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NATURA CZŁOWIEKA, SYSTEM I BEZPIECZEŃSTWO: W STRONĘ SYSTEMOWEGO ROZUMIENIA KONDYCJI LUDZKIEJ

HUMAN NATURE, SYSTEM, AND SECURITY: TOWARDS A SYSTEMATIC UNDERSTANDING OF CONTEMPORARY SECURITY CONDITIONS

Streszczenie

Jak autor zauważa, dynamiczne zmiany cywilizacyjne, którym jesteśmy poddani, są określone przez technologie przenikające coraz głębiej w sferę biologii, skąd człowiek staje się częścią złożonych układów cyber-fizycznych. Zmienia się zatem sam sposób racjonalizowania treści ludzkiego doświadczenia i konieczność nowego, systemowego rozumienia bezpieczeństwa. Niniejsza analiza biologicznego warunku bezpieczeństwa, przedstawia model człowieka jako organizmu wielowymiarowego – łączącego w sobie systemy biologiczne, psychiczne, społeczne i technologiczne – i wskazuje homeostazę jako uniwersalny wzorzec stabilności i adaptacji. Analiza opiera się na koncepcji systemów otwartych, wykorzystując metafory i mechanizmy biologiczne (m.in. sprzężenia zwrotne, autoregulację, elastyczność funkcjonalną) do reinterpretacji pojęcia bezpieczeństwa w wymiarze osobistym i społecznym. Omówione zostają relacje i napięcia między systemami technologicznymi a świadomością człowieka, a także ich korelacje w kontekście wartości, tożsamości i wspólnotowości. W konkluzji autor proponuje odejście od myślenia o bezpieczeństwie jako ochronie przed zagrożeniem i przejście do modelu bezpieczeństwa jako dynamicznych układów współzależności i zmiennych podstawowych mechanizmów integracji wymiarów biologicznego, technologicznego i duchowego. Homeostaza jawi się w tym ujęciu nie jako termin medyczny, lecz jako filozofia projektowania odpornych systemów, zdolnych do życia w niepewności bez utraty spójności.

Słowa kluczowe: bezpieczeństwo, dynamiczny model bezpieczeństwa, homeostaza, rewolucja IT, systemy

Summary

As the author notes, the dynamic civilizational changes to which we are subjected are determined by technologies penetrating deeper and deeper into the sphere of biology, from which humans become a part of complex cyber-physical systems. Therefore, the very way of rationalizing the content of human experience and the need for a new, systemic understanding of security are changing. This analysis of the biological condition for security presents a model of the human being

as a multidimensional organism – combining biological, psychological, social, and technological systems – and identifies homeostasis as a universal pattern of stability and adaptation. The analysis is based on the concept of open systems, using biological metaphors and mechanisms (including feedback loops, self-regulation, and functional flexibility) to reinterpret the notion of security on both personal and social levels. The relationships and tensions between technological systems and human consciousness are discussed, as well as their correlations in the context of values, identity, and community. In conclusion, the author proposes a departure from thinking about security as protection against threat and a transition to the model of security as dynamic systems of interdependence and variables based on mechanisms of integration of biological, technological, and spiritual dimensions. In this view, homeostasis appears not as a medical term, but as a philosophy for designing resilient systems capable of living with uncertainty without losing coherence.

Keywords: *dynamic security model, homeostasis, IT revolution, security, systems*

Introduction

In an era of rapid technological change and advancing automation, our perception of the world—and ourselves—is undergoing a deeper transformation than that resulting merely from the superficial use of mobile phones, the latest gadgets, artificial intelligence, or quantum computers. According to scientific theories, the environment and its elements influence psychophysical changes in conscious beings, that is, animals and humans. Thus, following this line of thought, the relationship between humans and the systems in which they function—biological, technological, abstract, and social—becomes a crucial issue. These are not new topics, of course. The correlations between systems and their mutual interactions have been known for years[1] now, but the intensity of changes because of the IT revolution, determines the nature of potential changes in the social world much faster, than before, and speeds up the natural processes, where the outcome may not necessarily be known, as well, as the individual praxis of life.

Because security is what conditions activity and reactivity in each of these systems, the author perceives it as a more universal value, in a sense of philosophical or normative categories, as a necessity in itself.[2] The starting point of this analysis is, therefore, the assumption that each of these systems shapes our security, understood both in material and cognitive, existential or structural terms, as both activity and reactivity, but originally as an active and conscious response to the environment, a response in self-conscious cognitive processes. Within such universal frameworks, security is considered a spatial/environmental value and a frame of minimal and maximal life processes that individually precede our social activity. Thus, previously, both the individual life and the social life were intertwined in spatial values, creating abstract laws, doctrines, symbols, and marks into a universal synthesis of security thinking and perception. In new settings of de-valued information transfer, of binary sequences, with the telecommunication and information revolution, we are witnessing an overpowering and overflowing subjective perspectives, never objectified in a social world of abstract, yet "natural" ideas.

1 Zob. U. Bronfenbrenner, *The Ecology of Human Development: Experiments by Nature and Design*, Cambridge 1979; U. Bronfenbrenner, *Toward an experimental ecology of human development*, American Psychologist 1977; K. Lewin, *Principles of Topological Psychology*, New York 1936; C. Brod, *Technostress: The Human Cost of the Computer Revolution*, Reading1984.
2 B. Kosowski, *Bezpieczeństwo jako wartość*, Toruń 2012.

Hence, the answer to the question of what patterns our "thinking" will be particularly important for the future studies of security in a new version of reality, at least in terms of anticipating possible threats. What our "rationality" will be, with a potentially new pattern of thinking, is not yet clear, as we are in the process of adapting this new version of "rationality" to everyday tasks, not only intellectual, but especially practical ones. For now, as artificial intelligence—a schematic, computational model of reality—already highlights the differences between human and mechanical cognition, it simultaneously exposes the distinctly human and binary perception of the reality being created. It compels reflection on the construction of human thinking, pointing to its intuitive fluidity, multidimensionality, and adaptability, which static and statistical models lack, and recalls the cybernetic control model described by the famous Norbert Wiener[3]. In this sense, the main shaper of language and cognition about security will be the AI and algorithmic sequencing. Whereas the AI will become not only a tool but also a mirror revealing the depth of complexity of the human cognitive system, as well as its "creativity," creating a binary puzzle of reality that we accept as true.[4]

Against this background, the question arises: Should the ideal model of a security system be "binarity" – defined by computational speed, or, and in what sense, should it still be the human being, a biological system active internally, yet neutral and reactive to external stimuli? The answer and the key concept here is homeostasis – a dynamic equilibrium ensuring the stability and adaptability of the organism. The main hypothesis assumes that homeostasis constitutes the archetype of systemic stability, and its mechanisms can also be found in technological and abstract systems. The key concepts here are system, homeostasis, and security, as a three-element synthetic response. Before the author proceeds to discuss this main issue and the topics above, let us define these terms.

A system, in general terms, is a set of elements interconnected by functional relationships, operating in an organized manner to achieve a specific state or fulfill a function. In the context of "human as a system," the system can take various forms: biological (the body), technological (devices, information networks), abstract (law, consciousness), social (family, institutions), or mixed (cyber-physical intelligent systems). Regardless of the form, a system is characterized by internal structure, boundaries, exchange of information or energy with the environment, and the ability to self-regulate or adapt.

Homeostasis is a key mechanism for maintaining relatively constant internal conditions within a system despite changing external conditions. In biology, it refers to an organism's ability to self-regulate, for example, maintaining appropriate body temperature, blood glucose levels, or blood pressure. Homeostasis is not a rigid state of equilibrium, but rather a dynamic process of feedback—continuous adjustment of parameters to keep the system functional and "safe." In a broader sense, homeostasis can also apply to social, technological, or informational systems—anywhere there is a need for stabilization and continuity. In relation to the above definitions, security is not just protection from threats or their absence. It is a state in which a system preserves its integrity, capacity for action, and survival in the face of disruptions. For humans, this means not only biological security, but also psychological, cultural, or technological security. In a systemic context, security cannot exist without mechanisms for detection, response, and adaptation—that is, without "systemic intelligence," whose biological equivalent is precisely homeostasis. Thus, system security is its ability to

3 N. Wiener, *Cybernetyka, czyli sterowanie i komunikacja w zwierzęciu i maszynie*. Warszawa 1961

4 W. Duch, W. *AI i ludzkie mózgi: podobieństwa i różnice.* Toruń 2025: https://is.umk.pl/~duch/ref/PL/25/2505-AI%20i%20Mozgi-AGH.pdf (dostęp: 25.06.2025).

prevent disintegration and destruction by actively responding to changes in the environment.[5]

THE BIOLOGICAL SYSTEM OF RESILIENCE – HOMEOSTASIS

The human organism is a multi-layered system. On the biological level, it encompasses feedback loops between the nervous, hormonal, and organ systems, which enable the maintenance of balance and response to external disturbances. But a human is also a social and spiritual being (at the very least, in the sense of choosing relationships and creating bonds and meanings based on objects—one's activity extends to cultural, social, communicative, or ideological systems). In this context, security is not merely a function of protection against threats—it is a state of regulated internal equilibrium, corresponding not only to physiology but also to psychological, identity, and social stability.[6]

The biological internal human environment is characterized by holistic and multi-level functioning. It consists of systems (nervous, circulatory, hormonal, and immune) that remain in constant interaction. Each of these systems has its own regulatory mechanisms, but the whole operates on the basis of integrated feedback loops that guarantee the efficiency and continuity of vital functions. The biological system has a natural, that is, nature-generated, ability to adapt and regenerate—it can not only react to stimuli but also learn, remember, and change structures and patterns of operation in response to environmental conditions. It is a dynamic, sensitive, and highly resilient system in terms of survival functions.[7]

In contrast, a technological system—although it may be more precise and faster in operation—is based on designed logic, input data, and processing algorithms. It does not possess a "natural" ability for regeneration or intuition. It requires external control protocols, updates, and, in the event of failure, often human intervention. Moreover, technology—regardless of its level of advancement—operates within predetermined parameters and goals, and its resilience to unforeseen variables is often limited. Contemporary trends show that many technological systems attempt to emulate biological intelligence (e.g., artificial intelligence, neural networks, learning systems), yet these are still approximations of mechanisms that the human organism implements in an "organic" and self-sustaining manner. This makes biology a point of reference in designing new-generation security systems. The end result is an abstract conceptualization of biological content as analogous to the generated "system of consciousness."

The system of consciousness is a concept that expands classical systemic approaches with an immaterial and reflexive dimension. It encompasses cognitive, emotional, and ideational processes that organize an individual's identity, intentions, motivations, and actions. Unlike physical systems, the system of consciousness is not directly measurable—its components are emergent, complex, and difficult to isolate.[8] Consciousness as a system, however,

5 K. Szwarc, *Uwarunkowania ciągłości działania systemu zarządzania kryzysowego*. Warszawa 2025. Wojskowa Akademia Techniczna. Dostęp: https://sbn.wat.edu.pl/pdf-135193-63506?filename=UWARUNKOWANIA%20CIAGLOSCI.pdf (30.06.2025).

6 Even only preliminarily, research problems already appear here, for which the methodological answer will be the correlation of the studied phenomena, and finally synthesis – the definition of a new space of "security." These problems can be reduced to the following questions, as well as many others: What systems determine human vitality, and how are they hierarchized? In what way do particular elements of systems organize human activity on the individual and social level? How do systems of individual activity evolve towards collective systems? What are the relations between biological, technological, and abstract systems? What follows from this analysis for fields related to security, including security sciences?

7 J.M. Bourgery & N. H. Jacob, *Atlas of Human Anatomy and Surgery*, Koln 2005.

8 See: Antonio Damasio, Hanna Damasio, *Homeostatic feelings and the biology of consciousness*, Brain, Volume 145, Issue 7, July 2022, Pages 2231-2235. https://academic.oup.com/brain/article/145/7/2231/6594735 (14.06.2025).

has its own operational structure: reception (stimulus intake), interpretation (assigning meanings), regulation (cognitive and emotional responses), and integration (creating coherence of experience). In this sense, one can speak of "homeostasis of consciousness"—a state of relative cognitive order that enables effective action in reality. The human system of consciousness also serves as a bridge between the biological and social systems. It allows for self-reflection, anticipation of the consequences of actions, reading the intentions of others, and formulating abstract systems (laws, language, ethics, ideologies). It is also crucial for the issue of security, because it is at the level of consciousness that decisions are made which can either protect or endanger both the individual and the environment.

The human being can be marked with a symbol of paradox. A human is both sensitive and strong, fragile and resilient at the same time. Within us pulses an enormous number of processes that never stop even for a moment, yet we rarely notice them. It is precisely in this hidden biological orchestra that one of the most extraordinary examples of systemic perfection lies, from which humanity—despite all technological progress—continues to draw inspiration. If we seek an ideal model of security, one perfect for humans, perhaps the most accurate approach is to turn our attention inward—to the biological system that, through millions of years of evolution, has learned to protect its existence not by domination, but through balance.[9]

The human biological system is an open system—it exchanges information, energy, and substances with its environment. It must constantly negotiate its integrity amid variability and potential chaos. The fact that we can function despite hunger, fatigue, ambient temperature, stress, or infection is thanks to a complex network of feedback loops operating beneath our consciousness. The nervous and hormonal systems co-create a complex matrix of information—they measure glucose levels, blood pH, temperature, pressure, and tissue oxygenation.[10] When a disturbance occurs, corrective mechanisms are activated: heat generation by muscles, increased heart rate, elevated secretion of insulin or cortisol. Interestingly, however, the organism does not strive for "ideal" values. It strives for functional balance—one that allows it to operate under specific conditions. This distinguishes it from most technological systems, which have rigid tolerance ranges. Herein lies the strength of biology as a model: flexibility instead of rigidity, adaptation instead of static control, integration instead of isolation of functions. It resembles jazz improvisation more than performing a piece strictly according to a score. The system does not so much "work correctly" as it "plays its role" in a context it never knows in advance.

The resilience and elasticity of this system—homeostasis—are rooted in time. In this sense, a human is a product of evolution, an expression of biography and history—a history unpredictable, brutal, and full of change. Every homeostatic mechanism we possess was "designed" by thousands of generations of organisms that survived because they adapted to new climates, threats, or ecosystem changes. This evolutionary wisdom is encoded in our genetic code, but not only that—it is also embedded in our ways of reacting, in mechanisms of feeling fear or pleasure, in instincts to withdraw or attack, in rhythms of sleep and wakefulness. Therefore, the biological system is not just a collection of physiological functions—it is also a system of adaptive memory that tests different strategies, selects effective ones, and "learns" across generations. In systemic terms, this means its resilience does not lie in

9 See: L. von, Bertalanffy, *Ogólna teoria systemów*. Warszawa 1984.
10 See: W. B. Cannon, *The Wisdom of the Body, W. W. Norton & Company*, New York 1932.

preventing disturbances but in the ability to learn from mistakes, modify responses, and store experiences.

Such a system knows how to err and not die; it recognizes its own errors in relation to the whole and understands their scope of influence—it recognizes potential correlations. Perhaps the most important feature of the biological system is that it can be imperfect without catastrophe. When one function fails, another can partially replace it (e.g., skin breathing in some organisms, neuroplasticity in brain injuries). When a new virus appears, the immune system does not know it but learns to recognize antigens, create new antibodies, and modify the inflammatory response. This kind of resilience based on cognitive flexibility is key in designing modern security systems. A system that cannot err must be perfect—which means high cost, lack of scalability, and extreme vulnerability to errors. A system that can err and learn is much more human and therefore safer in a world full of unpredictability.

Human security is more than a desired status quo; it is a dynamic balance between variability and stability. This balance is renegotiated daily—by the body, thoughts, relationships, and values. And it is precisely in this imperfect but living multidimensional system that we find the most human model of survival.

More and more often, technology designers, critical systems engineers, and AI researchers look at living organisms not as analogies, but as models to emulate. Neural networks are inspired by the cerebral cortex. Genetic algorithms mimic natural selection. Immune systems in cybersecurity work like white blood cells—they detect anomalies, learn, and evolve. But this is only the beginning. Understanding homeostasis as a universal principle of system operation can completely change the way we think about security: not as protection from threats, but as the ability to live in the face of uncertainty. Just as the body does not try to freeze the world but learns to react, so too should future systems strive to create mechanisms of dynamic equilibrium, not static control. From neural networks to networks of meaning, systemic identity is constructed without the conscious participation of the human being.[11]

When we say "human," we usually mean something simple, instinctively obvious. Yet in reality, this one being contains within itself an entire spectrum of worlds: biological, psychological, social, spiritual, informational.[12] A human is not only a complex system but a deeply multidimensional one, combining various layers of reality, from electrolytes in neurons to the sense of the meaning of existence. There is no single plane or center here. A human is rather a process of systemic integration, a dynamic field of tensions, a homeostatic balancing of internal and external forces. And it is this system, like no other, that shows us that security does not begin on the outside—it always starts from within, and its foundation is the vital sphere—physiology as the condition of existence.

At the base of all other spheres lies what is simplest and at the same time most fundamental—the vital sphere, that is, the functioning of the body as a biological organism. The heartbeat, the rhythm of breathing, muscle tension, metabolic transformations, the circulatory, nervous, hormonal, and immune systems. All these systems operate on the principles of self-regulation and mutual integration. It is this layer of the human system that determines survival, but more importantly, it constitutes the material "substrate" for the other

11 M. Brodziński, *Sztuczne sieci neuronowe i algorytmy genetyczne – inspiracje biologiczne w projektowaniu systemów obliczeniowych*. Warszawa 2006. 4programmers.net. https://4programmers.net/Z_pogranicza/Sztuczne_sieci_neuronowe_i_algorytmy_genetyczne (dostęp: 30.06.2025).

12 A. Leszkowska, *Człowiek skomplikowany i skategoryzowany*. Warszawa 2024. Sprawy Nauki. https://www.sprawynauki.edu.pl/archiwum/dzialy-wyd-elektron/288-filozofia-el/5225-czlowiek-skomplikowany-i-skategoryzowany (dostęp: 30.06.2025)

functions: psychological, social, and spiritual. If the body loses its balance, each of the other spheres is disrupted. And vice versa—for example, prolonged psychological stress can lead to somatization, psychosomatic illnesses, and hormonal disorders. That is why it is so important to understand the human as a system integrating layers, not as a mechanism operating in a vacuum.

The nervous system—with its billions of neurons, synapses, and the speed of information transfer—is like a control center in a highly adaptive system. But only when the other systems are in balance can information be processed efficiently. Otherwise—errors, process freezes, overloads occur. This, incidentally, resembles an IT analogy: even the most powerful processor is useless if the power supply is unstable and the case overheats. If the body provides existence, the psyche allows it to be experienced. The psychological sphere includes cognitive processes (attention, memory, perception), emotional processes (feelings, moods), and axiological processes (motivations, values). It is in this sphere that what we can call individual consciousness arises—the ability to feel oneself as "I" in relation to the "world."

As we have known since Aristotle, the psyche also functions as a system—it has its own self-regulatory mechanisms (e.g., repression, projection, neuroplasticity), and its goal is to maintain the coherence of experience. In other words—to feel "oneself," the psyche must constantly synthesize variable information, reconcile contradictions, and renew narratives about its existence.[13] When these processes become destabilized, we speak of a psychological crisis, depression, or anxiety disorders. Thus, psychological security is the systemic equilibrium of internal dialogue. Importantly, the psychological sphere is connected to the physiological one, for example, emotions "pass through the body." Fear can cause muscle tension, grief, and a tightness in the chest. Moreover, the psyche influences the perception of threats—it is not the event itself that determines the reaction, but the interpretation, that is, the mental process. In systemic terms, this means that a threat is not "objective"—its strength depends on the state of the interpreting system.

The most enigmatic, and at the same time the most deeply human, is the spiritual sphere, understood as a system of meanings, values, and transcendence. This is not just about religion, although religion is often an expression of this sphere, but more broadly, about the human ability to create and sustain systems of meaning. It is here that questions arise: who am I, why do I live, and what has meaning? A human cannot exist for long without answers, and the spiritual system provides them, not necessarily through logic, but through narratives, symbols, rituals, and traditions. It is this layer that connects a person to something greater than themselves—family, community, an idea, history, God. Spiritual systems also have their homeostasis—a violation of values or a "crack" in the worldview leads to a deep existential crisis. We can say that spirituality regulates the direction of the system's actions—it gives it purpose, meaning, and orientation. It is in this sphere that responsibility also appears—the awareness of the consequences of one's actions, and thus the ability to anticipate, limit, and ethically correct them. From the perspective of security, this is an indispensable systemic function, without which freedom becomes chaos. This is visible in the extended life of the individual, in social life.

A human being lives within society with others. From the very moment of birth, one enters a network of relationships, roles, and dependencies. The social sphere is not just a space for communication—it is another system in which a person participates, influences, and is shaped. Family, school, work, the state, religious communities, media—these are not merely

13 R. Stachowski, *O godności przedmiotu psychologii – ujęcie historyczne*, Nauka 200

"contexts," but structures that regulate the way an individual exists. The community provides norms, values, and frameworks for action, but it can also be a source of threats: violence, exclusion, and prejudice. That is why social security is not only a matter of institutions—it is the ability to keep up with the changing environment while maintaining individual integrity. In this sense, a human is a system that balances between adaptation and self-preservation. If one adapts too much, one loses identity. If one does not adapt, one risks isolation. This, again, is a homeostatic process, where a person is not a collection of functions, but a collection of processes balancing those functions. A human is a system of transitions—between body and mind, between individual and community, between fact and meaning. One's ability to survive and develop does not stem from physical strength or knowledge, but from the skill of integrating opposites.[14]

RELATIONS AND CORRELATIONS BETWEEN SYSTEMS

There is no longer a world of "humans" and a world of "technology" — there is only one world in which these two systems coexist ever more closely.[15] The human being, a biological entity full of emotions and bodily limitations, enters into relationships with technological systems that operate on completely different principles: binary logic, algorithms, data transmission. Can these two orders understand each other? Or perhaps… they already do, but we have yet to perceive this communication. It is precisely their correlations that determine how we understand security today—and how we might redefine it. Human and technology: mutual complement or rivalry?

Every technology begins with a need, and need is the language of the body. The wheel – to move the body. Fire – to warm it. The Internet – to satisfy the need for communication and knowledge. This means that technology from the very beginning has been an extension of biology. As McLuhan wrote, media are "extensions of man" – the microscope is an extension of the eye, the hammer of the hand, the computer of the brain.[16]

But the 21st century brings something new. Technology not only supports us, but it also shapes our inner world, influences our thinking, emotions, and decisions. Smartphones reorganize attention, social media shape social relationships, and artificial intelligence affects trust and cognition. The question arises: Is the technological system still "external"? Or, like an informational virus, does it enter the homeostasis of consciousness? Human systemic security today depends on how deeply technology is integrated with the biological-psychic system, and under what conditions. If, as a tool, it can empower. If as a dominant model of cognition, it can weaken.

Technology modeled on biology: cybernetics and the concept of feedback loops. It is worth noting, however, that technology itself has begun to "learn" from biology. Since the 1940s, Norbert Wiener developed cybernetics – the science of control systems based on feedback. This idea, inspired by biological systems (e.g., thermoregulation), became the foundation for constructing all automated systems: from autopilots to smart grids.

Today, artificial intelligence and robotics attempt to replicate adaptive features of living systems: neural networks inspired by brain structure, evolutionary algorithms mimicking

14 Bateson, G. *Umysł i przyroda: jedność konieczna*. Warszawa 1996. Państwowy Instytut Wydawniczy

15 B. Nowak, Fundacja Digital Finance Excellence. *Współistnienie ludzi i sztucznej inteligencji, czyli zrównoważony rozwój 4.0*. Warszawa 2025. Dostęp: https://dfe.org.pl/wspolistnienie-ludzi-i-sztucznej-inteligencji-czyli-zrownowazony-rozwoj-4-0/ (dostęp: 30.06.2025).

16 McLuhan, M. *Zrozumieć media: przedłużenia człowieka*. Warszawa 2004.

natural selection, immune systems in cybersecurity functioning like the biological immune system; meanwhile, the biological system increasingly draws on technology to strengthen itself (e.g., implants, brain-computer interfaces). The boundary is blurring—a new hybrid system is emerging: human-technology, in which security depends not on domination but on harmony. However, one cannot stop at the dichotomy of human versus technology. Between them, there is always a third system: society—a collection of structures, norms, institutions, expectations, and narratives that give meaning to individual actions. Society is a meta-system, a system of meanings and relations—thus language, law, culture, and ethics. And it is within this system that questions of security are decided: whether a given behavior, technology, or reaction is "acceptable," "compliant," or "risky."

Society, like any system, also has feedback loops: public opinion, legislation, protests, and sanctions. And just like the nervous system, it can react instantly (media), or slowly but durably (education, institutions). Here lies the problem—how can the social system adapt to the pace of technological and informational change if its mechanisms are structurally slower? It is no longer just about the "digital revolution"—it is about systemic destabilization: law cannot keep pace with AI, education lags behind the labor market, community cannot keep up with the pace of axiological changes. Thus, the biological system cannot keep pace with technological speed, and the social system cannot arbitrate between them.[17] This is precisely where the security gap arises—and the greatest challenge of the 21st century.

Even more intangible dimension of our systemic landscape is the abstract systems. These define the interpretative context—that is, how we even understand concepts such as "security," "threat," "I," or "we." This is the sphere of language, ideology, perception, and epistemology—systems that have no physical form but condition all our other interactions. The same biological virus (e.g., SARS-CoV-2) can be interpreted as: a health threat (in the biological system), a pretext for social control (in the political system), a tool of disinformation (in the informational system), a sign of the apocalypse (in the religious system), or a catalyst for transformation (in the philosophical system). This means that the same biological or technological data carries different "semantic charges"—depending on the reference system. And that's why it is so difficult today to reach an agreement on what is safe, what is necessary, and what is acceptable.

From these observations emerges a fascinating conclusion: isolated systems no longer exist; there is cross-correlation. Each system influences the others, and their relationships are often non-parallel, incommensurable, and multilayered. Psychology influences physiology (the placebo effect), technology influences emotions (digital addictions), ideology influences legislation (public policy toward AI). In systemic terms, this means we must move away from linear thinking. Security is not created "from the top down" or "from the bottom up," but at the dynamic intersection of systems: biological, technological, social, and abstract. Each brings different criteria of security—and only their resonance can provide a sense of stability.

In conclusion: perhaps the best metaphor for the modern human is no longer "the rational man" *(Homo sapiens)* or even "the playing man" *(Homo ludens)*, but the mediating man *(Homo interfacius)*. We are the interface between corporeality and machine, between past and future, between meaning and information. And it is in this role that we need a new understanding of security.

17 A. Zybała, *Polityka publiczna w Polsce: kultura, rządzenie, rozwój. Szanse i zagrożenia w czasach złożoności i niepewności*. Szkoła Główna Handlowa, Warszawa 2021.

FROM BIOLOGICAL HOMEOSTASIS TO SYSTEMIC RESILIENCE STRATEGIES AND PRACTICAL APPLICATION

Every theory faces its trial by fire in practice. If we claim that the human biological system is a model of an effective security system—dynamic, adaptive, resilient—then the natural step is to transfer this wisdom into the field of security studies. This is not about a simple analogy or metaphor. It is about transforming the way we think about security: from a linear, reactive, and institutional model to one of multi-level adaptation, in which security is understood as the system's ability to learn, cooperate, and survive despite changing conditions.[18] For example, in medicine, no one expects the body to be "rigid." On the contrary—health is the ability to balance divergent stimuli. In the same spirit, security in social or technological systems should be seen as a dynamic process of feedback, not as the result of a one-time intervention, but as an interconnected set of both responses and values in its algorithmic process:

- Early warning systems in crisis management should act like the nervous system: quickly identify disturbances, localize them, and trigger a local response without shutting down the entire system.

- Cybersecurity can draw from "immunological intelligence" – systems based on detecting anomalous behaviors, self-analysis, and reconfiguring defenses.

- Personal and psychological safety in organizations (e.g., in uniformed services) can be modeled on emotional homeostasis: recognizing early signs of stress, preventing escalation, and supporting regenerative processes.

All these practices share common features: decentralized responses, local intelligence, and adaptability. This is exactly what makes the human body so resilient to sudden changes. Resilience today is not just about a "fortress state," but is an adaptive strategy and the elasticity of a state's counteraction and reactivity.

In a world of global interconnections, migration, cyberattacks, and climate change, the classic approach to security—building a wall to separate us from threats—no longer works. Today, we need resilient systems—those that, even if breached, are able to rebuild, adapt, and continue functioning. Resilience is not about avoiding risk, but about learning to live with risk, i.e., creating alternative scenarios, incorporating margins of error into design, learning from failures ("failure-friendly thinking"), and decentralizing decision-making. This way of thinking applies not only to critical infrastructure but also to organizational management, education, and mental health. "Resilient" systems are like a body with a fever—they go through crisis, but do not collapse, often emerging stronger after the illness.

What if we redesigned social and technological organizations modeled after the body? The body does not have a single decision-making center for everything—different organs have autonomy but work together through information exchange. Blood transports data (glucose = energy, antibodies = threats), the nervous system reacts instantly (reflexes), the hormonal system regulates moods and processes over the long term. An organization inspi-

18 A. Czupryński, B. Wiśniewski, J. Zboina, (red.). *Nauki o bezpieczeństwie. Wybrane problemy badań*. Józefów 2017. Centrum Naukowo-Badawcze Ochrony Przeciwpożarowej – Państwowy Instytut Badawczy.

red by such a system would have local decision centers, gather data not only about results but also about "well-being" (e.g., employee morale), maintain functional diversity to survive sudden crises (redundancy), and care for regeneration—rest time, integration, "systemic sleep." All of this brings us closer to designing living systems—ones that do not require constant external intervention because they can adapt themselves.

When we look at this issue from the perspective of ethics and the deontology of security, we already see it as a constitutional problem—Article 5 of the Constitution of the Republic of Poland from 1997. The state is obliged to protect not only resources, but also national, cultural, and environmental values. While in the traditional approach, such security focused on the protection of life, property, and order, the inadequacy of this perspective is now evident. In the digital and systemic era, the protection of values—such as dignity, privacy, identity, and cognitive freedom—becomes equally important. In the context of homeostasis, this can be put as follows: a system is not secure if it loses its internal goals and identity, even if it survives physically. This type of perspective should be the foundation of ethical design for both the state and technology: AI, automated decision-making, data management. The human body does not allow itself to be "taken over" by any one device—it has built-in defense mechanisms. Similarly, every complex system should operate in such a way that protection does not become a source of enslavement.

From this perspective, it is also necessary to redefine Security Studies in the 21st century, due to new tasks, new languages, and the new necessity to approach security through the lens of freedom, as well as to understand new frameworks of freedom and their impact on security.[19] If a security system is to be truly effective, it cannot be merely an administrative tool for risk management. It must become an interdisciplinary, reflective platform for recognizing threats—not only those that are visible, but also those that are systemic, slow-moving, and embedded in the structure of reality.[20] That is why security studies today require: the integration of biology, sociology, philosophy, engineering, and psychology, a language processes and dynamics instead of normative formulas, a shift towards ecological and networked thinking, in which humans are not owners of the environment but its participants, openness to systemic uncertainty—that is, the ability to act under conditions of incomplete information.

Conclusions

All of this forms a new paradigm: security as the intelligent ability of an organism-system to survive while preserving meaning. This conclusion ties together all the previously developed sections and invites us to think about security not as a technical problem, but as a question of how to be a system in a world of other systems without losing oneself. Security must thus become not only an interdisciplinary systemic science, but perhaps above all, an art of systemic human presence in a world of mutual dependencies.

In a world that changes faster than our biological adaptations and social reflection can keep up, we increasingly need a new perspective: a systemic understanding of the human being and their security. Institutional, linear, or reactive thinking is no longer sufficient. We

19 K. Tybuchowska-Hartlińska, K., Mościcka, D. (red.). *Bezpieczeństwo w XXI wieku – wymiar praktyczny i teoretyczny*. Olsztyn 2016. Uniwersytet Warmińsko-Mazurski.

20 J. Piwowarski, *Fenomen bezpieczeństwa. Pomiędzy zagrożeniem a kulturą bezpieczeństwa*, Wyższa Szkoła Bezpieczeństwa Publicznego i Indywidualnego „Apeiron" w Krakowie, 2015 Dostęp: https: //apeiron-wydawnictwo.pl/wp-content/uploads/2017/01/fenomen_bezp.pdf (29.06.2015).

need a deeper perspective—one that recognizes that a human does not exist outside of systems, just as the body cannot function without the circulation of blood, neurons, and oxygen.

This analysis began with the definition and identification of system and systems. In defining a "system," it is not just about technical structures, but about a way of organizing dependencies that allows the whole to maintain its identity despite the variability of its parts. This is how life works. This is how a human operates, thanks to the "mechanism" of homeostasis, both as a metaphor and a real principle. Homeostasis—a concept derived from biology—has proven to be not only a physiological mechanism but a universal model of security. It is the dynamic ability to restore balance in the face of disturbances, without the need for rigid control. A secure system is one that: notices deviations (perception), interprets their meaning (cognition), responds proportionally (action), and at the same time learns for the future (adaptation). The human being, as a biological system, combines all these features in one living whole. But not only that. Humans also transcend these, bringing them to the level of psyche, society, and culture. The ability to learn, to feel meaning, to change identity, and to co-create meanings makes humans the most complex and open system known to nature.

A human is not a single system, but a structure of many intersecting and resonating systems: biological (the body and its vital processes), psychological (consciousness, emotions, identity), spiritual (values, meaning, transcendence), social (relationships, roles, institutions), technological (interactions with machines and information). In each of these dimensions, threats may arise, and in each, security means something slightly different. But the common feature of these different meanings is the need for the ability to balance tensions: between individual and community, between change and stability, between knowledge and uncertainty. The analysis of the relationship between humans and technology shows that we can no longer treat devices, data, or networks as "external" tools. They are part of a new, hybrid system—human-technology-society—whose security depends on the coherence of its components. Attempts to dominate or isolate one of them lead to the destabilization of the whole, and the answer to this is integration rather than control. This means: building feedback loops between systems, learning from mistakes and disturbances (adaptive resilience), designing systems that are resilient but not rigid (flexible architecture), taking values into account, not just functions (ethics-aware design), and above all, seeing the human being as the center, not as a systemic obstacle.

Finally, we come to the most existential dimension of this reflection: security is not about escaping from danger. It is about being present in a world that is uncertain, complex, and full of tension. Just as the body does not cut itself off from pain, but learns to live with it, so the human system learns to coexist with risk, uncertainty, and otherness. And perhaps this is the greatest wisdom of biology: safety is not a state, but the art of going through change without losing meaning. This is how cells live. This is how neurons function. This is how a person can live – if he understands that a system is not a machine, but a space of relationships. Man as a security system is not a closed system, but a vigilantly open one. The human biological system, with its ability to homeostasis, adapt, and integrate, is a model for the functioning of an effective security system. Its survival mechanisms do not rely on the durability of structures, but on movement, perception, and balancing contradictions. No other system – technological or social – has achieved such dynamic harmony.

In this sense, safety is not a product, but a process. The quality of this process depends on the sensitivity of the system to disturbances, the ability to interpret them, and respond

adequately. In other words, resilience is more important than immunity. The body is not a fortress, but a world of fluid communication between organs, stimuli, and signals. This is also how social institutions and technological systems should function – like living organisms, not like concrete walls. The systemic nature of man escapes mechanization. Although technology can mimic biological patterns, it cannot replace the multidimensionality of human experience: emotions, values, trust, ethics. When designing safety systems, it is not only necessary to take into account the human being as a user – it must be seen as the basic design pattern, with all its internal tension between body and spirit, individual and community. Modern security sciences must become systemic and reflective. It is not enough to know „what to do" – you need to understand „in what system to do it", „who is part of the system", „whether the system can learn and transform itself". Only in such a model is it possible to manage the complex world of contemporary threats: from mental crises, through information manipulation, to technological uncertainties and social disintegration. Man does not need full control, but balanced interdependence. And in this sense, it is not only a system, but a system-creating one. He creates structures to protect him, but ultimately it is he – his awareness, his empathy, his emotional intelligence – who decides whether the system protects or enslaves.

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