

The students can also upload their mind mirrors to social networks (TikTok, Instagram, Facebook, etc.) or blogs.

Thus, a mind mirror project is an interesting post-reading activity that leaves a lot of space for students' thinking, experimenting and imagination. Such activities can help teachers not only in teaching foreign languages but also in developing students' multiple intelligences, critical thinking, creativity, the ability to work in a team as well as cognitive, communicative, digital and other 21st century skills.

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Contemporary Evolutionary Technologies in Crisis Management of Education and Science During the BANI-to-SHIVA World Transition

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Abstract. The article explores the application of evolutionary computing (genetic algorithms, swarm intelligence) in anti-crisis management of science and education during the transition from BANI to SHIVA world. The author substantiates the inefficiency of linear management in conditions of supersonic speeds of change, hybridization and uncertainty. It is shown how evolutionary technologies optimize curricula, allocate resources of hybrid universities, form R&D portfolios and adapt interdisciplinary scientific teams to external shocks. It is concluded that the integration of evolutionary modeling transfers scientific and educational ecosystems to a state of antifragility, turning crises into a catalyst for development.

Keywords: educational management, science management, evolutionary computing, anti-crisis management, BANI-world, SHIVA-world, genetic algorithms, anti-fragility.

Introduction.

The modern world economy and national economies (which include the sphere of education and science) are at a bifurcation point, experiencing a stage of fundamental socio-cultural, economic and technological transformation [1]. And this global metamorphosis radically changes the ontological and methodological principles of the functioning of the service sector [2], which primarily include science and education. Until recently, the concept of the BANI-world served as a generally accepted intellectual framework for describing the turbulence and destructiveness of the external environment, it was it that quite accurately characterized the post-virus and early sanctions reality as fragile, disturbing, nonlinear and fundamentally incomprehensible to classical forecasting models [3]. However, the exponential acceleration of geopolitical processes, a qualitative leap in the development of end-to-end technologies, and a profound restructuring of global connections indicate the transition of the global service environment (including the education and science industries) to an even more rigid, aggressive, and dynamic phase – the so-called SHIVA-world.

In this new conceptual paradigm, the key determinants of social existence are supersonic speeds of change (Supersonic), total hybridization of physical, biological, and digital spaces (Hybrid), unprecedented and often latent interconnectedness of macro- and microsystems (Interconnected), permanent instability (Volatile), and deep semantic and axiological ambiguity (Ambiguous) of any incoming signals. In the case of such a radical transit, traditional, linear-reactive methods of anti-crisis management completely exhaust their potential, proving incapable of stabilizing managed objects [4].

It is worth emphasizing that the spheres of science and education demonstrate special strategic vulnerability in this situation [5-7] - because being by their nature institutions with a high level of inertia and conservatism, they are directly responsible for the formation of human, intellectual and technological capital, which determines the sovereignty of states in the long term. The management of educational ecosystems and research complexes in the SHIVA world requires not just a point modernization, but a radical transition to predictive, self-organized and highly adaptive cybernetic tools. The most adequate and promising scientific and practical response to this civilizational challenge is evolutionary computing and evolutionary technologies [8]. Having the inherent ability to find suboptimal and optimal solutions in conditions of strict resource constraints, extreme time shortage and multifactor stochastic uncertainty, these approaches allow us to completely rethink the methodological basis of anti-crisis management [9]. That is why the purpose of this study is the theoretical justification, conceptualization, and systemic and methodological structuring of the specifics of the application of evolutionary computing as the dominant tool of anti-crisis management in the spheres of education and science in the conditions of irreversible transit to SHIVA-reality.

Results.

The transition to the SHIVA-world fundamentally transforms not only the temporal parameters of the deployment of managerial crises, but also their internal tectonic architecture. The supersonic nature of changes deprives management of the opportunity to conduct classic multi-stage examinations and long collegial discussions, requiring the generation and implementation of solutions in real time, which is ahead of the destructive dynamics of the crisis. The hybridity factor finally blurs the lines of demarcation between real academic processes and virtual educational environments, digital platforms and metauniverses. In turn, total interconnectedness leads to the emergence of a large-scale "domino effect", in which a local failure in the financing of a separate direction or a data leak on a peripheral server instantly destabilizes the entire macrosystem of the institution.

Evolutionary calculations, based on mathematical simulation of the processes of natural selection, random genetic mutations, crossover and population dynamics, offer a fundamentally different, nonlinear logic of management. Instead of a fruitless search for one static "ideal" solution, which inevitably becomes obsolete even at the stage of its documentary confirmation, evolutionary technologies continuously operate with a large population of alternative adaptation scenarios. These scenarios are constantly tested and subjected to strict selection on the basis of a dynamically adjusted fitness function, which reflects current threats and environmental constraints. In the context of anti-crisis management of educational systems, evolutionary technologies acquire primary importance as a tool for multi-criteria optimization. A modern university or educational holding in the conditions of the SHIVA-world is under constant pressure from the threat of instant loss of relevance of the proposed knowledge and competencies. The use of genetic algorithms allows for continuous intellectual scraping and analysis of hybrid labor market demands, employer requirements, and technological trends. Based on this data, algorithms are able to perform structural reconfiguration of educational plans and modules in an automated mode, optimizing learning trajectories on the fly to achieve maximum competitiveness of graduates.

In addition, evolutionary modeling effectively eliminates crises of acute resource shortages and infrastructure imbalances. It allows for optimal distribution of material, financial, classroom, and human flows between physical campuses and digital ecosystems, minimizing operating costs, maximizing the throughput of knowledge transfer channels, and preventing psychological and professional burnout of faculty during periods of severe transformation.

No less acutely and deeply, crisis phenomena manifest themselves in the academic and scientific research sphere, where global hyper-competition for intellectual leadership is combined with total ambiguity and uncertainty of the vectors of scientific and technological progress. Anti-crisis management of science, integrating

evolutionary calculations into its contour, shifts the focus from reactive patching of holes to proactive design of sustainable and viable scientific and technical systems. The use of evolutionary strategies for the formation and restructuring of the portfolio of scientific and research projects allows to radically increase the efficiency of the distribution of grant and state funding of academic institutes and foundations. The evolutionary algorithm continuously assesses the risks, technological barriers and commercial potential of hundreds of parallel projects, conducting their selection and forming such combinations of fundamental exploratory and applied commercialized research that guarantee maximum survival and demand for a scientific organization under any macroeconomic and geopolitical fluctuations.

In parallel, swarm intelligence algorithms (including ant algorithms and particle swarm optimization, etc.), analyzing colossal arrays of unstructured data from patent offices, preprints, and publication activity, acquire the ability to instantly capture weak signals and hidden interdisciplinarity. This allows anti-crisis management to quickly, in a matter of hours, synthesize flexible, distributed cross-functional scientific consortia for a targeted response to exogenous challenges of a planetary scale that suddenly arise, whether it is the emergence of new pathogens, man-made disasters, or large-scale threats in the field of cybersecurity. Thus, evolutionary technologies deeply transform the philosophy of management itself, transforming scientific and educational structures from rigid and fragile bureaucratic systems into flexible, self-learning organisms capable of using the destructive energy of the crisis as a catalyst for internal structural restructuring.

Conclusions.

Summarizing the results of the theoretical and methodological analysis, it is necessary to explicitly state that the transit from the BANI world to the SHIVA world marks the final collapse of classical management stereotypes, rigid hierarchical plans and requires an urgent transition to strategies for maintaining the static. Evolutionary computing in this context proves its absolute ability and lack of alternative as a mathematical, algorithmic and programmatic basis for overcoming systemic and structural crises in the scientific and educational environment. Their large-scale implementation allows for the complete automation of the most complex, multifactorial analytical and predictive processes in conditions where human cognitive potential and traditional expert panels are paralyzed by the speed, chaos and colossal volume of incoming destructive signals.

The main conceptual conclusion of the study is that the integration of evolutionary technologies into the management circuit transfers scientific and educational institutions from a state of vulnerability and passive defense to a state of true antifragility. Systems whose management architecture is built on evolutionary principles cease to perceive chaos and crisis as a fatal threat. On the contrary, they

begin to utilize external fluctuations, stresses and uncertainty as a necessary nutrient substrate for permanent self-improvement, continuous selection of the best organizational practices and accelerated forward development.

Prospects for future research.

Further development and practical implementation of the proposed scientific and theoretical concept lies in the plane of deep interdisciplinary hybrid convergence of evolutionary algorithms with related end-to-end AI technologies [10]. The most promising and academically attractive vector is the development and implementation of hybrid neuro-evolutionary networks, in which evolutionary calculations will be responsible for automatic optimization of the topology, architecture and weighting coefficients of large artificial intelligence models, which carry out operational monitoring and redistribution of budgets, material assets and grant funding within large academic conglomerates.

The design and deployment of complex dynamic digital twins of universities, technology parks and research centers operating on the basis of evolutionary models is also of serious scientific interest. The creation of such virtual testing grounds will allow for highly accurate, in-depth stress testing of management systems, simulating extreme, catastrophic crisis scenarios of the SHIVA-world without the slightest risk to the real educational process and current scientific research. Finally, a detailed philosophical, ethical and legal analysis of the barriers, risks and limitations that inevitably arise in the process of delegating fateful, including personnel, ethical and strategic decisions in the field of science and education to autonomous artificial evolutionary agents should become an independent, critically important and interdisciplinary direction of future research.

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