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THE PHILOSOPHICAL DIMENSION OF OPEN SCIENCE: GOALS, VALUES, AND HUMAN COMPETENCIES

ABSTRACT. *The paper is dedicated to the philosophical investigation of the Weltanschauung principles and values behind the concept of Open Science. It is argued that Open Science is a complex phenomenon not limited to the procedures of open access procedures, as open access to publications is only a means of publicizing the results of scientific investigation. The Open Science is stated to be grounded on the classical ideal of the Enlightenment and on the Mertonian principles of the ethos of science. It is concluded that the full implementation of the ideas of Open Science requires a whole range of transdisciplinary human competencies, and especially general cognitive and communicative skills, aimed, among other things, at the popularization of science and its re-institutionalization in society.*

KEYWORDS: *citizen science, axiological foundations of Open Science, social crisis of science, ethos of science.*

INTRODUCTION. During the last few years, the concept of Open Science has already become a familiar element of both academic discourse and state and institutional policy in most countries of the world, including Ukraine. The awareness of scholars of the ideas of Open Science has clearly increased, both in theoretical issues and regarding different practical measures, for example, envisaged by the Ukrainian National Plan for Open Science, approved by the order of the Cabinet of Ministers of Ukraine in 2022 and supposed to be implemented as a whole by 2030 (Cabinet of Ministers of Ukraine, 2022).

According to the definition of the Ministry of Education and Science of Ukraine, the state policy of Open Science in the country is aimed at ensuring the establishment of the principles of openness of scientific and educational data, providing academics, educators, innovators, industrialists, and other interested parties with the greatest possible access to research infrastructures, publications, and data, creating conditions for ensuring equal opportunities and equal access for women and men in science (Ministry of Education and Science of Ukraine, 2026). However, there is a feeling of incompleteness and a certain imbalance in both the theory and practices of Open Science, especially in Ukraine: preference is given to procedural aspects, in particular, to the practices of open access to publications, the creation of institutional and national repositories, etc. It seems that these aspects are prioritized by the aforementioned National Plan, as it implies creating regulatory and legal prerequisites, providing interested parties with open access to scientific information, ensuring the FAIR principles, and so on (Cabinet of Ministers of Ukraine, 2022).

But what goals lie behind those principles, what is the actual aim of Open Science, and why and in what ways open access to scientific information can and should benefit our society and humans? It turns out that more profound, in particular, Weltanschauung and value aspects of the concept of Open Science and possible ways of its implementation are at risk of being neglected. Thus, the aim of this paper is to conduct a philosophical analysis of open science principles, goals, and values, as well as to turn attention to human qualities and competencies that are both needed for realizing Open Science and are supposed to be fostered by such realization.

METHODS. The paper employs methods of analysis, comparison, philosophical comprehension, and dialectics in order to consider the philosophical aspects of Open Science, including its goals, values, and the competencies of humans needed to implement those goals and values.

RESULTS AND DISCUSSION. According to legend, Guglielmo Marconi, credited as one of the inventors of radio, was once asked by a journalist at the very beginning of the 20th century: “Is it true that thanks to your invention we can now speak with America?” Marconi replied: “Yes, but the question is whether we have something to say to America”...

Even if this legend is not historically correct, it still has a grain of truth in it. For decades, and even from the very beginning of the development of technogenic civilization in the 16th c., means began to replace ends. Technologies, while rapidly emerging, are often considered as ends in themselves, as something both self-sufficient and self-valuable, even if it is incorrect both methodologically and philosophically. The most recent example is the AI-based technologies and LLMs that even appear as quasi-agents to some authors; however, from a philosophical perspective, they are actually just tools, with no difference from any other tools and devices, from digging sticks to atomic bombs, that can be used by humans to achieve totally different goals.

The popular topic of AI-based technologies is closely related to the idea of Open Science as well. In fact, the current situation with Open Science resembles that with any new technology, including the quoted legend about inventing radio. For now, we deal mostly with Open Science as a means instead of an end: open access, free circulation of information, FAIR principles, etc., are the most visible parts of Open Science, but they do not define what Open Science actually is and what it is for. They are ways and means to communicate the results of scientific investigation, but they do not define the quality of those results, as well as their, well, presence at all.

I would argue that Open Science is a complex, multi-layered phenomenon that can be shown to have three levels in it. The first level, the most obvious and applied one, consists of guidelines related to procedures, practices, and behavior, including, but not limited to, open access; that is, historically the first and the most well-known aspect of Open Science. The second level can be described as methodological and organizational: it consists primarily of infrastructure, technologies, and services, with Open Science appearing under this perspective as a platform for ensuring international and interdisciplinary cooperation of academics. Finally, the third level corresponds to the deepest theoretical and value foundations, even social ideals (Mielkov, 2021).

That last level is definitely the most obscure one, and even if we can trace the proclamation of those social ideals to the very first vision of Open Science expressed by initiators of this movement already ten years ago (Amsterdam Call for Action on Open Science, 2016), it seldom comes to the focus of investigators and policy makers today. In short, Open Science is actually aimed at the social re-institutionalization of science as well, as a response to the present-day social crisis of science — to achieving a kind of citizen science, which is to bring research and society closer together, to promote democracy both in science and society. And the way to achieve this goal is said to be, in particular, a radical change in the way society evaluates, rewards, and stimulates academic activity, by getting rid of the emphasis on publications, their numbers, and their impact factor, while searching for alternative ways of evaluating academic activity and achieving wider dissemination of academic research results in society (Mielkov, 2023).

The profound connection between democratization of science and society becomes evident in the philosophical analysis of science. Already in the 18th century, Thomas Jefferson (Jefferson, 1795) called freedom “the firstborn daughter of science”: scientific rationality, academic freedom, the autonomy of the human person, and social democracy — all have the same roots tracing back to the ideal of the Enlightenment. In my opinion, both democracy and science appear in this philosophical and axiological aspect not so much as a characteristic of a certain political system or an industry of activity for the production of new knowledge, respectively, but as a culture of thinking and a culture of educating people to make them capable of thinking. It is about the direct connection of science and democracy with education: it is not without reason that Paulo Freire came to this conclusion, reflecting on educational practices from the perspective of ethics and democracy and noting the affinity of higher education with research activities — and especially with what he called

“epistemological curiosity” (Freire, 2001) — with critical thinking, with the principle of student autonomy, with openness in general. In the beginning of the 20th century, John Dewey was the first to emphasize this topic, opposing the idea of science as an esoteric occupation of a few ‘initiates’ to its understanding as a open and public enterprise, and emphasizing the importance of democracy as a culture of thinking and a way of life (Dewey, 2016). Further on, that idea found its development in Karl Popper’s famous notion of ‘open society’ (Popper, 1945) — the notion that the founders of the Open Science initiative were definitely well aware of.

If we look at the dialectics of the historical process of the development of science, then classical science of the 16th–18th centuries will appear as completely “open” and totally “European”; however, despite all its devotion to the idea of democracy, it still remained elitist in practice: only a very small number of people in Europe itself, and even fewer in other regions of the world, which at that time were mostly European colonies, could afford to have sufficient education and time for performing any kind of research activity. Still, it is this narrow circle of people that used to embody the model world of *République des Lettres*, democratic and cosmopolitan by its standards and open to all talented scholars regardless of their belonging to a particular country or class. Becoming ‘massified’, science of the 19th–20th centuries, the age of Modernity, loses — at least partially — its academic freedom, its autonomy and its openness, submitting to state centralization (that was well described by Dewey at his time) or to the commercial interests of private companies. Finally, the present-day science, and Open Science as well, characterized by recognizing to complex human-commensurable systems and their self-organization, and therefore recognizing ethical and cultural values, in a certain sense returns to classical ideas on a new level of development, without losing its acquired mass character and its diversity.

Of course, that also means that science recognizes its own values in the first place. And I would argue that Open Science does not have its own values besides those of science in general, science as such, science in its ideal classical form. That is, the values of Open Science are actually based on the Mertonian principles of the ethos of science — with ‘openness’ directly corresponding to both *universalism and communism*, as well as to the principle of *disinterestedness*: first, science recognizes no borders, it is irrelevant to race, nationality, religion, class, and so on; second, findings of science are a product of social collaboration and are assigned to the community, thus they constitute a common heritage and can’t be private property; third, the only motive for being a scientist is a passion for knowledge, idle curiosity, and altruistic concern with the benefit to humanity, with no place for any claims for profit (Merton, 1973).

From such analysis of the philosophical and axiological foundations of science, and with a reference to the already noted idea of Karl Popper, we can conclude that the opposite of Open Science is a “closed” science — that is, one that is based on undemocratic principles and on values that contradict the norms of universalism. In this regard, it is the democratization of scientific activity that is one of the decisive steps on the path of implementing the principles of open science in the academic community in order to overcome the current crisis of science as a social institution (Chubin, 1985). The crisis in question could be considered just as the form of making science ‘closed’, first of all — closed to the general public as opposed to Open Science and citizen science. Estonian researcher Jüri Eintalu even calls it “institutional degeneration” of science “...it may turn out that the scientific institutions are not producing science, while the “non-scientists” are doing real science” (Eintalu, 2021). Not only in Ukraine but in much larger countries such as China, Brazil, or India, the pursuit of formal quantitative indicators of academic activity under the requirements set up by government bodies leads but to the loss of quality: publications in “predatory” journals, falsification of reviews, diminishing the role of humanities, green light for the enterprising and money-hungry, not the talented and honest academics, placing publishing on a business stream, opening the path to pseudoscience, etc., etc. (Onie, 2020; Tymoshyk, 2021). That is what can be called “a *pokazuha*-science”, as coined by Eintalu (Eintalu, 2021).

However, it would be a mistake to call the activity of “non-scientists” the desirable “citizen science”, as most, if not all forms of “folk science” have little to do with the ideals and methodology of Open Science

and rational inquiry in general, up to being frank pseudoscience. If the “organized professional” science finds it difficult to comply to the ethical principles of *communism* and *disinterestedness*, then the self-organized “alternative science” clearly contradicts the fourth Mertonian principle of *organized skepticism*! Still, such self-organization of pseudo-science is rather a lawful offspring of the public disillusionment with the institutionalized science, a result of a forced excessive trust turned into mistrust, maybe even a rejection of science as a whole, with all its knowledge and methods. As stated by Christian Fuchs, in the age of “post-truth politics” and fake news spreading globally through social media, people no longer trust facts and experts — they do not rationally examine “what is real and what is fiction, but assume something is true if it suits their state of mind and ideology” (Fuchs, 2023).

Still, achieving “citizen science” remains the ultimate goal of the idea of Open Science as such. According to researchers from the European Commission’s Directorate-General for Research and Innovation: “When all researchers are aware of Open Science, and are trained, supported and guided at all career stages to practice Open Science, the potential is there to fundamentally change the way research is performed and disseminated, fostering a scientific ecosystem in which research gains increased visibility, is shared more efficiently, and is performed with enhanced research integrity. It can create unprecedented connections between researchers and the general public, allowing for a vibrant citizen science movement, poised to have transformative effects on how research is executed” (European Commission, Directorate-General for Research and Innovation, 2017). In fact, openness to the “wider public” is perhaps the main form of openness in science in general, while open access to scientific publications makes sense only for scientists themselves! That is, the way to make science truly ‘Open’ lies in the direction of popularization of science and its social re-institutionalization in the first place. Besides, in the era of financial autonomy, higher education institutions must themselves prove their right to exist, their need for society, and if there can be no fundamental doubts about their “first” mission, that is, the provision of higher education itself, then the second mission, conducting scientific research, turns out to be more vulnerable.

What is the usefulness of science in the eyes of the state and society, if the former no longer needs (or almost does not need) any kind of ideological support, and the latter is not very confident in the need to spend significant funds of taxpayers’ money to satisfy the curiosity of scientists in solving problems too far from everyday life, especially in times of war, demographic and ecological crises, and other troublesome circumstances? The most obvious attempt to answer this question is the trend of commercialization of scientific knowledge as a result of research and knowledge transfer, which are obviously capable of interesting the vast majority of grant-givers and simply sponsors, — however, technology as a result (and sometimes a rather unpredictable one) of scientific research still does not justify the purpose of the research itself, since it by definition belongs to the category of ‘means’, and not ‘ends’. In other words, open access to publications is also nothing more than a means (albeit an adequate and successful one) to publish the results of discoveries, the significance of which may be enhanced by the availability of this access, but is by no means determined by such availability. Open access is a means to satisfy the interest of both the general public and scientists in familiarizing themselves with the results of the activities of scholars, but if there is no such interest present in society, it can contribute to its creation.

That leads us to the next question we are to consider: the question of developing the broad human skills and competencies both of scientists and of the general public in order to achieve openness and citizen science, that is, a situation where research activities are transparent to the entire society and therefore are justified in the eyes of society. Specialists of the European Council for Doctoral Students and Young Scientists identify a whole range of such skills and competences, starting from purely applied ones (“career development”: job search, CV preparation, etc. — such things, all the more so given the priority given to them, demonstrate the urgent need for scientists to prove their right to exist and to engage in professional activities), but also including cognitive skills (critical thinking, problem solving, etc.), and purely research skills (related in particular to academic integrity). No less important are communicative skills (from simple academic writing to the ability to popularize science among the general public), digital skills (including in-

formation search and processing), and interpersonal skills (teamwork, conflict management, independence and leadership, etc.), as well as purely entrepreneurial skills (up to the transfer of knowledge and commercialization of research results) (European Council of Doctoral Candidates and Junior Researchers, 2018).

Skills and expertise necessary for open access publishing are thus augmented and enriched by a whole number of other skills and expertise, especially those regarding not only research and management, but also skills and expertise enabling one to act in and beyond one's own scholarly and disciplinary community, skills and expertise resulting from a general and broad concept of citizen science, where researchers interact with the general public to enhance the impact of science and research (European Commission, Directorate-General for Research and Innovation, 2017). Just as with AI-based technologies, it is not just digital competencies that should be fostered, but general human competencies of critical thinking and moral judgment, as that's what enables adequate use of any technology for the benefit of humanity and not against it.

CONCLUSIONS. To summarize, we can assert the complex nature of Open Science, its deep philosophical background referring to the classical ideal of the Enlightenment, citizen science, and making science popular and close to society as its ultimate goal, and a whole range of diverse and truly transdisciplinary skills and competencies that scholars need to possess to fully realize the end and the potential of Open Science. The mass nature of science and higher education has naturally led to the devaluation, and in some cases to the profanation of the research activity, which is by no means a mass business in its current classical form. Focusing on means instead of ends, on the number of publications, on their formal compliance with requirements and on the degree of their indexation instead of their content, scientists receive neither the satisfaction of their own curiosity in studying the natural and social world, nor the recognition of the significance of their activities by the wider public. And such a problematic situation definitely requires further investigations from the side of contemporary philosophy, sociology, and ethics.

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ФІЛОСОФСЬКИЙ ВИМІР ВІДКРИТОЇ НАУКИ: ЦІЛІ, ЦІННОСТІ ТА ЛЮДСЬКІ КОМПЕТЕНЦІЇ

АНОТАЦІЯ. Роботу присвячено філософському дослідженню світоглядних принципів та цінностей, що лежать в основі концепції відкритої науки. Зазначається, що відкрита наука — це комплексне явище, яке не обмежується процедурами відкритого доступу, оскільки відкритий доступ до публікацій є лише засобом оприлюднення результатів наукових досліджень. Стверджується, що відкрита наука ґрунтується на класичному ідеалі Просвітництва та на мертонівських принципах етосу науки. Зроблено висновки, що повна реалізація ідей відкритої науки вимагає цілого спектру трансдисциплінарних людських компетентностей, і особливо загальних когнітивних та комунікативних навичок, спрямованих, окрім іншого, на популяризацію науки та її реінституціоналізацію в суспільстві.

КЛЮЧОВІ СЛОВА: громадянська наука, аксіологічні підвалини відкритої науки, соціальна криза науки, етос науки.