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SYSTEM ANALYSIS OF KEY ISSUES AND CHALLENGES IN UKRAINE FOR THE DEVELOPMENT OF OPEN SCIENTIFIC DATA MANAGEMENT POLICIES BASED ON FAIR PRINCIPLES

ABSTRACT. Today, a significant amount of scientific data, as a rule, remains outside the scope of scientific articles, monographs, and preprints, and, in fact, is removed from scientific circulation. Therefore, there is a need to create and develop specialized information systems and platforms for the publication and management of open scientific data. First of all, we are talking about the FAIR principles, that is, about ensuring the following requirements for open scientific data: 1) their preservation, 2) their accessibility, 3) their compatibility with similar results, and 4) the possibility of their reuse in scientific research by other scientists. Thus, in developed countries, the FAIR principles are deeply integrated into the policies of scientific activity. For Ukraine, on its path to integration into the international sphere of research and development, there is a need for more active adaptation of international experience in the policy of managing open scientific data. The purpose of the report is to conduct a systematic analysis of key problems and challenges in Ukraine that arise during the development and implementation of open access policies and FAIR principles in the field of open scientific data. The system of restrictions in the areas of organizational and management policies and regulatory and legal policies has been considered. A set of alternatives has been developed for the implementation of regulatory and educational policies. The effectiveness criteria for the given alternatives can be the number of open scientific data in the created state repository, the growth in the number of scientific articles, international patents, and licenses of Ukrainian scientists, the growth in the number of international grants, etc.

KEYWORDS: open research data; FAIR principles; open access; research data management; research data repositories; research infrastructure; interoperability; data reuse.

INTRODUCTION. The rapid development of information technologies for supporting and conducting scientific research, the development of tools for conducting scientific experiments, leads to the receipt of a large amount of scientific data. At the same time, a significant amount of such scientific data, as a rule, remains outside the scope of scientific articles, monographs, and preprints, and, thus, is essentially removed from scientific circulation. Therefore, there is a need to create and develop specialized information systems and platforms for both the publication of open scientific data and their management. First of all, we are talking about the FAIR principles, that is, about ensuring the following requirements for open scientific data: 1) their preservation, 2) their accessibility, 3) their compatibility with similar results, and 4) the possibility of their reuse in scientific research by other scientists.

Today, in developed countries, there are a large number of international Internet platforms that store open scientific data in the form of either Supplements to articles in scientific journals or separate Preprints, the publication of which is not mandatory in the future. For example, these are such Internet platforms as arXiv, bioRxiv, medRxiv, ChemRxiv, PsyArXiv, SSRN, etc. Moreover, in many leading scientific journals (for example, Nature, Physical Review families, etc.), it is allowed that the text of the article first appears on the corresponding preprint site before being accepted for publication. Also, recently, technologies for creating specialized repositories of open scientific data have been rapidly developing in developed countries.

Thus, in developed countries, the FAIR principles are deeply integrated into the policies of scientific activity. For Ukraine, on the path of integration into the international sphere of research and development,

there is a need for more active adaptation of international experience in the policy of open scientific data management.

The purpose of the report is to conduct a system analysis of key problems and challenges in Ukraine that arise during the development and implementation of policies for access to open scientific data and the FAIR principles.

MATERIALS AND METHODS. The report uses materials on the implementation of FAIR principles both in the world and in Ukraine [1–2]. It was found that the application of FAIR policies in the field of open scientific data is rapidly developing in Ukraine. New tools are also emerging to increase the level of openness of scientific data [3]. All this requires the development and implementation in Ukraine of a set of open access policies for open scientific data.

RESEARCH RESULTS. The first stage of achieving the goal is the analysis of the limitations associated with the available resources and capabilities. In the area of organizational and management policies, the following limitations have been identified: the choice of a policy for managing open scientific data, the development of the necessary regulatory and legal acts that will accompany the creation and functioning of the National Repository of Open Scientific Data, etc. In the area of regulatory and legal policies: the absence of a single national system for managing scientific data, legal and ethical challenges related to copyright and intellectual property rights, etc., and low efficiency of scientific data exchange for stakeholders, etc.

Next, a space of possible alternatives (roadmaps) is formed. Here, the following alternatives for the formation of open access policies can be distinguished, which complement each other: involve interested ministries and departments in the modification and development of the existing regulatory framework for the formation, preservation, management, and use of open scientific data obtained as a result of scientific research and development. It is also necessary to develop and implement a policy for training Ukrainian scientists in the principles of open science (training in the FAIR principles, the concept and policies of open access to scientific information (e.g., Open Science), open scientific data management plans (e.g., Data Management Plans), etc.).

The effectiveness criteria for the above alternatives can be the number of open scientific data in the created state repository, the growth in the number of scientific articles, international patents, and licenses of Ukrainian scientists, the growth in the number of international grants, etc.

CONCLUSIONS. The report provides a system analysis of key issues and challenges in Ukraine for the development of open scientific data management policies and FAIR principles.

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СИСТЕМНИЙ АНАЛІЗ КЛЮЧОВИХ ПРОБЛЕМ ТА ВИКЛИКІВ В УКРАЇНІ ЩОДО РОЗРОБКИ ПОЛІТИКИ УПРАВЛІННЯ ВІДКРИТИМИ ДОСЛІДНИЦЬКИМИ ДАНИМИ НА ОСНОВІ ПРИНЦИПІВ FAIR

АНОТАЦІЯ. Сьогодні значна кількість дослідницьких даних, як правило, залишається поза межами наукових статей, монографій, препринтів і, по суті, вилучається з наукового обігу. Тому існує потреба у створенні та розвитку спеціалізованих інформаційних систем і платформ для публікації та управління відкритими науковими даними. Перш за все, мова йде про принципи FAIR, тобто про забезпечення наступних вимог до відкритих дослідницьких даних: 1) їх збереження, 2) їх доступність, 3) їх сумісність з аналогічними результатами та 4) можливість їх повторного використання в наукових дослідженнях іншими вченими. У розвинених країнах принципи FAIR глибоко інтегровані в політику наукової діяльності. Для України на шляху до інтеграції в міжнародну сферу досліджень і розробок існує потреба в більш активній адаптації міжнародного досвіду політики управління відкритими науковими даними. Метою статті є проведення системного аналізу ключових проблем і викликів в Україні, які виникають під час розробки та впровадження політики відкритого доступу та принципів FAIR у сфері відкритих наукових даних. Розглянуто систему обмежень у сферах організаційно-управлінської та нормативно-правової політики. Розроблено набір альтернатив для реалізації регуляторної та освітньої політики. Критеріями ефективності наведених альтернатив можуть бути кількість відкритих наукових даних у створеному державному репозитарії, зростання кількості наукових статей, міжнародних патентів і ліцензій українських учених, зростання кількості міжнародних грантів тощо.

КЛЮЧОВІ СЛОВА: відкриті дослідницькі дані; принципи FAIR; відкритий доступ; репозитарії, наукова інфраструктура; інтероперабельність.