Evolution of Theoretical Approaches and Ways to Ensure the Responsibility of University Research Activities in the Context of Implementing the “Open Science” Concept

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Abstract
The article is devoted to highlighting of the evolution of theoretical approaches and identification of ways to ensure the responsibility of university research activities in the context of the implementation of the Open Science concept. The author analyses the EU policy documents in the field of Responsible Research and Innovation and Open Science, and justifies the need to strengthen the responsibility of university research activities in the context of implementation of Open Science standards in the national research space to fulfill the tasks set out in the National Open Science Plan. The author considers the results of case studies of domestic and foreign, primarily European, scholars and shows that a characteristic feature of the current evolutionary stage of theoretical interpretations of the problem of responsibility of research activity is its development within the framework of the RRI concept, which is considered in the EU as a transformational, critical and radical concept. The author substantiates the expediency of applying the systemic RRI concept for the formation and implementation of policies to strengthen the responsibility of research activities of Ukrainian universities. The author highlights the advantages of this concept, which are that it combines academic procedural and political approaches to RRI, covers the key components of RRI (public engagement, open access, science education, gender, ethics and governance), and provides for the assessment of RRI conditions and processes (expectations, reflexivity, inclusion and sensitivity).

The author focuses special attention on highlighting the “Societal Readiness Thinking Tool” regarding the use of its potential to promote the RRI concept, formulate and actively implement RRI policies in Ukrainian HEIs to ensure their integration into the ERA of responsible research and open science.

This article is based on the results of the author’s previous research, which were obtained within the framework of the academic research of the Universities’ Research Activities Unit at the Institute of Higher Education of the National Academy of Educational Sciences of Ukraine on the topic “Increasing the Research Capacity of Ukrainian Universities in the Conditions of War and Post-war Recovery in the Context of Implementing the Open Science Concept” (State Registration No. 0122U200775).

Introduction
The scientific debate on the responsibility of research activity, which has been ongoing in the European space for the last decade, and supported by the European Commission’s policies, has contributed to the shaping of the now popular Responsible Research and Innovation concept (RRI), which is aimed at aligning research and innovation to the values, needs and expectations of society (Rome Declaration on Responsible Research and Innovation in Europe, 2014). Aiming to bridge the gap between the scientific community and society in general, the Science and Society Action Plan was launched by the EC’s Directorate-General for Research and Society. The implementation of this plan was accompanied by the development of the Responsible Research and Innovation concept (RRI), which is aimed at aligning research and innovation to the values, needs and expectations of society (Rome Declaration on Responsible Research and Innovation in Europe, 2014). The author is an O. (2023). Evolution of Theoretical Approaches and Ways to Ensure the Responsibility of University Research Activities in the Context of Implementing the “Open Science” Concept. International Scientific Journal of Universities and Leadership, 15, 54-65. https://doi.org/10.31874/2520-6702-2023-15-54-65
and Innovation in 2001 to define a common strategy for better communication between science and European citizens. In 2007, in accordance with the 7th Framework Programme for research and technological development including demonstration activities (FP7), the Science and Society Action Plan was aimed at the direction of “Science in Society (SiS)”, with the main objective to foster public engagement and a sustained two-way dialogue between science and civil society. The program tasks pursued under part V “Science with and for Society” of the Horizon 2020 Program became a continuation of the launched initiatives (European Commission, 2014).

Today, responsibility is a key requirement and one of the main principles of research activities of European research institutions and universities. According to the Principles, Values and Responsibilities section of the Magna Charta Universitatum 2020, universities are responsible to cooperate and respond to the challenges of the world, strive to promote sustainability and benefit to humanity and the communities they serve (Magna Charta Universitatum, 2020). As defined in the European Strategy for Universities, being at the crossroads of education, research, innovation, universities occupy a unique place in serving society and economy; they play a crucial role in development of the European Research Area (ERA) and the European Higher Education Area (EHEA). Universities have a role and responsibility as key participants in development of the European model of implementation for the interests and values of respect for human dignity, freedom, democracy, equality, the rule of law and human rights, and compliance with international norms and standards (European strategy for universities, 2022), as declared in the documents of binding EU primary law (Treaty on the European Union, 1992; The Treaty on the Functioning of the European Union, 2007; Charter of Fundamental Rights of the European Union, 2012).

Responsible research with an emphasis on gender equality and inclusiveness, mainstreaming the role of social sciences and humanities, ethics and integrity of research, open academic practices, science education, dissemination and use of academic knowledge are the objective of the Horizon Europe Strategic Plan to reform and improve the European R&I system for 2021-2024 (Directorate-General for Research and Innovation (European Commission), 2021). The common key objectives of European universities for the period up to 2024 are to strengthen the European dimension in higher education and research, support universities as beacons of the European way of life, empower universities as change agents in the dual transition to green and digital technologies, strengthen universities as a driving global force and EU leadership (European Commission, 2022).

Problem setting

The study of theoretical approaches and ways to ensure the responsibility of university research activities is becoming important for Ukrainian universities in the context of the goals and objectives set out in the National Plan for Implementation of Open Science Standards aimed at integration of national science into the open ERA (National Plan for Open Science, 2022). Strengthening of the responsibility for research activities and their results in relation to the needs of society is a requirement for the implementation of Open Science (Open Science, 2019).

Recent research and publications analysis

Certain provisions of the researched issue are substantiated and highlighted by the author in the analytical materials “Theoretical Foundations for Increasing the Research Capacity of Universities of Ukraine in the Context of Implementing Open Science Concept” (Petroye, 2021) and “Analysis of Leading Domestic and Foreign Experience in Increasing the Research Capacity of Universities of Ukraine in the Conditions of War and Post-war Reconstruction in the Context of Implementation of the Open Science Concept” (Petroye & Reheilo, 2022). In particular, the article clarifies the goals and key tasks of implementation of the Open Science concept as a condition and mechanism for integration of the national science into the ERA; outlines the
place and role of research responsibility in the EU policy in the ERA development; summarizes international and European standards, identifies key actors and their areas of responsibility for research; substantiates the relevance of tasks concerning implementation of responsibility in the research activities of national universities. Based on the analysis of recent foreign and national publications, generalization of materials from the EU thematic projects (GREAT; RRI-Practice; NewHoRRlzon; RRING; EnRRICH, etc.), the essential features and promising directions to increase the responsibility of research activities of Ukrainian universities in the context of the Open Science concept implementation are outlined.

Issues of academic responsibility became the subject of discussion at the International scientific and practical conference on the topic “Academic responsibility”, organised by the Kyiv Regional Centre of the National Academy of Legal Sciences of Ukraine, whose participants mainly discussed issues of academic freedom, academic misconduct, academic integrity and anti-plagiarism, etc. (Akademichna vidpovidalnist, 2021).

Methodological approaches to the analysis of the system of academic responsibility, which can be extended to other components and directions of RRI, were revealed by N. Davydova in the publication “Legal Responsibility vs Academic Responsibility: Correlation of Concepts” (Akademichna vidpovidalnist, 2021). By extending the approach proposed by the author for academic responsibility to the responsibility of research activity in general (Petroye, 2022), RRI should be considered as a separate form and sphere of responsibility, a multi-meaning concept that acts as a type of professional, social, corporate, moral and ethical, legal responsibility, and a type of state coercion. The mechanisms to ensure responsibility in the field of research activity are: regulatory and legal; local (regulations on academic plagiarism of higher education institutions, requirements for publishing articles in scientific journals); ethical (Ethical code of the scientist of Ukraine, Olbia Declaration of Universities: academic freedoms, university autonomy, science and education for sustainable development).

The approach to the analysis of academic responsibility offered by N. Maslova in her publication “Academic Freedom and Academic Responsibility” is also of some interest for structuring of the system and policy of RRI of universities, where three levels of academic responsibility are distinguished (Akademichna vidpovidalnist, 2021):

1) responsibility to oneself (has a moral character);
2) responsibility to other subjects of the academic community (can be moral, corporate or legal in nature);
3) responsibility to the state and society (has a purely legal character).

In general, the topic of RRI, in general, and the topic of theoretical interpretations and approaches to ensure the responsibility of university research activities have not yet received due attention in Ukrainian academic thought.

The paper objective is to highlight the evolution of theoretical approaches and to identify ways to ensure the responsibility of university research activities in the context of the implementation of the Open Science concept.

Results and their discussion

RRI is a hot topic among European policy makers, researchers and innovators. Due to joint efforts, more people in Europe understand the changes that are taking place in the research and development system: more citizens are involved in science; cooperation between natural, technological, sociological and human sciences is developing; users are becoming leaders of innovation; open access trends are changing the publishing system; gender equality is rightly gaining political support, etc. Together, these efforts form a pan-European approach to research and innovation — RRI (The RRI Tools project, 2016). The contribution to the discourse on “RRI intensity” by the European Commission is influential, as it has introduced RRI into its policy as a cross-cutting area in all aspects of the Horizon 2020 research framework for 2014-2020 (de Heaver et al., 2020).
The evolution and benefits of RRI are highlighted in the report “Monitoring the Evolution and Benefits of Responsible Research and Innovation”. The monitoring report contains a set of RRI indicators and the results of four data collection surveys for 2014-2016, namely: “Science in Society Stakeholder Survey” (SiS survey); “Survey of Research Funding Organizations” (RFO survey), “Survey in Higher Education Institutions” (HEI survey) and “Survey among Public Research Organizations” (PRO survey) (Spaini et al., 2018).

Analysis of a wide range of topics, including ethical, legal and social aspects of RRI, ethical decision-making, prevention and combating misconduct, questionable research practices, regulation of research records, data sharing, data audit, reproducibility, authorship, publication, peer review, intellectual property, conflict of interest, mentoring, safe research environment, animal experimentation, research involving human subjects and social responsibility is provided in Responsible Conduct of Research (Shamoo & Resnik, 2022).

The monograph “Responsible Research and Innovation. From Concepts to Practices” by a team of British authors summarizes the principles and general goals, and characterizes the benefits of RRI at both the regulatory and functional levels (Gianni et al., 2018).

In the study “Towards a Research Agenda for Promoting Responsible Research Practices”, Dutch academicians offered a model of RRP as a comprehensive system consisting of three different levels (level of academic structures; level of academic system; level of empirical cycle) (Tijdink et al., 2021).

The publication “A Practical Guide to Responsible Research and Innovation. Key Lessons From RRI Tools” reveals the implementation tools and content of the key elements of RRI: research ethics and integrity; gender equality; governance; open access; public engagement and science education (Table 1) (The RRI Tools project, 2016).

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<th>Table 1. Rationale for the key elements of RRI</th>
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<td><strong>Research ethics and integrity</strong></td>
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<td>Research, including its results and the way it is conducted, must be morally sound and acceptable to society. Honesty, accountability, equity and efficiency should be the basic principles of research and innovation.</td>
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<td><strong>Governance</strong></td>
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<td>RRI principles should be incorporated into research and innovation governance mechanisms, consistent with existing practices and flexible to respond to unforeseen changes.</td>
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<td><strong>Public engagement</strong></td>
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<td>Involving stakeholders and the public in the research and innovation process helps to ensure that the results are in line with the values, needs and expectations of separate communities and society as a whole.</td>
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Source: compiled by the author on the basis of (The RRI Tools project, 2016).

Generalization of measures to integrate RRI principles into the higher education system “RRI in Higher Education” was carried out by the University of Oxford. The publication emphasizes that the concept of RRI has recently become increasingly important, as state
research funds include RRI principles in their policies, which encourages higher education institutions to adopt these principles as well. According to the authors, teaching RRI is one of the key activities for implementation of its principles in higher education (Nulli & Stahl, 2018).

The publication “Towards a 2030 vision on the future of universities in Europe” shows that universities, as central pillars in society, play a crucial role in identifying problems, challenges and solutions for society today and in the future through their research missions. Therefore, the goals of strengthening of the European dimension in higher education are inextricably linked to RRI, and the synergy between them is identified as one of the key goals to be achieved through joint efforts at the institutional, national and European levels (Whittle & Rampton, 2020).

The authors of the research “Challenges in the implementation of responsible research and innovation across the Horizon” emphasize the significant number of European projects that have significantly expanded the available knowledge about the theory, methods and implementation of RRI. At the same time, as the authors note, various assessments and studies have revealed limited and diffuse implementation of the RRI concept and some political uncertainty. After analysis of the eight H2020 program areas (ERC, MSCA, LEIT, FOOD, ENV, SEC, WIDENING and EURATOM), strategic documents and the results of semi-structured interviews with representatives of various groups of interest, the researchers concluded the limited implementation of RRI in Horizon 2020 due to resistance to the conflict of RRI principles with existing values in the research space (Tabarés et al., 2022).

The publication “What’s in a name? Perceptions and promotion of responsible research and innovation practices across Europe” is dedicated to studying of the situation with RRI based on the analysis of 217 organizations. The study found out that most organizations are not familiar with RRI, but despite this, they use different perceptions of responsibility and mechanisms to promote it. Civil society organizations are primarily outward-looking, cooperating with others and conducting research activities. Private companies are more focused on internal affairs and are more inclined to formalize these efforts in strategies and internal guidelines. Universities act in a similar way to private companies, while private and public financial institutions use special funding instruments to encourage responsible practices. In general, the authors conclude that RRI is still not sufficiently institutionalized, and in some areas, it is not paid attention to at all in the research and innovation systems of the team (Christensen et al., 2020).

The results presented in “A Key Moment for European Science Policy” summarize trends in the integration of science and society, proving that the commitments outlined in the European Framework Programs have already made significant progress in better aligning research and innovation with European society. According to the authors, this is evidenced by positive trends in key areas of RRI in European academic institutions. These include gender equality, open access, academic literacy and science education, public engagement, and ethics. The results also show that different European countries experiment with RRI and develop it in their own particular way, taking into account the specifics of the country, with its own priorities and practices for RRI development, while maintaining compliance with general European commitments (Mejlgaard et al., 2018).

In this context, the results of generalized approaches to RRI teaching in higher education institutions, carried out by HEIRRI project experts (Ecsite, 2018a, 2018b), seem convincing. Based on the six key areas of RRI identified by the EC (public engagement, gender equality, open access, science education, ethics and governance in research and innovation).

According to the results of interviews with members of the European scientific community (researchers, research supervisors — heads of higher education institutions, deans) on their understanding and attitude towards RRI, most respondents support RRI in terms of interaction with society (both with stakeholders and the general public) and the choice of research topics in accordance with social relevance, not just for science (Carrier & Gartzlaff, 2020).
The article “Responsible Research and Innovation in Europe: A Cross-Country Comparative Analysis” develops empirical, quantitative approaches to RRI. The authors analyse the empirical structure of the data collected as part of the “Monitoring the Evolution and Benefits of Responsible Research and Innovation” (MoRRI) project, define RRI indicators aimed at characterizing the RRI landscape of European countries. Having conducted a comparative country-by-country analysis of a set of 11 indicators covering six dimensions of RRI indicators, the authors highlighted the current situation in approaches to RRI at the level of European countries (Fig. 1, 2) (Mejlgaard et al., 2019).

RRI indicators:
- “GE action” — the level of political actions taken by research organizations (RPOs) to promote gender equality in a particular country;
- “GE status” — the observed macro-level of achieved gender equality in the academic community in the countries (the share of women researchers in the country’s higher education sector, the share of women authors in scientific publications in the country);
- “RRI training” shows the extent to which educational institutions teach RRI-related issues;
- “SLSE culture” — the level of culture of broad scientific communication in the country;
- “Public participation” — the level of public participation in science;
- “PE in assessment” — the role played by public involvement in the context of research funding;
- two indicators “Ethics in RPOs”: the 1st reflects RPOs with research ethics committees and research integrity offices; the 2nd — ethical aspects in research funding;
- “OA status” — the volume of open access publications coming from the country;
- “OA actions” — the use of open access scientific literature;
- “Governance” takes into account indicators of the use of science in policy-making in different countries based on MASIS data; the share of organizations that have established governance mechanisms related to ethics, public engagement, open access, gender equality, or specific RRI policies; records the targeted promotion of RRI by organizations in relation to their own employees or beneficiaries, as well as to partner organizations and networks.

As a result of the cluster analysis, the researchers found out the differences and similarities in the approaches to RRI and identified clusters of countries with similar characteristics:
- “green” cluster: Belgium, Germany, France, Denmark, Italy, the Netherlands, Finland, Sweden and Great Britain;
- “black” cluster: Spain, Portugal and Romania;
“red” cluster: Bulgaria, Poland, Slovenia, Croatia, Lithuania, Estonia, Latvia and Slovakia;

“blue” cluster: Austria, Luxembourg, Malta, Czechia, Greece, Cyprus and Hungary.

As shown in Fig. 1, the countries of the “green” cluster have the best conditions for RRI in many indicators: “GOV”; “GE action”; “SLSE culture”; “Public participation”; “Ethics in RPOs” with research ethics committees and research integrity departments. The countries of the “black” cluster have the best achievements in involving the public in research evaluation — “PE in assessment” and rather high indicators of “GE status”, “GOV” and “OA status”. At the same time, this cluster is characterized by the lowest level of manifestation of such RRI dimensions as “Ethics in RPOs” with research ethics committees and research integrity departments, “OA actions”, “Public participation” and “GE action”. The RRI profile of the countries in the “red” cluster is characterized by the highest achievements in “RRI training” and “Ethics in RPOs” in research funding. The lowest scores in this group of countries are for “GE action”, “SLSE culture” and “Governance”. The countries of the “blue” cluster have the highest scores for the “OA status” indicator and the lowest scores for “GE status”.

Based on the results of the RRI-Practice project, the researchers consider RRI as an embodiment of the five RRI keys: 1) ethics; 2) gender equality and diversity; 3) open access and open science; 4) scientific education; 5) public/community engagement) and four dimensions of RRI as a process: 1) anticipation and reflexivity; 2) diversity and inclusiveness; 3) openness and transparency; 4) responsiveness and adaptability (Wittrock et al., 2021).

Summarizing the existing interpretations, scholars M. Bernstein, M. Nielsen, E. Alnor proposed two different approaches to RRI: an academic procedural approach and a political approach that is more focused on input resources (which has gained popularity in European countries). The procedural approach proposes specific RRI “conditions”: expectations, reflexivity, inclusion and sensitivity. Together, these four RRI conditions create a basic framework that helps researchers to analyse the intended and possible unintended outcomes, and the application of research and innovation in different societal contexts (expectations). They encourage researchers, innovators, funders, and science policy makers to raise questions on people whose voices and interests should be considered in the design and development process (inclusion); on the underlying goals, motivations, assumptions and worldviews that guide activities (reflexivity); and on the ways to respond to the knowledge gained through such reflection (sensitivity). Another, policy-based or input-based approach to RRI suggests pillars or “key components” that should be considered in research and development — six distinct keys (public engagement, open access, science education, gender, ethics, and governance) (Bernstein et al., 2022).

This generalized approach, which combines key achievements in RRI research, was the basis for the development of the Societal Readiness Thinking Tool, which aims to increase society’s readiness for research, helping researchers and innovators to develop research projects with greater sensitivity to societal values, needs and expectations (Nielsen et al., 2018; de Jong et al., 2022).

Societal Readiness Thinking Tool:

- addresses the five keys of RRI: 1) ethics, 2) gender, 3) open access, 4) public engagement, and 5) science education. The absence of governance in the SR Thinking Tool is explained by the fact that changes in the rules, regulations or practices of research and innovation to promote the five RRI pillars will necessarily entail changes in governance;

- integrates the four process-focused RRI conditions: 1) anticipation (anticipating potential impacts), 2) inclusion (diverse perspectives), 3) reflexivity (motivations and assumptions), and 4) responsiveness (responding based on new information from these three activities).

- involves four stages of RRI common to research projects: 1) covers the processes of generating ideas for discovery, when research problems are conceptualized and formulated, and appropriate data collection and experimentation procedures are planned; 2) covers activities related to implementation, data collection, and experimental testing;
3) includes data analysis, evaluation and interpretation of results; 4) extends to launching project results and disseminating results to stakeholders, researchers and the public, etc.

**Conclusions**

Summarizing the evolution of approaches to research, it can be concluded that today RRI is considered in the EU as a transformational, critical and radical concept, which is being implemented to integrate RRI into formal and non-formal education of scholars, engineers and other specialists of higher education institutions and research institutions, it imposes new duties and responsibilities on scholars and responsibility for the consequences of their work, concerns the alignment of scientific knowledge production with broader societal needs and expectations, and ensures public involvement in responsible research and the research and innovation process.

The concept of RRI, which is based on six key components, gained the most recognition in the EC:
1) public involvement (involvement of a wide range of social actors in the research process, including researchers, producers, politicians and civil society participants);
2) open access (making research and innovation activities more transparent and easily accessible to the public, for example, through open data and free access to publications);
3) scientific education (increasing the general academic literacy of society, for example, by increasing children’s interest in science and technology, as well as by arming civil society participants with the necessary skills for more active participation in the research process);
4) gender (promoting the participation of women as researchers and integrating the gender dimension into the content of research);
5) ethics (acquiring high social significance of research activity, its compliance with the highest ethical standards);
6) responsible management of research and innovation.

Despite long-term efforts in research, formation and implementation of national policies, the implementation of RRI in practice turned out to be difficult, and its practical implementation in the EU is characterized by significant regional differences (clusters of countries with similar characteristics: “green” cluster: Belgium, Germany, France, Denmark, Italy, the Netherlands, Finland, Sweden and Great Britain; “black” cluster: Spain, Portugal and Romania; “red” cluster: Bulgaria, Poland, Slovenia, Croatia, Lithuania, Estonia, Latvia and Slovakia; “blue” cluster: Austria, Luxembourg, Malta, Czechia, Greece, Cyprus and Hungary), focusing mostly on solving only certain reflective and anticipatory problems in all processes of research activity (for example, only at the initial, middle or final stage); focusing on one rather than a set of RRI parameters. Although some policy goals and models of participation are common to many countries, there are also significant differences in research policy goals, the structure of academic responsibilities, management styles, and the goals and mechanisms of public participation. Existing differences in approaches to content and RRI policies can be explained by differences in the relations between science and society in different countries.

The proposed systemic concept of RRI is of significant interest for further in-depth study, it combines academic procedural and political approaches to RRI, covers key components of RRI (public involvement, open access, scientific education, gender, ethics and governance) and provides an assessment of RRI conditions and processes (expectations, reflexivity, inclusion and sensitivity).

The “Societal Readiness Thinking Tool” with specific case examples of the RRI application, methods and resources for further increase of responsible consideration and attention to social and ethical problems in research, project management, etc., developed and deployed for online use, deserves special attention regarding the popularization of the RRI concept in the higher education institutions of Ukraine and the formation and implementation of the RRI policy (thinkingtool.eu).
Prospects for further research

Considering the innovative nature and insufficient establishment of the RRI concept, it is important for further research to analyse the practical experience of foreign and Ukrainian universities regarding the implementation of the RRI policy, with special attention to specific national and institutional contexts.

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Competing interests
No potential competing interest was reported by the author.

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REVIEW ARTICLE

Еволюція теоретичних підходів та шляхи забезпечення відповідальності дослідницької діяльності університетів у контексті імплементації концепції «Відкрита наука»

Ольга Петроє

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Анотація
Стаття присвячена висвітленню еволюції теоретичних підходів та виявлению шляхів забезпечення відповідальності дослідницької діяльності університетів у контексті імплементації концепції «Відкрита наука». Автор аналізує політичні документи ЄС у сфері Responsible Research and Innovation та Open Science, обґрунтовує необхідність посилення відповідальності дослідницької діяльності університетів у контексті імплементації стандартів Open Science у національний дослідницький простір на виконання завдань, визначених Національним планом щодо відкритої науки. Розглядає результати тематичних досліджень вітчизняних та зарубіжних, передусім, європейських, вченів, та показує, що характерною ознакою сучасного еволюційного етапу теоретичних інтерпретацій проблематики відповідальності дослідницької діяльності є її розвиток в рамках концепції RRI, що розглядається в ЄС як трансформаційна, критична та радикальна концепція. Обґрунтовує доцільність застосування системної концепції RRI для формування та реалізації політики щодо посилення відповідальності дослідницької діяльності українських університетів. Висвітлює переваги цієї концепції, які полягають в тому, що вона поєднує академічний процедурний та політичний підходи до RRI, охоплює ключові компоненти RRI (залучення громадськості, відкритий доступ, наукова освіта, гендер, етика та відкриття), передбачає оцінювання умов та процесів RRI (очікування, рефлексивність, включення та чутливість).

Окрему увагу автор зосереджує на висвітленні інструментарію «Societal Readiness Thinking Tool» щодо використання його потенціалу для популяризації концепції RRI, що використовується у ЄС як процесно-трансформаційна концепція RRI, що відповідає вимогам політичного підходу до RRI. Ця концепція включає в себе ключові компоненти RRI, такі як громадське залучення, відкритий доступ, наукова освіта, гендер, етика та відкриття, передбачає оцінювання умов та процесів RRI (очікування, рефлексивність, включення та чутливість).

Мова статті: англійська


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