

Interpretation and Implications of the U.S. OSTP's New Public Access Policy Guidelines

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Abstract

[Objective/Significance] Open access policies are critical for advancing open scholarship and scientific and technological innovation. Examining the experiences of major international open access policies can provide references for the formulation, implementation, and development of open access in China. [Method/Process] This article introduces the development background of the new public access policy guidelines from the U.S. Office of Science and Technology Policy (OSTP), analyzes the policy content and its differences from previous open access policies, strengths and weaknesses, and reflected trends, and discusses the impacts of policy implementation on federal funding agencies, the publishing landscape, and library operations. [Results/Conclusion] By synthesizing the content and impacts of the OSTP's new policy guidelines and analyzing the deficiencies in current domestic open access policies and practices, this study proposes recommendations including issuing national-level guiding policies for open access, constructing and deploying national-level open access repositories, and promoting research data management and sharing at the project level.

Full Text

Preamble

Interpretation and Implications of the U.S. OSTP's New Public Access Policy Guidance

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Abstract

[Purpose/Significance] Open access policies are crucial for advancing open scholarship and scientific and technological innovation. Examining the experiences of major international open access policies can provide valuable references

for the formulation, implementation, and development of open access policies in China. **[Method/Process]** This paper introduces the background of the new public access policy guidance issued by the U.S. Office of Science and Technology Policy (OSTP), analyzes its content and its differences from previous open access policies, and discusses its advantages, disadvantages, and embodied trends. The paper also examines the impacts of policy implementation on federal funding agencies, the publishing landscape, and library operations. **[Result/Conclusion]** Based on the content and impacts of OSTP's new guidance, this paper analyzes deficiencies in China's current open access policies and practices, and proposes recommendations including: issuing national-level open access guiding policies, constructing and deploying national-level open access repositories, and promoting research data management and sharing at the project level.

Keywords: open access; public access; mandatory policy; OSTP; enlightenment

1. Introduction

The Budapest Open Access Initiative (BOAI) in 2002 introduced the concept of “Open Access” (OA), defining it as the free availability of literature in the public domain of the Internet, permitting any user to read, download, copy, distribute, print, search, or link to the full texts of articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose without financial, legal, or technical barriers, except those inseparable from gaining access to the Internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited [1]. Over the past two decades, countries worldwide have increasingly recognized the significance of open access for scientific and technological innovation. The global open access movement has rapidly evolved from conceptual advocacy, publicity, and pilot projects toward policy and legal formulation to ensure the expansion of open scholarship.

On August 25, 2022, the U.S. Office of Science and Technology Policy (OSTP) released new public access policy guidance titled *Ensuring Free, Immediate, and Equitable Access to Federally Funded Research* (hereinafter referred to as the “new guidance”) [2][3]. This guidance updates OSTP's 2013 public access memorandum, *Increasing Access to the Results of Federally Funded Scientific Research* [4] (hereinafter referred to as the “2013 memorandum”). The new guidance significantly expands upon previous policies across multiple dimensions, including embargo periods, coverage scope, deposit pathways, research data, data formats and metadata, usage and restrictions, allowable costs, coordination efforts, and timelines. Notably, the new guidance employs the term “public access” rather than “open access.” The *OSTP Economic Landscape of Federal Public Access Policy* report [5] clarifies the distinction: “public access” primarily refers to the provision of federally funded scholarly resources (including publica-

tions, data, and other research outputs) to the public free of charge, serving as a policy term that emphasizes the U.S. federal government's move toward more open and transparent science. "Open access," by contrast, encompasses broader principles and practices of publication sharing, including those required by public access as well as those adopted by the scientific and publishing communities. Thus, open access represents a broader scope of sharing principles and practices than public access, with the latter specifically representing OSTP's sharing principles for federally funded research outputs. Despite this subtle difference, the principles and practices embodied in "public access" derive from "open access," and both share the common fundamental attribute of pursuing open sharing. The new guidance's release has drawn international attention from relevant institutions and the publishing industry, being hailed as a historic milestone in scientific communication [6]. Analyzing this influential, top-level, and recent open access policy is therefore of great significance for informing China's policy formulation and practical development.

2. Research Design

2.1 Research Status

Internationally, research has focused primarily on open access policy practice. An increasing number of international organizations, governments, funding agencies, universities, libraries, and publishers have recognized the importance of open access and have actively promoted its development through strong policy measures. In Europe, national departments and funding programs, as well as large-scale regional open access policies, have gained momentum. Examples include Ireland's National Steering Committee's *National Principles for Open Access Policy Statement* (2012) [7], the UK Research Councils' (RCUK, now UK Research and Innovation - UKRI) *Open Access Policy and Guidance* (2013, updated in August 2021) [8][9], Germany's Federal Ministry of Education and Research open access strategy (2016) [10], the European Commission's Horizon 2020 program's *Guidelines on Open Access to Scientific Publications and Research Data* (2017) requiring all funded scholarly articles to achieve green or gold OA [11][12], the OA2020 Initiative aiming to replace subscription models with new models for full open access transition [13], and cOAlition S's Plan S (2018) requiring open access publication for publicly funded research from 2021 onward [14]. These national, regional, and coalition-level policies have gradually evolved from initial proposals to mandatory or quasi-mandatory requirements, establishing a policy environment foundation for complete open access.

Domestically, research has emphasized theoretical aspects, focusing on reviews and introductions of foreign policies. Literature covers open access policies formulated by various entities. For instance, Zhou Lingyuan et al. [15] analyzed representative national open access policies of the U.S., UK, and Ireland at the national level; Fan Hao et al. [16] interpreted the content and implementation details of Plan S from a funding agency perspective; and Zheng Erte [17] examined 28 university library open access policies using the ROARMAP platform,

analyzing their release dates, geographic distribution, policy enforceability, and openness levels.

While existing domestic research on open access policies provides important reference value for China's policy construction, most studies elaborate on policies formulated by certain types of entities from a macro perspective, with fewer focusing on analysis of specific open access policies. The United States is an active practitioner of the open access movement, and OSTP, as an executive office of the White House that formulates policy on behalf of the U.S. President, means that OSTP's new guidance represents the U.S. government's position and will regarding new developments and trends in open access. Analyzing and interpreting OSTP's new guidance is therefore beneficial for understanding the latest developments in open access and providing current experience and reference for China's policy formulation.

2.2 Research Design

This study primarily employs content analysis, focusing on the text of the 2022 OSTP public access policy guidance as the main research object. The paper analyzes the guidance's textual content, identifies key points, and uses comparative analysis to examine differences between the new guidance and the 2013 memorandum. It summarizes the new guidance's advantages and disadvantages, analyzes embodied trends and impacts, and finally proposes targeted recommendations by combining these findings with deficiencies in China's current open access policy formulation and practices.

3. Background of the New Guidance

The new guidance was formulated based on previous policies, considering public demand for immediate access, changes in the global publishing landscape and open access technology development, and catalyzed by the COVID-19 pandemic.

First, previous policies provided successful experiences for the public and scientific community in achieving free sharing of research outputs. The NIH's 2008 public access policy [18] and OSTP's 2013 memorandum established a policy foundation for the new guidance. In particular, the 2013 memorandum greatly promoted open access development in the U.S., with over 8 million scholarly publications achieving open sharing since 2013.

Second, public demand for immediate access drove the formulation of the new guidance. Previous policies typically included 12-month embargo periods, which became the primary obstacle to immediate public access, limiting instantaneous access to those able to pay or with access through library and institutional resource platforms. To achieve equal opportunity, federal public access policies required further improvement to enable broad and delay-free access to federally funded research outputs.

Third, changes in the global scientific research publishing landscape served as

an external factor driving the new guidance. The implementation of Plan S in 2018 was a major action affecting the publishing landscape, facilitating open access publishing agreements between European funding agencies and publishers, such as Germany's Projekt DEAL. In the U.S., influenced by Plan S, publishers have also reached numerous open access publishing agreements with universities and academic consortia, such as the University of California with Elsevier [19] and the Big Ten Academic Alliance with Cambridge University Press [20]. Meanwhile, the development of native OA and fully OA journal publishing has provided an environmental foundation for open access, with native OA publishers like PLOS, Frontiers, and MDPI thriving, and traditional publishers such as Springer Nature, Elsevier, and Wiley developing fully open journal portfolios.

Fourth, developments in open access technologies and tools provided favorable technical support. Between 2013 and 2022, digital technologies continuously evolved, online data hosting costs decreased, and the 启用 of cloud storage services, digital persistent identifiers, and digital repositories all reduced difficulties and obstacles in sharing, storing, finding, and accessing research data and publications. Additionally, the development of institutional repositories like PubMed Central and CHORUS open access service platforms, as well as research social networks like ResearchGate and Academia that store and provide discovery and communication vehicles for open content, provided strong technical support and tools for the new guidance.

Finally, the COVID-19 pandemic accelerated the urgency of public access. The pandemic stimulated public demand for immediate access to open access content, prompting the U.S. government, industry, and scientists to collaborate in implementing immediate open measures that greatly accelerated the speed of scientific discovery [5]. The tremendous benefits of immediate access to federally funded research and the urgent need for public access made the COVID-19 pandemic a direct factor driving the formulation of new public access policies.

4. Analysis of the New Guidance

4.1 Content Framework

The new guidance's content framework covers relevant institutions, purposes, objectives and vision, guiding principles, and key dimensions (see Figure 1 [Figure 1: see original paper]). The guidance was jointly formulated by the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB). Public access plans developed by federal funding agencies must be submitted to OSTP and OMB for review. The National Science and Technology Council Subcommittee on Open Science (NSTC SOS) serves as the open science technical guidance group, responsible for coordinating the development and implementation of public access plans across federal funding agencies. The policy's purpose is to ensure that federally funded science and research can be opened freely, immediately, and equitably, further ensuring the completeness and breadth of open research outputs. The guidance aims to enhance the au-

thority of federal scientific research and the U.S.'s international leadership in science, with a vision of establishing an increasingly robust and more equitable federal scientific ecosystem. The guidance upholds the principle of open science while requiring that research information comply with legal, privacy, and security considerations. It mandates that federal funding agencies bear important responsibility for developing and implementing public access plans, and standardizes unified standards across relevant dimensions to make public access content more sustainable, while coordinating participation from publishers, libraries, museums, professional associations, researchers, and other interested non-governmental organizations in public access efforts.

The public access policy, guided by its purpose, objectives, and principles, establishes key dimensional content to direct federal funding agencies in developing and updating public access plans. The key dimensions constitute the main body of the new guidance and include: embargo periods, coverage scope (including funding agencies, disciplinary fields, and publications), deposit pathways, research data, data formats and metadata, usage and restrictions, allowable costs, coordination efforts, and timelines.

(1) Embargo Period

Zero embargo is the most distinctive key directive of the new guidance. It requires federal funding agencies to update public access plans to ensure federally funded research outputs are publicly accessible without delay and free of charge upon publication. Reducing the embargo period to zero fully complies with the immediacy principle of the open access movement, making the new guidance one of the most forceful actions in U.S. open access policy history and demonstrating the U.S. government's will to rapidly advance public access.

(2) Coverage Scope

Coverage scope primarily includes funding agencies, disciplinary fields, and publications: Regarding funding agencies, the new guidance imposes no budget restrictions, covering all federal funding agencies with external R&D budgets;

In disciplinary fields, the guidance expands from basic and applied sciences to include humanities institutions; For publications, the guidance substantially broadens the definition to include not only research articles and accepted manuscripts but also peer-reviewed book chapters, editorials, and conference proceedings. Overall, the new guidance greatly expands the scope of public access policy across funding agencies, disciplinary fields, and publications, substantially complying with open access principles of breadth, equity, and comprehensiveness.

(3) Deposit Pathways

The new guidance requires that publications resulting from federal funding agency research be made freely and publicly accessible without embargo in repositories designated by the federal funding agencies.

(4) Research Data

To enhance research integrity, quality, and reproducibility, the new guidance

proposes requirements for research data openness: Research underlying data associated with federally funded peer-reviewed publications and not restricted by intellectual property, privacy, or security concerns should be immediately accessible; Beyond research underlying data associated with peer-reviewed publications, federal funding agencies should develop methods and timelines for sharing and opening other data generated by federally funded research; Federal funding agencies should provide researchers with guidance on open research data repositories, which should meet the characteristics outlined in NSTC's document *Desirable Characteristics of Data Repositories for Federally Funded Research*.

(5) Data Formats and Metadata

To ensure research output credibility and usability, the new guidance proposes requirements for data formats and metadata. Regarding data formats, the guidance maximally complies with the FAIR principles (Findable, Accessible, Interoperable, and Reusable), requiring research publications and data to be machine-readable and broadly accessible through assistive devices to support researchers and the public in applying research outputs through text and data mining, computational analysis, and other advanced technologies. Regarding metadata, the guidance requires collection and public disclosure of relevant metadata when storing research publications and data in public access repositories to ensure accurate copyright attribution and version control. Metadata includes: names, affiliations, and funding sources of all authors and co-authors; publication date; unique digital persistent identifiers for research outputs; peer review status; guidance for researchers to obtain unique digital persistent identifiers compliant with the common core standards for services as defined in the U.S. National Security Presidential Memorandum implementation guidance (NSPM-33); assignment of unique digital persistent identifiers to all federally funded research outputs to link funding agencies with grantees.

(6) Usage and Restrictions

The new guidance requires federal funding agencies to propose plans for usage and restriction conditions, specifying prerequisites for free and open use of research publications, including any usage and reuse rights and restrictions including copyright attribution. Determination and selection of usage and restriction conditions determine the type of open license, which can promote the open utilization of research publications to some extent.

(7) Allowable Costs

The new guidance states that federal funding agencies should consult with OMB to allow researchers to include reasonable publication costs and costs related to submission, data management, and other special handling in research budgets.

(8) Coordination Efforts

To improve efficiency in developing and implementing new public access plans across federal funding agencies, the new guidance designates NSTC SOS to coordinate relevant efforts among agencies, including: coordinating digital repository access across federal funding agencies; taking measures to reduce inequalities in publishing and accessing federally funded research publications and

data; developing procedures and measures to reduce the burden on federally funded researchers in complying with public access requirements; establishing unified benchmarks and metrics to monitor and evaluate public access policy implementation and iterative improvement; collaborating with stakeholders including publishers, libraries, museums, professional associations, researchers, and other interested non-governmental parties, and encouraging participation in federal funding agencies' public access plans; developing guidance on desirable characteristics of online digital repositories and sharing best practices; making federally funded research publications, research data, and other research outputs and their metadata findable, accessible, interoperable, and reusable through appropriate methods and strategies.

(9) Timeline

The new guidance sets clear timeline requirements for federal funding agencies to update their public access plans. All federal funding agencies must complete and submit their public access plans by December 31, 2024, with effective dates no later than December 2025. Specifically, agencies with annual R&D expenditures exceeding \$100 million must submit updated public access plans within 180 days of the guidance's release, while agencies below this threshold have 360 days.

4.2 Comparative Analysis of Key Dimensions with the 2013 Memorandum

The new guidance's key dimensions have undergone major changes compared to the 2013 memorandum. Table 1 compares the two policies across dimensions including embargo period, coverage scope (funding agencies, disciplinary fields, publications), deposit pathways, research data, data formats, metadata, usage and restrictions, allowable costs, coordination efforts, and timelines.

Dimension	2013 Memorandum	2022 New Guidance
Embargo Period	12-month embargo	Zero embargo
Funding Agencies	Federal agencies with annual R&D budgets exceeding \$100 million (approximately 20+ agencies) [22]	All federal agencies with external R&D budgets (estimated 400+ agencies) [21]
Disciplinary Fields	Basic and applied sciences	Basic/applied sciences and humanities
Publications	Peer-reviewed accepted author manuscripts	Research articles, accepted manuscripts, peer-reviewed book chapters, editorials, conference proceedings
Deposit Pathways	Repository not specified	Federal agency-designated repositories

Dimension	2013 Memorandum	2022 New Guidance
Research Data	Non-classified research data should be stored and publicly accessible; researchers within policy scope required to develop data management plans	Research underlying data associated with publications immediately accessible; other research data requires open sharing methods and timelines; repositories must meet NSTC standards
Data Formats	Standardized formats, widely available, non-proprietary archive formats, accessibility for persons with disabilities	Machine-readable, broadly accessible via assistive devices to support text/data mining and computational analysis
Metadata	Ensure public access to publication metadata at initial publication, interoperable with current/future search technology; links to full text and supplementary materials available after embargo	Detailed requirements for multiple metadata types including author, affiliation, funding source, publication date, unique persistent identifier, peer review status, agency-grantee linkage
Usage & Restrictions	Appropriate costs for data management and access	Must specify usage/reuse rights and restrictions including copyright attribution
Allowable Costs	Not specified	Publication costs and submission, data management, special handling costs
Coordination	No coordinating body designated	NSTC SOS responsible for inter-agency coordination
Timeline	Not specified	All plans due by December 31, 2024; effective by December 2025. Agencies >\$100M: 180 days; <\$100M: 360 days

The comparison reveals numerous deficiencies in the 2013 memorandum, including the 12-month embargo, limited coverage of federal agencies, focus solely on research papers, coverage limited to basic and applied sciences, unspecified deposit pathways, non-mandatory immediate openness of research underlying data, lack of specific metadata requirements, absence of usage and restriction conditions, and focus only on data management and access costs. In contrast,

the 2022 new guidance comprehensively expands and strengthens all dimensions, representing a fundamentally different and more forceful policy. The zero-embargo requirement is one of the most distinctive differences from the 2013 memorandum, reflecting the immediacy demand of open access. Additionally, the 2022 guidance significantly expands coverage across federal agencies, publication types, and disciplinary fields, and mandates immediate openness of research underlying data, fully embodying the comprehensiveness of open access. Regarding interoperability, the 2022 guidance requires machine-readable data formats, emphasizing operational and intelligent capabilities for data mining and analysis, while specifying various metadata types and strongly supporting persistent identifiers. The 2022 guidance also newly emphasizes publication cost support. Furthermore, it proposes requirements for deposit pathways, usage and restrictions, coordination efforts, and timelines, addressing deficiencies in the 2013 memorandum. The new guidance's provisions and requirements for key dimensions fully demonstrate the current U.S. federal government's emphasis on advancing open access.

4.3 Advantages, Disadvantages, and Embodied Trends

Through comparative analysis with the 2013 memorandum, the new guidance's main advantages are concentrated in the improvement and enhancement of key dimensional content. Specific strengths include: The zero-embargo requirement significantly improves open access timeliness, substantially expands agency coverage, enriches research publication resource types, and provides more comprehensive disciplinary coverage; Mandatory research data openness with immediate open access strategies for research underlying data associated with publications is key content, with immediate data openness being the factor most likely to positively impact research by facilitating dataset discovery and utilization and ensuring scientific authority; Explicit metadata specifications and strong support for persistent identifiers for the first time facilitate long-term preservation and public oversight of federal funding, researchers, and peer review; Increased support for open access costs, with newly emphasized provisions allowing agencies to include publication costs in budgets, providing financial support for OA publishing; Added and clarified coordination efforts through NSTC SOS guidance to advance multiple implementation priorities, particularly for standardizing repository construction and access; Clear timeline requirements for agencies to develop and implement public access plans, facilitating rapid advancement of U.S. open access and open science.

Despite breakthroughs across key dimensions, the new guidance still has shortcomings: No unified format for deposited publications [23]. Each federal agency must decide whether to support accepted manuscripts (AM) or versions of record (VoR), affecting deposit strategies and publication costs; Agencies independently decide to deposit publications in their designated institutional repositories without considering establishment of a relatively centralized open access exchange platform; Uncertainty regarding implementation costs and

management of immediate research data openness strategies, which are difficult to implement [24]. OSTP's economic impact report [5] did not estimate costs associated with implementing open research data strategies, which are harder to predict than publication costs. Data types vary across fields, and no digital archiving method currently suits all data types and formats. Additionally, privacy, competition, and national security concerns will affect research data openness, suggesting full implementation will likely lag behind research publications; Unclear usage and restriction conditions. The guidance does not specify concrete conditions, potentially leading to particular license requirements or inconsistent open licenses; Supporting publication costs may impact R&D budgets [23]. Allowing agencies to include reasonable publication costs in budgets may force cuts to research process funding if grant amounts remain unchanged. Whether additional appropriations will be provided and how to allocate budgets between R&D and publishing remain unanswered.

The 2022 new guidance improves upon previous public access policies. Although imperfect, it more fully embodies major trends in open access regarding embargo periods, coverage scope, and standardized development.

Immediate, zero-embargo open access to publicly funded research will become the norm. The new guidance establishes immediate, zero-embargo access as key policy language and purpose, distinguishing it from previous policies and representing the fastest national open access policy in U.S. history. In Europe, the important Plan S principle also states that “from 2021, all scholarly publications resulting from research funded by public or private grants from national, regional, and international research councils and funding agencies must be published in open access journals, on open access platforms, or made immediately available through open access repositories without embargo” [25]. In February 2023, the Swedish Presidency submitted a draft Council conclusion on high-quality, transparent, open, trustworthy, and equitable scholarly publishing to the EU Council, which was adopted in May 2023, urging member states to develop or update national policies to make publicly funded research papers immediately open as the norm, without author fees, and supporting non-profit academic publishing models [26]. Thus, immediate zero-embargo access is becoming an important international consensus and norm.

Research data openness will become a significant trend. The new guidance mandates research data openness, enhancing immediacy for research underlying data associated with publications and expanding openness to data beyond research underlying data. Additionally, NIH released its new data management and sharing policy during the COVID-19 pandemic in 2020 [27], requiring that from January 25, 2023, funded projects must include a data management plan and ultimately make research data publicly available to enhance sharing of NIH-funded research data. Research data openness demonstrates the comprehensive and in-depth development of open access.

Open access will develop toward greater standardization, normalization, and digitalization. OSTP's 2013 memorandum emphasized metadata

interoperability, and the 2022 new guidance further specifies various metadata types and digital persistent identifiers. Metadata standards remain crucial for long-term preservation and utilization of digital research publications. Public access policies repeatedly emphasize metadata specifications for open sharing, and beyond requiring immediate research underlying data openness, stress that research data infrastructure standards should follow NSTC's *Desirable Characteristics of Data Repositories for Federally Funded Research*. This demonstrates great emphasis on metadata and repository standards and specifications, with open access moving toward more standardized, normalized, and digitalized development.

5. Impact Analysis of the New Guidance

The new guidance proposes higher requirements for comprehensiveness, immediacy, usability, research quality and integrity assurance, and promotion of equity for institutions and individuals, bringing important impacts to federal funding agencies, the publishing landscape, and libraries.

First, the new guidance will accelerate the updating and formulation of public access policies across U.S. federal funding agencies. Federal agencies will provide OSTP and OMB with updates on their public access plans in 2023, implementing policy plans no later than December 31, 2025. Following the new guidance's release, agencies have responded actively, with NIH and the Department of Energy (DOE) both stating they will follow the policy and promptly develop and share their implementation plans [28][29], and the National Science Foundation (NSF) releasing Public Access Plan 2.0 in February 2023 [30].

Second, the new guidance's implementation will accelerate changes to academic publishing rules [31] and profoundly impact the publishing landscape. The impacts mainly manifest as weakening of traditional subscription models and development of various OA models. The zero-embargo policy and allowance for OA publishing expenses will directly impact and disrupt subscription models with paywalls. Designating institutional repositories as deposit and access pathways will continue supporting green OA development. Requiring immediate open access while allowing publication fees means gold OA publishing through article processing charges (APCs) also offers immediate open access advantages, making publishers more willing for authors to publish OA articles based on APCs, thereby promoting gold OA development. Additionally, the new guidance represents a major opportunity for native OA development, increasing additional APC revenue and expanding market share.

Finally, the new guidance will drive libraries to develop open access services. As federal funding agencies develop or update public access plans, libraries may need to provide open access-related services to comply with the new guidance, including services in scholarly publishing, storage, metadata and persistent identifiers, research data management, and consultation, requiring increased infrastructure construction and investment. The Association of Research Libraries

(ARL) and Association of College & Research Libraries (ACRL) held network listening sessions specifically on OSTP's new guidance and surveyed aspects of greatest library concern [32], with APC costs being among the most prominent issues. Libraries must therefore prepare for open access cost monitoring and estimation to assess implementation feasibility.

6. Enlightenment and Recommendations

In recent years, China has achieved certain results in open access policy formulation, institutional repository construction, and research data open sharing, but gaps remain compared with international developments.

Regarding policies, domestic open access policy formulation and implementation remain at the level of individual departments and institutions, lacking unified national-level open access guiding policies. Currently, China's open access is primarily led and promoted by the National Natural Science Foundation of China (NSFC) and the Chinese Academy of Sciences (CAS), which successively released policy statements in May 2014 requiring open access for funded project publications [33][34]. However, these policies need improvement, mainly reflected in: 12-month embargo periods; coverage limited to research papers without including other outputs like monographs, research reports, or patents; absence of research data openness requirements; simplistic requirements for metadata standards, data formats, and usage restrictions. These institutional policy requirements have difficulty keeping pace with current open access trends.

Regarding open access infrastructure, institutional repository construction is primarily university-based, with fewer repositories built by national ministries. Furthermore, the openness level of institutional repositories is low, with most university repositories used only for internal preservation and management of research outputs, rarely providing external public access.

Regarding research data open sharing, many domestic research funding programs do not explicitly require applicants to submit data management plans. Agencies such as NSFC, the National Office for Philosophy and Social Sciences, and the Ministry of Education's Social Sciences Department have not yet issued research data management and sharing policies for their funded projects. By contrast, many foreign funding agencies, including NSF, NIH, and UKRI, have detailed data management and sharing policies requiring applicants to submit data management and sharing plans. Therefore, domestic research funding agencies need to specify requirements for managing and sharing research data generated by projects.

Addressing these deficiencies and drawing on OSTP's new guidance, this paper proposes corresponding open access strategies and recommendations.

6.1 Issue National-Level Open Access Guiding Policies

OSTP's new guidance essentially serves as a guiding policy document that directs and supervises U.S. federal funding agencies in developing public access policies. China should also consider issuing national-level guiding open access policies through the General Office of the State Council to provide guidance for departments to develop specific open access policies. In developing such guiding policy documents, China should adhere to the principle of categorized advancement, fully articulating different open access policies based on funding sources and research types, forming a policy system combining priority and general levels, and standardizing corresponding policy text content.

Priority-level open access policies apply to basic research projects funded by central finance, involving primarily national ministries funding basic research, including the Ministry of Science and Technology (including NSFC and the Institute of Scientific and Technical Information of China), Ministry of Finance, Ministry of Education, and State Council-affiliated public institutions (such as CAS, Chinese Academy of Social Sciences, and Chinese Academy of Engineering). These entities should develop mandatory priority-level open access policies emphasizing “must” rather than “encourage” or “should.” Policy content should draw on OSTP's new guidance to impose strict requirements on embargo periods, publication versions, deposit pathways, research data, data formats, metadata, usage and restrictions, allowable costs, and monitoring and evaluation (see Table 2).

General-level open access policies apply to applied research and talent projects or enterprise-funded projects at provincial, municipal, and lower levels, involving primarily provincial, municipal, and district/county funded research departments and universities. These entities may develop general-level open access policies with encouraging nature, with appropriately relaxed requirements for embargo periods and monitoring and evaluation (see Table 2).

Table 2: Content Specifications for National-Level Open Access Guiding Policies

Element	Priority-Level Open Access Policy	General-Level Open Access Policy
Research Projects	Basic research projects	Applied research projects; Talent projects; Enterprise-funded projects
Responsible Entities	National ministries: Ministry of Science and Technology (including NSFC, ISTIC), Ministry of Finance, Ministry of Education; State Council-affiliated institutions (CAS, CASS, CAE)	Provincial, municipal, district/county funded research departments and universities

Element	Priority-Level Open Access Policy	General-Level Open Access Policy
Publication Types	Research papers, plus monographs, research reports, patents, and other research outputs	Research papers primarily
Disciplinary Fields	Basic sciences	Applied sciences, humanities
Embargo Period	Zero embargo, immediate open access	Immediate open access preferred, minimize embargo as much as possible
Deposit Versions	Both AM and VoR versions	Either AM or VoR version
Deposit Pathways	Project management-designated repositories AND institutional repositories of research output affiliations	Institutional repositories of research output affiliations
Research Data	Research underlying data associated with publications immediately accessible, with designated platforms and policies	Research underlying data associated with publications immediately accessible, with designated platforms and policies
Data Formats	Machine-readable, broadly accessible via assistive devices for interoperable and intelligent data mining/analysis	Machine-readable, broadly accessible via assistive devices for interoperable and intelligent data mining/analysis
Metadata	Including author, affiliation, funding source, publication date, unique persistent identifier for research output. Metadata standards should comply with international standards while considering domestic realities, particularly regarding persistent identifier standards and updates	Including author, affiliation, funding source, publication date, unique persistent identifier for research output. Metadata standards should comply with international standards while considering domestic realities
Usage & Restrictions	Conditions must comply with current international open licenses, such as Creative Commons Attribution license in Plan S [25]	Conditions must comply with current international open licenses, such as Creative Commons Attribution license in Plan S
Allowable Costs	Full support for open access publishing expenses	Partial support for open access publishing costs; full support for zero-embargo open access publishing

Element	Priority-Level Open Access Policy	General-Level Open Access Policy
Monitoring & Evaluation	Examine OA deposit or publication during project assessment and final acceptance; non-compliance results in measures such as reduced funding or disqualification from future applications	No mandatory requirements

6.2 Construct and Deploy National-Level Open Access Repositories

Open access repositories (including institutional repositories and preprint platforms) constitute the most basic open access infrastructure. OSTP's new guidance requires that publications from federally funded research be made freely and publicly accessible without embargo in repositories designated by federal funding agencies, meaning each agency must first build its own institutional repository to provide public access. Major U.S. federal funding agencies including NIH, DOE, Department of Defense (DOD), NSF, Department of Agriculture (USDA), and NASA have essentially built their own institutional repositories to store research outputs from funded projects, providing strong support for open access to federally funded research. NIH's PubMed Central is currently the world's most successful open access repository.

Given that China's institutional repository construction is currently university-based, China should consider constructing and deploying national-level open access repositories, with relevant national ministries playing exemplary and leading roles. NSFC is already taking action, having released the NSFC Basic Research Knowledge Repository in May 2015, launching the Science Fund Big Data Knowledge Management Service Portal in December 2016, and in 2022, building the NSFC Open Access Repository (OAR) modeled after PubMed Central to store and share research outputs from funded projects [35]. Additionally, standardized construction of open access repositories should be emphasized, particularly clarifying metadata standards, usage and restriction conditions, and data formats to promote repository discoverability, accessibility, interoperability, and reusability. NSFC has recognized the importance of standards during repository construction, announcing on June 1, 2023, the 启用 of the Basic Researcher ID (BRID) to clearly identify researchers related to science fund management, facilitate precise retrieval of funded outputs, and promote broad dissemination and open sharing [36]. Finally, repository openness should be improved. The current low openness level is not unrelated to policy deficiencies. With the promulgation and implementation of national-level open access guiding policies, the openness level of repositories built by various institutions should improve.

6.3 Promote Research Data Management and Sharing at the Project Level

OSTP's new guidance stipulates that research underlying data associated with publications should be immediately accessible, and that other data generated by federally funded research should also have open sharing methods and timelines. China should also strengthen management and sharing of research data generated by research projects.

China has already issued guiding documents on scientific data submission and management for national science and technology programs. In February 2018, the Ministry of Science and Technology and Ministry of Finance jointly issued the *Management Measures for National Science and Technology Resource Sharing Service Platforms* [37], proposing submission, organization, and preservation of scientific data formed by science and technology programs. In March 2018, the General Office of the State Council issued the *Measures for Scientific Data Management* [38], imposing mandatory submission requirements for scientific data generated by government-funded science and technology programs (special projects, funds, etc.), to be submitted by project lead units to relevant scientific data centers. To implement these requirements, the Ministry of Science and Technology and Ministry of Finance optimized and adjusted existing national science and technology infrastructure platforms in June 2019, forming 20 national scientific data centers to provide important carriers for scientific data open sharing [39].

National-level policies on scientific data submission and management for science and technology programs provide guidance for research project management departments to develop research data management and sharing policies. Management departments at all levels for science and technology programs (special projects, funds, etc.), including NSFC, the National Office for Philosophy and Social Sciences, and the Ministry of Education's Social Sciences Department, should develop specific detailed rules based on their projects' actual conditions, including: responsible entities for data submission, submission content, management and sharing plans, submission workflows, and submission schemes (specifying submission times, opening times, and sharing methods for various research data types) to promote policy implementation. Second, establish performance management and evaluation mechanisms for research data submission responsible units and individuals, linked to project support and personnel evaluation to motivate researchers' enthusiasm for data submission and sharing. Evaluation of research data submission and sharing completion should primarily examine whether submission was completed timely, whether submission quantity matches work plans, and the scientific validity, completeness, and effectiveness of submitted data.

The global open access movement is unstoppable, while China's open access development remains in early stages with certain gaps compared to Europe and America. Advancing the formulation and implementation of national-level

open access guiding policies is important for China's research output open access and exchange, and for enhancing China's international academic influence and discourse power. The launch of OSTP's new guidance provides profound enlightenment and reflection. In the open science development environment, China must continue efforts and exploration in policy improvement, open access repository construction, and research data sharing to integrate into the broader open science development trend and promote China's scientific openness and technological innovation.

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References: [1] Open Society Institute. Budapest open access initiative[EB/OL].[2022-12-02].<https://www.budapestopenaccessinitiative.org/read/>.

[2] Office of Science and Technology Policy. OSTP issues guidance to make federally funded research freely available without delay[EB/OL].[2022-12-02].<https://www.whitehouse.gov/ostp/news-updates/2022/08/25/ostp-issues-guidance-to-make-federally-funded-research-freely-available-without-delay/>.

[3] Office of Science and Technology Policy. Ensuring free, immediate, and equitable access to federally funded research[EB/OL].[2022-12-02].<https://www.whitehouse.gov/wp-content/uploads/2022/08/08-2022-OSTP-Public-Access-Memo.pdf>.

[4] Office of Science and Technology Policy. Memorandum for the heads of executive departments and agencies[EB/OL].[2022-12-02].<https://obamawhitehouse.archives.gov/sites/default/files/>

[5] Office of Science and Technology Policy. Economic landscape of federal public access policy[EB/OL].[2022-12-26].<https://www.whitehouse.gov/wp-content/uploads/2022/08/08-2022-OSTP-Public-Access-Congressional-Report.pdf>.

[6] Association of Research Libraries. ARL celebrates Biden-Harris administration's historic policy to make federally funded research immediately available[EB/OL].[2023-06-10].<https://www.arl.org/news/arl-celebrates-biden-harris-administrations-historic-policy-to-make-federally-funded-research-immediately-available/>.

[7] National Steering Committee. National principles for open access policy statement[EB/OL].[2023-06-10].<https://www.epa.ie/publications/research/previous-call-documents/National-Principles-on-Open-Access.pdf>.

[8] Liu Yan, Meng Shaoxin, Zhang Mixue, et al. Experience and Enlightenment of Scientific Funding Organizations in Promoting Open Access: A Case Study of UK Research and Innovation[J]. *Science-Technology and Publication*, 2020(09):137-143.

[9] UK Research and Innovation. UKRI open access policy[EB/OL].[2023-06-10].<https://www.ukri.org/publications/ukri-open-access-policy/>.

[10] Wang Yang, Shen Junjun, Jiang Zhen. Discussion on the Implementation of Germany's Open Access Strategic Planning[J]. *Digital Library Forum*, 2020(01):40-46.

- [11] European Research Council Executive Agency. *Guidelines on implementation of open access to scientific publications and research data*[EB/OL].[2022-12-02].<https://ec.europa.eu/research/participants/data/ref/h2020/other/hi/oa-pilot/h2020-hi-erc-oa-guide{en}.pdf>.
- [12] Zhang Yu'e, Wang Yongzhen. EU Research Data Management and Open Access Policy and Its Enlightenment: A Case Study of the EU Horizon 2020 Program[J]. *Library and Information Service*, 2017,61(13):70-76.
- [13] Open Access 2020. About OA 2020[EB/OL].[2022-12-02].<https://oa2020.org/be-informed/#about>.
- [14] SCHILTZ M. Why Plan S[EB/OL].[2022-12-02].<https://www.coalition-s.org/why-plan-s/>.
- [15] Zhou Lingyuan, Li Shuimao, Duan Longzhen. Review of National-Level Policy Progress on Open Access Abroad[J]. *Journal of Intelligence*, 2014,33(4):
- [16] Fan Hao, Wang He. European Open Access Policy and Its Enlightenment: A Case Study of "Plan S"[J]. *Research on Library Science*, 2019(9):37-43,73.
- [17] Zheng Erte. Research on University Library Open Access Policies Based on the ROARMAP Platform[J]. *Journal of Academic Library and Information Science*, 2022,40(03):100-106.
- [18] National Institutes of Health. NIH public access policy details[EB/OL].[2022-12-06].<https://publicaccess.nih.gov/policy.htm>.
- [19] UC Office of the President. UC secures landmark open access deal with world's largest scientific publisher[EB/OL].[2023-1-29].<https://www.universityofcalifornia.edu/press-room/uc-secures-landmark-open-access-deal-worlds-largest-scientific-publisher>.
- [20] The Big Ten Academic Alliance. The Big Ten Academic Alliance announces publishing deal with Cambridge University Press[EB/OL].[2023-1-29].<https://btaa.org/about/news-and-publications/news/2021/06/17/the-big-ten-academic-alliance-announces-publishing-deal-with-cambridge-university-press>.
- [21] Open Research Funders Group. Open Research Funders Group applauds bold OSTP action[EB/OL].[2022-12-26].<https://www.orfg.org/news/2022/8/29/open-research-funders-group-applauds-bold-ostp-action>.
- [22] SPARC. Fact sheet: White House OSTP Memo on ensuring free, immediate, and equitable access to federally funded research[EB/OL].[2022-12-26].<https://sparcopen.org/our-work/2022-updated-ostp-policy-guidance/fact-sheet-white-house-ostp-memo-on-ensuring-free-immediate-and-equitable-access-to-federally-funded-research/>.
- [23] Clarke & Esposito. Zero embargo[EB/OL].[2022-12-26].<https://www.ce-strategy.com/the-brief/zero-embargo/>.
- [24] RATNER H. OSTP 2022 Nelson Memo: My thoughts and observations[EB/OL].[2022-12-26].https://www.chorusaccess.org/ostp_{{2022}}_{{nelson}}_{{memo}}_{{thoughts}}
- [25] cOAlition S. Part I: The Plan S principles[EB/OL].[2022-10-29].<https://www.coalition-s.org/addendum-to-the-coalition-s-guidance-on-the-implementation-of-plan-s/principles-and-implementation/>.
- [26] Council of the European Union. *Preparation of the Council (Competitiveness (Internal Market, Industry, Research and Space)) on 22-23 May 2023 Draft Council conclusions on high-quality, transparent, open,*

trustworthy and equitable scholarly publishing-Approval[EB/OL].[2023-06-21].<https://data.consilium.europa.eu/doc/document/ST-8827-2023-INIT/en/pdf>.
[27] National Institutes of Health. *Data management and sharing policy*[EB/OL].[2023-06-10].<https://sharing.nih.gov/data-management-and-sharing-policy>.

[28] National Institutes of Health. *Statement on NIH plans to speed access to federally funded research results*[EB/OL].[2022-12-26].<https://www.nih.gov/about-nih/who-we-are/nih-director/statements/statement-nih-plans-speed-access-federally-funded-research-results>.

[29] U.S. Department of Energy Office of Scientific and Technical Information. *2022 OSTP public access Memo release*[EB/OL].[2022-12-26].<https://www.osti.gov/2022-OSTP-Public-Access-Memo-Release>.

[30] National Science Foundation. *NSF public access plan 2.0*[EB/OL].[2023-06-16].<https://nsf.gov/resources/nsf.gov/2023-06/NSF23104.pdf?VersionId=cSTD31SSPUEkM{Vm25HSlgZBDeil>

[31] cOAlition S. *cOAlition S welcomes the updated open access policy guidance from the White House Office of Science Technology and Policy*[EB/OL].[2022-10-29].<https://www.coalition-s.org/coalition-s-welcomes-the-updated-open-access-policy-guidance-from-the-white-house-office-of-science-technology-and-policy/>.

[32] Association of Research Libraries. *Library Associations Share Community response to White House Memorandum on public access to research*[EB/OL].[2022-10-29].<https://www.arl.org/news/library-associations-share-community-response-to-white-house-memorandum-on-public-access-to-research/>.

[33] National Natural Science Foundation of China. *Policy Statement on Implementing Open Access for Research Papers from Funded Projects*[EB/OL].[2023-06-16].<https://www.nsf.gov.cn/publish/portal0/tab442/info61625.htm>.

[34] Chinese Academy of Sciences. *Policy Statement of the Chinese Academy of Sciences on Implementing Open Access for Papers Published from Publicly Funded Research Projects*[EB/OL].[2023-06-16].<https://www.cas.cn/xw/yxdt/201405/P02014051655941425960>

[35] National Natural Science Foundation of China. *Open Tender Announcement for the National Natural Science Foundation of China Open Access Repository (Phase I)*[EB/OL].[2023-06-16].<https://www.nsf.gov.cn/publish/portal0/zfxgk/04/10/info87589.htm>.

[36] National Natural Science Foundation of China. *Notice on the Work Arrangements for Promoting and Releasing the Basic Researcher ID (BRID)*[EB/OL].[2023-06-16].<https://www.nsf.gov.cn/publish/portal0/tab442/info89446.htm>.

[37] Ministry of Science and Technology of the People's Republic of China, Ministry of Finance of the People's Republic of China. *Notice on Issuing the "Management Measures for National Science and Technology Resource Sharing Service Platforms"*[EB/OL].[2023-06-18].<https://www.most.gov.cn/xxgk/xinxifenlei/fdzdgnr/fgzc/gfxwj/gfxwj20>

[38] General Office of the State Council. *Notice of the General Office of the State Council on Issuing the Measures for Scientific Data Management*[EB/OL].[2023-06-18].https://www.gov.cn/gongbao/content/2018/content_{5283177}.htm.

[39] Ministry of Science and Technology of the People's Republic of China, Ministry of Finance of the People's Republic of China. *Notice on Publishing the Optimized and Adjusted List of National Science and Technology Resource Sharing Service Platforms*[EB/OL].[2023-06-

18].https://www.most.gov.cn/xxgk/xinxifenlei/fdzdgknr/qtwj/qtwj2019/201906/t20190610_{147031}.html.

Note: Figure translations are in progress. See original paper for figures.

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