Survey of Scientific Data Use Agreement Application in U.S. Universities and Implications: Postprint

Authors: Chen Yue, All are unremarkable., Zhou Qiong

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Abstract

[Purpose/Significance] Data use agreements serve as the link between providers and users of scientific data, forming the foundation for safeguarding the rights and interests of both parties. Understanding their concepts, content, and application status can provide references for domestic universities to undertake related work. [Method/Process] Thirty U.S. universities were selected, and web survey and text analysis methods were employed to analyze policies and measures related to data use agreements, summarize their application characteristics, and subsequently propose recommendations for Chinese universities to develop related work. [Results/Conclusion] The surveyed U.S. universities generally established specialized institutions responsible for data use agreement matters, and have built a relatively comprehensive support and guarantee system around the drafting, approval, and practical implementation of agreements. Chinese universities should standardize the main content of data use agreements, strengthen the connection between agreements and laws and regulations, adopt multiple approaches to construct an efficient service guarantee system, and form a practical application environment for data use agreements.

Full Text

Preamble

Investigation and Enlightenment on the Application of Scientific Data Use Agreements in American Universities

Chen Yue[1], Du Pingping[2], Zhou Qiong[1]
[1] Division of Information Technology and Management, China University of Mining and Technology, Xuzhou 221116
[2] China University of Mining and Technology Library, Xuzhou 221116

Abstract:
[Purpose/Significance] Data use agreements serve as the critical link between scientific data providers and users, forming the foundation for protecting the rights and interests of both parties. Understanding their concepts, content, and application can provide valuable references for domestic universities undertaking related work. [Method/Process] This study selected 30 American universities and employed web surveys and textual analysis to examine policies and measures related to data use agreements, summarizing their application characteristics, and subsequently offering recommendations for Chinese universities. [Result/Conclusion] The surveyed American universities have generally established specialized offices to handle data use agreement matters, creating relatively comprehensive support systems covering agreement drafting, approval, and implementation. Chinese universities should standardize the main content of data use agreements, strengthen their alignment with laws and regulations, adopt multiple approaches to build efficient service guarantee systems, and create practical application environments for data use agreements.

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Scientific data sharing promotes data reuse and maximizes data value. With increased research funding and enhanced innovation capacity, China has become a major producer of scientific data [1]. For example, the National Basic Science Public Data Center, jointly built by 37 research institutions under the Chinese Academy of Sciences, Ministry of Education, and Ministry of Industry and Information Technology, covers eight disciplines including physics, chemistry, and materials science, effectively promoting comprehensive data utilization and interdisciplinary innovation [2-3]. As of April 2021, the center had integrated 1.515 petabytes of data resources [2-3]. This data has also been widely downloaded and utilized by other countries, with cumulative data access and downloads from seven nations including the United States and Ukraine exceeding 25 terabytes, of which downloads from the United States alone reached 16 terabytes [5].

The state attaches great importance to scientific data, regarding it as a fundamental strategic resource [3]. In March 2018, the General Office of the State Council officially issued the *Administrative Measures for Scientific Data*, establishing an action plan for scientific data management in China and providing a policy basis for promoting data sharing [3]. However, at the operational level, the policy system for data usage remains incomplete, creating practical difficulties for researchers in data sharing and reuse. On one hand, as data providers, researchers lack standardized policies and legal frameworks to regulate data use, fearing their interests cannot be protected and worrying about potential ethical and legal issues arising from users' misuse or misinterpretation of data [6-8]. On the other hand, as prospective data users, researchers lack support channels when encountering obstacles in data applications [9]. Additionally, from the

perspective of research institutions, the uncontrolled outflow of sensitive data due to inadequate usage controls creates data security risks [10].

Data provision and usage are complementary. To promote open data sharing, certain regulations are needed to clarify the interests between data providers and users. Data Use Agreements (DUAs), as the link connecting providers and users, can adjust and constrain the rights and responsibilities of both parties, forming the basic guarantee for data sharing and utilization. Compared with open data licenses, DUAs have special characteristics: (1) they primarily cover restricted data involving sensitive information; (2) they are signed one-to-one between data providers and users, sometimes requiring negotiation of terms; and (3) beyond considering the rights of providers and users, they must also account for the rights of other individuals related to the data.

A Google Scholar search using "data use agreement" as the keyword with the time range set to 2016-2020 returned 333 records when the search domain was limited to U.S. educational institutions (by adding "site:edu"to the search query), but only 11 records when limited to Europe (by adding "site:eu"). Based on comprehensive analysis of these search results, this study selected several American universities to investigate their DUA application practices, including agreement texts, related mechanisms, and supporting measures, to summarize experiences and characteristics and provide references for improving scientific data use agreement policies in Chinese universities.

1 Research Status

Governments and research institutions have widely implemented open data initiatives, driving policy research in data sharing. Regarding open data licenses, domestic researchers have conducted detailed investigations and analyses of license types and applications [11-14], designing licensing frameworks suitable for China' s characteristics [15]. Research on data use agreements remains limited and fragmented, with most studies analyzing the compliance of agreements used on government data platforms [16]. Only a few studies touch upon DUAs within broader policy discussions, such as incorporating them into university data security protection frameworks [17] or utilizing them to ensure data citation [18].

International research has concentrated in three areas: (1) earlier studies focused on analyzing DUA compliance requirements, such as discussing compliance content from a software requirements engineering perspective [19] and identifying how excessive compliance restrictions may create conflicts with other requirements [20]; (2) as DUAs gained acceptance, research shifted to their application in different scenarios, including evaluating storage and usage qualifications for biomedical data [21], preventing genetic data leakage through dual authentication mechanisms [22], addressing the use of incompletely anonymized data [23], and promoting the reuse of qualitative research data [24]; (3) recent research has increasingly focused on problems in DUA implementation and solutions, including investigating barrier factors in agreement execution [25-26], optimizing

agreements periodically to eliminate adverse effects on data use [27], and accelerating approval processes by constructing and using agreement templates with fixed basic terms [28].

In summary, existing research addresses specific "point" issues concerning DUAs or discusses DUA-related topics within particular data sharing contexts. No comprehensive "surface-level" investigation and analysis of DUA application practices exists. Since American universities began applying DUAs earlier and generally provide relevant materials on their websites, this study selected several U.S. universities to investigate their scientific data use agreement applications, aiming to clarify DUA concepts, core elements, and supporting environments, and offer recommendations based on China' s actual conditions.

2 Definitions, Survey Methods, and Basic Data

This paper adopts the definition of scientific data from the *Administrative Measures for Scientific Data*, which includes data and derived data generated or collected through research, experiments, observation, surveys, or inspections for scientific activities [29]. Since "Research Data" is commonly used internationally, this term is directly translated when citing foreign literature, with equivalent meaning to scientific data.

Based on the 2021 U.S. News university rankings, the top 30 universities were selected for investigation. Using "data use agreement" as the keyword and each university' s domain suffix (e.g., mit.edu) as the search domain, Google was employed to locate relevant information on university websites, with the survey concluding in March 2021. As California Institute of Technology' s DUA information required institutional VPN access and could not be obtained, it was excluded and replaced by Tufts University according to the ranking order.

The investigation focused on the institutions responsible for DUA review, supporting measures, and related content. The collected information was organized as shown in Table 1 .

3 Concept and Application Scope of Data Use Agreements

3.1 Basic Concept of Data Use Agreements

Currently, no unified authoritative definition exists, and universities express DUAs differently. Analyzing these variations, the basic concept can be summarized from three aspects: legal status, regulatory content, and primary functions:

(1) **Legal Status:** A DUA is a legally binding contract signed between data providers and users [30-31].

(2) **Regulatory Content:** DUAs regulate user behavior regarding data acquisition, transfer, and use [32-33].

(3) **Primary Functions:** DUAs require researchers to use data in compliance with regulations to avoid legal violations [34] or inability to publish research results [35].

According to the survey, the University of Chicago and the University of Michigan are notable for mentioning "Data Sharing Agreement" alongside DUA on their websites. However, at the University of Chicago, the webpage containing "Data Sharing Agreement" is actually titled "Data Use Agreement." While the University of Michigan states that DUAs include data sharing agreements [36], its research administration' s DUA training documents do not mention this [37], and the agreement template provided on its website is titled "Data Use Agreement" [38]. Furthermore, a Google Scholar search for "Data Sharing Agreement" yields far fewer results than "Data Use Agreement," and the usage context of the former is essentially equivalent to the latter. Based on this analysis, mainstream universities tend to use the term "Data Use Agreement."

3.2 Application Scope of Data Use Agreements

Not all data usage requires a DUA. Data produced or collected by public institutions, or data not bound by commercial terms or patents, can be used under open data licenses. However, for research data in certain fields involving sensitive or confidential information, DUAs must be signed for access and utilization. When publishing DUA policies, universities specify the datasets covered, though definitions vary. Some universities adopt the Limited Dataset defined in the Health Insurance Portability and Accountability Act (HIPAA) as the specific dataset [30,34,40-41], while others extend this scope to other research data [33,42] or include all sensitive, restricted research data [32,43].

Based on these definitions, datasets requiring DUA management primarily include: (1) health information data (requiring removal of personal identifiers such as names, license plates, and social security numbers) [40,44]; (2) commercial data without explicit authorization documents, such as financial, economic, and business information [42]; and (3) other research data identified as sensitive or confidential by governments or funding agencies, such as questionnaires or interview data for psychological studies [24].

4 Main Content and Participants of Data Use Agreements

4.1 Main Content of Data Use Agreements

Among the surveyed universities, 10 publicly disclosed DUA samples. This study used NVivo software to code these samples. First-level coding employed open coding to analyze and extract key points line by line. These codes were then analyzed to identify relationships and ultimately categorized into seven secondary codes: general provisions, data-related rights, data usage requirements, agreement term and termination, usage verification and reporting, data-related liabilities, and other provisions. The coding hierarchy is shown in Figure 1 [Figure 1: see original paper], where block sizes correlate positively with the number

of reference points and coded items, annotated as "number of reference points (number of coded items)."

4.1.1 General Provisions

General provisions include term definitions and data use purposes. Defining terms in the agreement ensures all parties understand their specific meanings in context. For example, "data" includes experimental data [45], "limited dataset" adopts the definition from the *Standards for Privacy of Individually Identifiable Health Information* [46], and "HIPAA" refers to the Health Insurance Portability and Accountability Act [47]. Data use purposes limit data usage to specific projects, whose names must be listed in the agreement text or attachments [48].

4.1.2 Data-Related Rights

This section typically stipulates that data providers retain data ownership while users have the right to use the data for research within specified purposes [46,49].

4.1.3 Data Usage Requirements

As the core of the agreement, this section imposes requirements on user behavior throughout the usage process. For data acquisition, data must be used for specific projects [49], and new projects using the same data require reapplication [45]. For data management, users must comply with applicable laws and cannot transfer data to third parties through leakage, distribution, or sale, except for legally mandated disclosures [45,48]. Agreements emphasize data security and confidentiality, with specific requirements for particular data types. For privacy protection, they stress that data cannot be used to re-identify individuals or contact specific persons, with dedicated clauses addressing this [45,48,50-51].

4.1.4 Agreement Term and Termination

DUA templates vary significantly in term length, ranging from 10 years [50] to 3 or 1 year [52], with options for renewal based on project execution [45,49]. Some agreements specify terms lasting until all data are returned or destroyed [46] or until terminated according to clauses [47]. Given project diversity, parties must carefully consider the term during signing [53].

To protect both parties, most templates include termination clauses specifying conditions such as: (1) expiration without renewal; or (2) early termination by either party [45,48-50,52]. To promptly prevent violations, some templates allow providers to terminate immediately upon notifying users of material breach [45-47].

4.1.5 Usage Verification and Reporting

Agreements may allow providers to inspect users to monitor compliance [47]. Most require users to report any data leakage or violation within specified timeframes [45-47,49,51-52], sometimes including remedial measures [46]. Some templates require users to submit usage reports upon project completion or even if research objectives are not achieved [45].

4.1.6 Data-Related Liabilities

These clauses typically hold users liable for defending, indemnifying, and protect-

ing providers from losses caused by user breaches [45-47,51]. Some agreements include provider disclaimers, exempting them from liability for losses or claims from data use except as legally required [46].

4.1.7 Other Provisions

Beyond the above, templates include general terms such as usage of party names [47-50], governing law, amendment, and severability [45-46,48].

4.2 Participants and Relationships in Data Use Agreements

In DUA scenarios, universities can act as either data providers or users, while external institutions (research institutes, corporate R&D organizations, etc.) may also serve in either role. Within both provider and user organizations, two key entities are involved: management service agencies and researchers. All surveyed universities have established specialized offices responsible for DUA matters, providing consultation and review services. DUA review often involves multiple campus departments and sometimes requires negotiation with external organizations on specific terms [31-32]. These external entities may be data providers or prospective users. Researchers complete applications, draft agreements, and execute data provision or acquisition after signing. The business relationships among these parties throughout the DUA drafting, signing, and execution process are illustrated in Figure 2 [Figure 2: see original paper].

5 Supporting Measures for Data Use Agreements

5.1 Provision of Diverse Instructional and Training Materials

Due to regulatory compliance requirements, researchers preparing DUAs must consider numerous factors: which data require agreements, what materials to prepare, and how to use online submission/approval systems. To assist researchers, beyond Q&A sections on websites, universities have introduced innovative measures. Stanford University designed a DUA decision tree to help researchers determine when agreements are needed and where to submit applications [59]. The University of Michigan created quick reference cards presenting common questions, approval steps, and contact information for online approval systems in a concise format [60]. The University of Virginia recorded video tutorials demonstrating the online submission process step-by-step [61].

5.2 Networked DUA Approval Environments

Among the 30 surveyed universities, 12 have adopted online DUA application submission. Some have established management systems that fully digitize the application, review, and approval process. For example, Johns Hopkins University built the Agreement Workflow System (JAWS) [62], while the University of Chicago and the University of Pennsylvania established dedicated modules in their research management systems for faculty to submit research-related

agreements, enabling online staff review and allowing faculty to track approval progress [41,63].

5.3 Multi-Departmental Support Services

DUAs involve intellectual property, data security, privacy protection, and research ethics. Some universities have established cross-departmental mechanisms to coordinate DUA matters from an integrated research data management and security perspective. Princeton University formed a joint research data services working group comprising the library, academic affairs, and IT departments to incorporate usage management into the data lifecycle [64]. Vanderbilt University' s IT department collaborates closely with research administration to coordinate information security measures for DUA-covered data [32]. Duke University' s Interdisciplinary Research Initiatives Office provides protected data network services for graduate students, while its Research Data Security team handles data destruction per DUA or provider requirements [65].

6 Advancing DUA-Related Work in Chinese Universities

6.1 Standardizing DUA Content and Strengthening Legal Alignment

Drawing from American university experiences, Chinese universities should standardize DUA templates at the institutional level, focusing on core elements such as usage requirements, data rights, and term/termination conditions to avoid regulatory gaps and legal risks from insufficient domain knowledge among drafters and reviewers.

Legal requirements must be promptly implemented to ensure compliant DUA execution. First, following the *Data Security Law* Article 21 [66-67] and *Administrative Measures for Scientific Data* Article 20 [29], universities should promptly conduct scientific data classification and grading, establish data catalogs, and clarify dataset scopes, protection levels, and openness degrees to accurately reference data during DUA preparation. Second, per the *Personal Information Protection Law*, universities should review existing DUAs and datasets, renegotiate or terminate non-compliant agreements, and de-identify or encrypt datasets containing legally defined sensitive personal information to ensure lawful DUA execution [68].

6.2 Establishing Efficient Service Guarantee Systems

American universities prioritize DUA service support environments, with all surveyed institutions establishing specialized offices for template management, policy consultation, training support, and negotiation review. Nevertheless, surveys show that delays from DUA preparation to data delivery remain serious due to growing terms, complex compliance requirements, and increased cross-departmental negotiations [25].

Therefore, Chinese universities should prioritize efficiency in DUA implementation: (1) Establish cross-departmental coordination mechanisms for scientific data use management, integrating libraries, research administration, and IT departments to create one-stop service portals providing DUA policies, templates, Q&As, and training materials with interlinked business pages for efficient information access; (2) Leverage IT to comprehensively upgrade service capabilities, starting with online DUA approval and gradually introducing collaborative editing and electronic signatures, with future AI-powered knowledge bases for intelligent Q&A and text review [69]; (3) Avoid document-centric promotion, instead adopting diverse training formats using new media platforms like WeChat and short videos to enhance DUA outreach effectiveness.

The Fifth Plenary Session of the 19th CPC Central Committee proposed that data should participate in market allocation as a production factor to maximize utility. Promoting DUA application is not merely a departmental issue but a test of overall university governance capacity, requiring preparedness across policy, mechanisms, technology, and services to address evolving scientific data needs through continuous reflection and exploration.

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Author Contributions:
Chen Yue: Manuscript writing and revision;
Du Pingping: Research framework design and manuscript revision;
Zhou Qiong: Data collection, content analysis, and table preparation.

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