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Survey and Mapping Geographic Information Archive Informationization Management Construction Analysis

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Abstracts: With the rapid development of science and technology and the rapid accumulation of geographic information data, the management of surveying and mapping geographic information archives is facing increasing challenges. The traditional manual management mode makes it difficult to meet the needs of large-scale data processing and sharing, so information management has become a key strategy to improve the efficiency of data management and optimize the use of resources. In this context, this paper discusses the construction of informatization management around surveying and mapping geographic information archives. The key steps in the construction of information management include the nodes of technical infrastructure, data standardization and organization, digital conversion of archives, archive retrieval and query system, security and authority management, and continuous updating and maintenance of archives. At the same time, to promote the construction of information management, work can be started from the formulation of a comprehensive information management plan, the establishment of cross-departmental collaboration mechanisms, the strengthening of personnel training and technical support, as well as the establishment of a data quality management system, to meet the needs of multiple fields and to realize the greater value of data.

Keywords: mapping geographic information archives; informatization management

Introduction

As an important carrier for recording various spatial information on the earth's surface, surveying, and mapping geographic information archives carry rich geographic data and traces of human activities. These archives are not only of great value in the fields of geoscientific research, urban planning, and environmental protection but also play a key role in national defense and infrastructure construction. With the development of science and technology and the rapid growth of data, the traditional mode of geographic information archive management of surveying and mapping has revealed many shortcomings. Traditional manual management in the face of the huge amount of data, information complexity, and data sharing needs appears to be unable to do so, easily leading to information access difficulties, data redundancy, and a serious waste of resources and other issues. Because of this, informationization management has emerged as an important means of coping with management challenges in surveying and mapping geographic information archives.

1. Application and Challenges of Integrated management and Informatization in Surveying and Mapping Geographic Information Archives

1.1 Importance and management challenges of surveying and mapping geographic information archives

Surveying and mapping geographic information archives are of irreplaceable importance as precious resources for recording all kinds of spatial information on the earth's surface. These archives contain key information such as historical geographic

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data, geomorphological changes, infrastructure distribution, etc., which provide valuable references and support for geoscience research, urban planning, resource management, and other fields. However, the traditional archive management model faces many challenges, such as huge data that are difficult to manage, inefficient retrieval, and difficult data sharing, which not only limits the application value of archive data but also hinders cross-sectoral cooperation and innovation. Therefore, it is urgent to seek solutions for informatization management to fully release the potential of mapping geographic information archives and meet the growing demand for data.

1.2 Status quo of surveying and mapping geographic information archive management

At present, surveying and mapping geographic information archive management still mainly adopts the traditional manual management mode, facing a series of challenges and limitations. In this mode, archive data mostly exists in paper form, and the storage, retrieval, and sharing process is cumbersome, which easily leads to data loss, damage, or repeated storage. At the same time, with the continuous increase of geographic information data, the efficiency and scalability of the traditional management mode are gradually limited, and the timeliness and accuracy of the data are difficult to ensure. In addition, cross-departmental collaboration is limited and data isolation is widespread, affecting decision-making and research in related fields. Therefore, there is an urgent need to turn to informatization management and use modern technology and methods to improve the integration, sharing, and application efficiency of archive data, to better meet the needs of multiple fields.

1.3 The role of informatization management in surveying and mapping geographic information archives

Informatization management has a far-reaching role in surveying and mapping geographic information archives. First of all, informatization management can greatly improve the accessibility and sustainability of archive data. Through digital conversion and database management, archive data can be stored online and retrieved at any time, thus avoiding the risk of damage and loss of paper archives and guaranteeing the long-term preservation and effective use of data (Shen et al., 2020). Secondly, information management can optimize the integration and sharing of data and promote collaborative work between multiple departments. By establishing a unified data standard and metadata system, different departments can share data resources more efficiently, avoid repeated data collection and redundant storage, promote data integration and aggregation, and facilitate cross-departmental cooperation and decision-making accuracy. Finally, informatization management strengthens data security and privacy protection. The use of data encryption, permission control, and other security measures can effectively prevent unauthorized access and leakage and protect sensitive information from malicious attacks (Li, 2020). At the same time, informatization management also helps to establish a perfect audit mechanism to track the use and operation of data and ensure the legal and compliant use of data. Therefore, informatization management brings efficient data management, cross-departmental cooperation, data security, and other benefits to the surveying and mapping of geographic information archives, and plays an important role in improving the level of archive management and data value.

2. Steps for the Construction of Informatization Management of Surveying and Mapping Geographic Information Archives

2.1 Technical infrastructure

The technical infrastructure is the foundation of informatization management, including the selection of appropriate database systems and the construction of network architecture. Selecting a suitable database system is crucial for storing and managing massive geographic information data, and a relational database, non-relational database, or spatial database can be selected according to the data characteristics and needs. Meanwhile, building a stable and efficient

network architecture is also the key to ensuring data transmission and sharing, and factors such as network bandwidth, security, and scalability should be considered.

2.2 Data standardization and collation

Data standardization and collation are key steps to ensure data quality and consistency. Before data are imported into the system, data from different sources need to be cleaned, unified in format, and supplemented with metadata to ensure the accuracy and comparability of the data. The development of unified data standards and coding systems helps the interoperability and sharing of different data.

2.3 Digital conversion of archives

Converting paper archives into digital form is a key step in improving data accessibility. This can be achieved using scanning, shooting, etc. At the same time, the text information in the images can be converted into searchable text data with the help of OCR technology, thus facilitating retrieval and utilization.

2.4 File retrieval and query system

The establishment of an efficient archive retrieval and query system can greatly enhance the efficiency of data utilization. Using technologies such as full-text search and keyword indexing, users can quickly find the information they need. In addition, combined with geographic information visualization technology, the data can be displayed visually through maps and other means to enhance the user experience.

2.5 Security and permission management

Ensuring the security and privacy of archive data is an important aspect of information management. The use of data encryption, user authentication, permission control, and other measures can protect the data from unauthorized access and leakage. Setting up access rights for different users and assigning different data operation privileges according to roles can help maintain data integrity and security.

2.6 Continuous updating and maintenance of files

Informatization management is not a one-time task but requires continuous data updating and maintenance. Establish a regular data update mechanism to update new data, repair and clean up old data promptly, and guarantee the timeliness and accuracy of data. At the same time, data quality monitoring and repair are implemented to ensure that the data are always in good condition.

3. How to Promote the Construction of Informatization Management of Surveying and Mapping Geographic Information Archives

3.1 Formulate comprehensive informatization management planning

The development of a comprehensive informatization management plan is a key step to ensure the smooth progress of the project. First of all, it is necessary to clarify the objectives and scope of the project and determine the required resources, budget, and time plan. All aspects of the needs should be fully considered in the planning, including technology, personnel, equipment, etc., to ensure the comprehensiveness and feasibility of the planning (Wang & Li, 2019). In addition, the planning stage needs to clarify the key indicators and outcomes of the project for subsequent evaluation and monitoring. Determine the milestones of the project and divide the tasks and priorities of different phases to provide a clear direction for the advancement of the project. The sustainability of the project also needs to be taken into account when formulating the plan to ensure that information technology management can continue to develop and evolve in the long term. The development of a comprehensive information management plan also requires extensive consultation and advice from relevant departments and personnel to ensure the scientific and consensual nature of the plan (Yao, 2019). In the planning process, expert meetings, workshops, and other forms can be organized to brainstorm and gather the wisdom of all parties to make the planning more comprehensive and effective. Formulating a comprehensive information management plan is an important step in promoting the construction of information management of mapping and geographic information archives. Only under the guidance of

clear planning can the project advance in an orderly manner, achieve good results, and realize the efficient management and application of data.

3.2 Establishment of cross-departmental collaboration mechanism

The process of informatization management, involves data sharing, collaborative work, and resource integration of multiple departments, so it is necessary to set up a special mechanism to coordinate the cooperation of all parties. A cross-departmental informatization management committee or working group can be set up, consisting of representatives from all relevant departments, responsible for coordinating the work of informatization management. This mechanism can coordinate the cooperation between different departments, solve problems and conflicts in the process of collaboration, and ensure the smooth progress of the project. Cross-departmental communication channels can be established to facilitate the flow and sharing of information. Information can be shared and exchanged through regular meetings, communication platforms, or workflows so that various departments can understand the progress and needs of the project and thus better cooperate. In addition, the establishment of a cross-departmental collaboration mechanism can also help enhance project transparency and compliance. Through joint participation in decision-making and supervision, information asymmetry and lack of clarity can be reduced, and the efficiency and quality of cooperation can be improved (Han, 2015). The establishment of a cross-sectoral collaboration mechanism is an important means to promote the construction of informatization management of mapping and geographic information archives. An effective collaboration mechanism, can promote cooperation and communication between different departments, realize information sharing and integration, and thus promote the construction of information management to achieve good results.

3.3 Strengthen personnel training and technical support

Informatization management introduces new technologies and work processes, which require relevant personnel to have corresponding knowledge and skills. For personnel involved in information management, systematic training is needed to familiarize them with the new systems, tools, and operating procedures. The training may include the use of the system, data entry and query methods, security measures, and other aspects. Through training, the efficiency of personnel can be improved and the risk of operational errors can be reduced, thus better supporting the implementation of information management. To solve the problems and difficulties encountered in the process of use, timely technical support needs to be provided. A specialized technical support team is set up to answer users' questions, deal with technical failures, and provide operational guidance. Technical support can be carried out through online platforms, hotlines, etc., to ensure that users can receive timely help and support in the process of use (Zhang & Sun, 2019). In addition, organizing user training and technical seminars regularly can continuously improve the technical level and application ability of personnel. By sharing the use experience and best practices, it can promote learning and communication between different departments and promote the continuous optimization and innovation of information management. Strengthening personnel training and technical support is an important part of promoting the construction of informatization management of mapping and geographic information archives. Through training and support, personnel can be better adapted to the new way of working to ensure the smooth progress of the project and achieve good results.

3.4 Establish a data quality management system

Data quality is directly related to the effectiveness of informatization management and the credibility of data application, so a series of measures need to be taken to ensure the quality of data. Uniform data standards and specifications can be formulated. Through the development of standardized processes for data collection, collation,

validation, and other aspects, to ensure that data are handled consistently in different departments and links, to avoid data inconsistency and confusion (Li, 2010). Establish data validation and cleaning mechanisms. Before data are imported into the system, data validation and cleaning are performed to exclude erroneous and incomplete data. Data validation tools and algorithms are used to detect outliers and conflict points in the data to improve the accuracy and completeness of the data. At the same time, a data quality monitoring and evaluation system can be established to regularly check and evaluate the quality status of data. Data quality indicators and evaluation standards are set up to conduct regular quality assessments of data, identify problems, and repair them in time. With the help of data quality tools and systems, continuous monitoring and analysis of data can be realized to ensure that the data is always in good condition. In addition, it is important to establish a responsible system for data quality. Clarify the responsibilities and roles of each department and personnel in data quality management, and ensure that there is a person in charge of data quality in each link. By establishing a responsibility system, the management and guarantee level of data quality can be improved (Geng, 2023). Establishing a data quality management system is a key step in promoting the construction of information management by mapping geographic information archives. Through standardization, validation, cleaning, monitoring, and other measures, the accuracy, completeness, and consistency of data can be ensured to provide high-quality data support for information management.

Summarize

The informatization management of surveying and mapping geographic information archives has been deeply discussed and analyzed in this paper. Through informatization management, the accessibility, sharing, and security of archive data have been significantly improved, effectively promoting the ability of multi-departmental cooperation, data integration, and decision-making support. Informatization management brings efficiency, convenience, and accuracy to archive management, thus providing stronger support and application value for geoscience research, urban planning, resource management, and other fields. The construction of informatization management in surveying and mapping geographic information archives is not a once-and-for-all process, but a process of continuous optimization and innovation. The renewal of technology, the constant change of data, and the continuous evolution of demand require us to maintain a keen awareness of continuous improvement and innovation. Only by focusing on technological innovation and business practice while continuously promoting information management can we ensure that the mapping geographic information archives always maintain their efficient, safe, and sustainable management status and give full play to their great role in various fields.

Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

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