RESEARCH ON SCIENTIFIC DATA SHARING AND DISTRIBUTION POLICY IN ADVANCED MANUFACTURING AND AUTOMATION FIELDS

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ABSTRACT

Scientific data sharing is a long-term and complicated task. The related data sharing and distribution policies are prime concerns. By using both domestic and international experiences in scientific data sharing, the sources, distribution, and classification of scientific data in advanced manufacturing and automation are discussed. A primary data sharing and distribution policy in advanced manufacture and automation is introduced.

Keywords: Distribution policy, Advanced manufacturing and automation, Data sharing

1 INTRODUCTION

Actualizing scientific data sharing in the advanced manufacturing and automation fields in order to enhance our independent innovation capability will significantly improve technological levels and product quality in Chinese manufacturing industries and accelerate national economic development.

Scientific data sharing is a long-term and complicated task. The related data sharing and distribution policies are important concerns. A research project on advanced manufacturing and automation, organized and guided by the Ministry of Science and Technology, has been in operation since 2002. Through three years of extensive research, the current status of the data resources is clear, and the overall schemes and standards of the project are presented in this paper. Using both domestic and international experiences in scientific data sharing and based on the features of data production, distribution and classification as well as the factors of users and database-building investors, a primary data sharing and distribution policy in advanced manufacture and automation is introduced.

2 FOREIGN EXPERIENCES ON SCIENTIFIC DATA SHARING AND DISTRIBUTION POLICY

In the past 20 years, many studies have been done in the developed countries regarding the policies, regulations as well as the mechanisms of data sharing on information publication, sharing, management, rights, protection of interest, and secrecy control. Specific practices in every country are not the same because of differing situations, but they all have one point is in common - based on data classification, different sorts of sharing services are offered according to factors such as investors, users or user purposes. Citizens can use data, information data, or information which comes from government funded and invested sources at no cost. It will be important for us to use foreign experiences for reference when actualizing our scientific data sharing.

3 ANALYSIS OF FACTORS IMPACTING ON DATA SHARING AND DISTRIBUTION

Scientific data are issued, distributed, and applied to generate economic and social benefits and to realize real value in different ways. Data sharing policy making should be the most important part of the whole scientific data sharing project.

The prerequisites are to do no harm to the benefits of the state and the organizations who build the databases and to effectively protect intellectual property to achieve the normative management of the scientific data and the best use of data and value-added services. Therefore, many factors need to be considered, such as the goals of investors of scientific data (state data, enterprise data, and state-owned enterprise data), data users (official

activities, public service, and business users), data properties, etc. For the intrinsic properties of scientific data only, factors, such as the availability of scientific data (e.g. metal corrosion data generated over years and even decades), their economic value, scope of application, processing patterns (preformed data, finish machining data, special processed data), confidentiality, etc., need to be referenced.

4   SOURCES AND DISTRIBUTION CHARACTERISTICS OF SCIENTIFIC DATA IN ADVANCED MANUFACTURING AND AUTOMATION

Investigation and analysis of scientific data resources in advanced manufacturing and automation show that the data are generated by institutes and colleges engaging in related studies. Scientific data comes mainly from the following sources:
(a) Fundamental research programs funded by the Ministry of Science and Technology and the National Natural Science Foundation;
(b) Science and technology programs funded by the former Ministry of Machinery and Industry;
(c) Large-scale state projects and programs;
(d) Database programs undertaken by relevant institutes and colleges;
(e) Industrial and academic institutions, associations, and individuals in related specialties.

Scientific data in advanced manufacturing and automation not only have the common characteristics of other scientific data, such as being a public good, sharable, and value-added but also have their own characteristics, such as being long-term, application oriented, and marketable, which have to be taken into account when making data sharing and distribution policies in these fields.

5   CLASSIFICATION OF SCIENTIFIC DATA IN ADVANCED MANUFACTURING AND AUTOMATION

To study the distribution policy of scientific data, the first job is to classify the data and then make different policies of issuance and distribution for various applications. Advanced manufacturing and automation belong to the engineering technology field. To classify the data in this field, considerations should be given to different viewpoints regarding the scientific, natural, economic, and social attributes, etc.
(a) By their scientific attributes, data can be classified into five themes such as modern design technology, advanced manufacturing process, automation technology, general technology, and modern management techniques.
(b) By their natural attributes, data can be classified from the following aspects such as data acquisition methods, processing levels, and availability.
(c) By their economic attributes, data can be classified according to the differences of investors and investment costs.

6   RECOMMENDED DISTRIBUTION POLICY

Integrated with the features of scientific data resources in advanced manufacturing and automation, based on scientific data classification criteria, and considering various impacts comprehensively, data distribution can be divided into three styles: sharing for free, sharing at cost, and sharing at commercial price. Considering that some data are connected to the defense industry and military applications, which are involved in national security, and also taking the protection of intellectual property into consideration, distribution operates in both open and secret environments.

The distribution policy for specific data is a simple function of a series of factors, such as ownership, processing level, cost, degree of secrecy, user objectives, and social attributes. The importance of each factor is analyzed in order to fix its weight in the function. By quantifying each influencing factor, the result of the distribution policy is determined. By plotting out the thresholds of the distribution policy, a suitable policy is made from the attributes of sharing for free, sharing at cost, and sharing at commercial price.

Scientific data classification and distribution policy play an important role in the mechanism of data sharing. A strong operating policy is required in practice. Therefore, further in-depth research needs to be followed and continued.

7 REFERENCES

Ad-hoc Group on Data and Information, International Council for Science and the Committee on Data for Science and Technology, Geneva, Switzerland (1997) *Principles for Disseminating Scientific Data.*

Chen, J., & Wang, C. (2003) *Consideration on Mechanism of Scientific Data Sharing.* China Basic Science.

Committee on an Information Technology Strategy for the Library of Congress (2000) *A Digital Strategy for the Library of Congress.* National Research Council: National Academy Press.

Huang D. & Guo, Z. (2002) *Research on Management of Scientific Data Sharing.* Beijing: Science and Technology of China Press.