

Thinking about the Quality Evaluation System and Mode Design of GIS

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SUMMARY

Aiming at the current quality supervision requirements of Geographic Information System in the high-speed of the geographic information industry, basing on the importance and necessity analysis of Geographic Information System testing and quality evaluation system establishment. The goal, content and framework of GIS will be on the schedule.

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1. INTRODUCTION

In recent years, the geographic information industry in China has experienced a rapid growth. According to the Development Report of China's Geographic Information Industry in 2011, the annual output value of the geographic information industry in China will exceed 200 billion Yuan by the end of 2015. As the pillar and important part of geographic information industry, Geographic Information System (GIS) in China has entered the stage of rapid development and also gained popularity in a variety of governmental organizations and industries. Besides providing technical support such as the spatial information and spatial analysis for the decision-making process, the software and hardware of the GIS in China has covered a complete series of products ranging from large-scale basic platforms to various application systems, hence playing an important role in the national economy and social development. What is more, more efforts should be made to engage in the building of the quality evaluation of GIS so as to bring the technical support of the standardization in the geographic information industry into full play, improve the quality of the basic GIS and professional GIS, promote the industrialization of the GIS application software, intensify the management of the GIS technology and product as well as push forward the healthy development of GIS.

2. SOME REFLECTION UPON THE QUALITY EVALUATION OF GIS

The quality of GIS should be reflected in various features. It also refers to the capability of GIS to satisfy the explicit or implicit requirement. The quality evaluation of GIS should be based on the quality model of GIS and specific procedure and also aims to offer a systematic survey and overall evaluation of the GIS quality. Generally speaking, the GIS is known as a complex software and hardware system featured by the human-computer interaction. The quality of GIS should be reflected in the systematic function and performance during the whole process including the system design, development and operation.

The major task of the quality evaluation of GIS is to study the evaluation technologies such as the quality model, quality element (sub-element) and quality evaluation process, draw up the evaluation standard of GIS quality as well as establish the basic guarantee system for the GIS quality evaluation from the perspective of the mechanism, technology, standard and environment.

Based on the inherent feature of the GIS, the GIS quality model will be built from the angle of system function and overall performance, quality control, user satisfaction degree and fitness as well as the social and economic benefits.

3. THE MODEL DESIGN OF GIS QUALITY

The quality elements of GIS are known as a series of features of those entities making up the GIS. Based on the analysis of the system structure, quality feature and evaluation dimension of the GIS, a group of GIS quality elements have been determined, which are known as the function, safety, efficiency, reliability, usability, compatibility, normativity, benefitability and satisfaction degree. They have constituted the basic framework of the requirement definition and quality evaluation of GIS. The sub-element of each quality element will be presented in the figure below.

3.1 Function

In the condition of normal operational environment and evaluation environment, the system should be able to realize the explicit and implicit functions required by the quality evaluation, including the integrity and accuracy of the system function as well as the ability of complying with the standard, regulation and law related to the function.

3.2 Safety

The safety is known as a group of attributes related to the safety of the system. It has also reflected the ability of the system or data preventing the unauthorized or unexpected access.

3.3 Efficiency

In the standard operational condition and environment, the single function point or multiple function points will constitute the key business procedure. According to the amount of resource being used, the GIS should provide the performance abilities, such as the response time processing, the utilization of the resource of appropriate quantity and category as well as adhering to the relevant standard or regulation related to system efficiency.

3.4 Reliability

In some special cases such as the failed or illegal interface and system breakdown, the GIS should be able to maintain the capability in the required level.

3.5 Usability

The usability refers to the ability of the GIS being understood, studied, used or appealing to the user in the normal environment.

3.6 Compatibility

The compatibility refers to the ability of GIS functioning across the platform, operating system, network server, browser and other software.

3.7 Normativity

The normativity should include the realization degree of design goal, the standard degree of system development and quality control as well as the rationality and advancement of the hardware, network and technology. The normativity is the indirect reflection of the GIS quality.

3.8 Benefitability

The GIS system should be able to create the economic benefit for the user (the enterprise) and contribute positively to the social development (the user being the government or non-profit organization).

3.9 Satisfaction

It refers to the satisfaction degree of the system operator when the GIS is put into operation.

GIS Quality Model			
Function	Function integrity Accuracy of function realization Compliance of function and standard	System interface and visualization Database building and management Spatial query and analysis Drawing and data output	Attributes
Safety	Physical safety Access controllability Data security Backup and recovery	Physical environment Authority and access control Log management and key strategy Backup and recovery	Attributes
Efficiency	Time feature Resource utilization Efficiency compliance	Load pressure test Response time and throughput Concurrent performance Memory and resource utilization	Attributes
Reliability	Fault tolerance Recoverability	Mean time between failures Mean downtime Mean recovery time	Attributes
Usability	Intelligibility Easy to learn Easy operation Attractability	User's manual Help file Installation test Interface test	Attributes
Compatibility	Across operating system ability Across network server ability Across browser ability	Support and compatibility of data format	Attributes
Normativity	Rationality of technical design Standard of development process Advancement of hardware network Originality of overall system	Quality system certification Development and testing file Hardware system performance Network system performance	Attributes
Benefitability	Economic benefit Social benefit	Scientific value Decision-making ability	Attributes
Satisfaction	User unit Satisfaction System operator Satisfaction	User unit Satisfaction System operator Satisfaction	Attributes

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4. CONCLUSION

With the widespread application of GIS in various industries and the growing scale and function complexity of the GIS system, a variety of GIS systems have been different from one another in terms of software and hardware system, database content, function performance and system safety. All of those factors have posed a great challenge to the quality guarantee of the GIS. In order to evaluate the quality and grade of GIS in an objective and scientific manner, measure the quality of industrial product as well as promote the healthy development of geographic information industry, it will be a task of great significance to carry out the quality evaluation of GIS.

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