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Concept of Quality of Information Systems In International Legislative Acts

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ABSTRACT: The article defines the information system (IS) and serves to describe its types. It shows the specificity of data processing from the point of view of security management and indicates the relevance of the objectives of quality determination for IS. The thorough analysis of international legal acts shows that there is no any single term or set of criteria that can form the basis of the methodology for IS quality assessment.

KEYWORDS: Information systems, quality of information systems, security of information systems.

I. INTRODUCTION

Information system (IS) - an interconnected set of information, technical, software, mathematical, organizational, legal, ergonomic, linguistic, technological and other means, designed to collect, process, store and issue economic information and make management decisions [1].

In the State Standard of Uzbekistan of 2012, IS is defined as an organizationally ordered set of information resources, information technologies and communications that allows the collection, storage, retrieval, processing and use of information [2].

A number of foreign authors of IS are considered as a system of user machines to support the management process, operations and decision-making in the organization defined by the information system as a set of interrelated elements or parts that store, process, retrieve and disseminate information to support control and management [3].

In this case, information processing means are considered not only any equipment, including tangible data carriers containing data for their storage, but also personnel who serve the controlled process [4].

Data processing is directly provided by software, which includes [5-8]:

- system software designed to maintain the functioning of the information system or increase the efficiency of its work in the process of using additional programs;
- application software designed to solve problems in a specific area of the information system.

In addition, separately among the application programs, one can distinguish control software, supervisor programs, drivers, etc.

When deploying IS in organizations, software solutions can be used both from different manufacturers — combined solutions, and from one vendor — platform-based solutions. In practice, combined solutions are most often encountered [9-13]. However, the integration of software products from various manufacturers often leads to a significant complexity of the architecture of the information system due to the heterogeneity and complexity of the interaction between automation tools. Also, the combined solution complicates the process of servicing the information system.

An important task of any information system is to ensure data organization - presentation and data management (a set of functions to ensure the necessary presentation of information, its accumulation and storage, timely updating, deletion, search by various criteria).

The data management process is associated with the storage, processing, presentation, transmission of information through various communication channels. Moreover, depending on the tasks, these functions have specific features for various information systems.

For example, when solving business automation tasks, the following functions are assigned to the information system:

1. In the field of information processing:

- creation of accounting and tax documentation;
- accounting for the movement of invoices for goods and services;



- formation of financial statements;
 - creation of analytical reporting on business processes.
2. In the field of information storage:
- storage of previous system configurations;
 - storage of accounting documents, etc.
3. In the field of information transfer:
- reporting to regulatory authorities;
 - creation of an internal document management system;
 - sending data to counterparties (suppliers or customers).
4. In the field of data visualization:
- visualization of analytical reports for management;
 - tabular presentation of various management information.

At the same time, organizations of various fields of activity prefer to use such information systems that provide a variety of ways to enter information, the ability to keep records of several legal entities for tax optimization purposes, several types of accounting, as well as adaptability and the ability to use ready-made configurations.

II. THE RELEVANCE OF ASSESSING THE QUALITY OF IP IN TERMS OF SECURITY

The legal documents also emphasize that one of the types of information management is to ensure its security.

The goal of IP security is to maintain its required level. In accordance with international law and the legislation of the Republic of Uzbekistan, IP protection is carried out in order to:

- ensuring information security of the individual, society and the state;
- preventing leakage, theft, loss, distortion, blocking, falsification of information resources and other unauthorized access to them;
- preventing unauthorized actions to destroy, block, copy, distort information and other forms of interference with information resources and information systems;
- maintaining state secrets and confidential information contained in information resources [14].

Hereinafter, the term "information security" will be understood as the state of information security, in which its confidentiality, integrity, accessibility, and reliability are adequately ensured. The level of information security will be understood as the level of security of the above properties.

Integrity, accessibility and reliability are initially inherent in information, i.e. are its internal characteristics. Moreover, confidentiality is a consequence of the use of protective equipment, therefore, from this point of view it is an external (transcendental) property.

The properties of confidentiality, integrity, availability and reliability are supported by the corresponding security services, i.e. a set of methods, procedures, mechanisms and other types of information protection that provide a given level of information security, or determine the fact of an attack.

Ensuring the security of information in any organization involves the identification of probable sources of threats and vulnerabilities that may be affected by the corresponding threat. If a corresponding vulnerability is found for a threat, then there is a risk of an impact on information security.

In accordance with international standards [15], information security risk refers to a possible threat to exploit the vulnerability of an information system, causing damage to security services. To quantify the amount of risk (R) can be done by multiplying the probability of the threat (V_r) and the size of the alleged damage (S).

$$R = V_r * S$$

Countering threats to information security should be based on the use of effective protective equipment [16-19].

Information security tool (IST) - hardware, software, substance and / or material designed or used to protect information. The following information protection measures are implemented by the SIS: legal (laws in force in the country, decrees and other regulatory acts that govern the rules for handling information and responsibility for their violations), organizational (regulating the functioning of the data processing system, the use of its resources, staff activities, as well as the procedure for user interaction with the system), hardware and software (electronic devices and special programs) and physical (mechanical, electro- or electronic-mechanical devices and structures). Sometimes cryptography is singled out as a separate category of measures.

Based on the foregoing, it can be concluded that various tasks are assigned to modern IPs, the successful implementation of which has a significant impact on the activities of its operating organization. At the same time, the



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efficiency of the information system decreases with a low level of information security of IS. The operation of weakly protected systems can lead to loss, unauthorized changes, information leakage, which minimizes the result of automation of all processes within the organization.

In this regard, the task of assessing the quality of IS is relevant at each of the design stages, both when choosing components and means of protection, and during operation, when it is necessary to maintain the system's operability and security.

III. DEFINITION OF THE CONCEPT "QUALITY OF AN INFORMATION SYSTEM"

There is currently no single definition of the term "IP Quality" in the state standards of the Republic of Uzbekistan and the CIS countries, as a result of which each scientist in his scientific works on IP quality management interprets it in his own way. However, according to the analysis of work on this topic, it was revealed that quality is an integral cumulative indicator.

A number of authors designate the term "quality of IS" [21-22] as "an integrated property of the quality of the functioning of the system", highlighting environmental requirements and factors affecting the result of using the information system. The factors that characterize the requirements of the external environment include reliability, integrity, etc. The second type is efficiency, functionality, ease of use, technical processes in the system, etc.

The most popular opinion regarding the issue under study is determining the quality of IP through the quality of the information that is processed in it. For example, in [23-27], an approach to assessing IS quality from the perspective of semiotics is considered. Thus, the following groups of properties of IS characterizing its quality were distinguished: pragmatic, semantic, syntactic. Also, a number of authors indicate that the quality of IS depends primarily on the technical condition of the information flow; the level of process optimization in IS; the degree of duplication of information and the effectiveness of the process of correcting errors in the information stream.

From the foregoing, it can be concluded that there is no single view on the set of indicators for assessing the quality of IS, and the available approaches do not fully take into account the specific features of the task of assessing the quality of IS, primarily the presence of subjective uncertainty associated with the need for widespread use of expert information. In addition, the significant disadvantages include the inconsistency of the methods proposed by the authors with the global quality management standards described in the ISO 9000 series of standards, which not only contain a definition of the concept of "quality", but also include an exhaustive description of indicators that affect him. The elements of IS quality assessment considered earlier either do not correlate with the terms of the standard, or do not take into account the significant ones (for example, the assessment of system security).

International standards of the ISO 9000 series describe the basic principles and stages of the development and implementation of a quality management system (QMS), which in turn made it possible to organize certification activities at the international level. At the same time, it is assumed that in certain areas of activity or regions, their own legal acts developed on the basis of ISO 9000 and related to quality management began to appear. For example, in the Russian Federation there are state standards ISO / IEC 27000, on the basis of which enterprises can implement an information security management system to effectively manage the level of information security.

A single view on the definition of the term "IS Quality" based on international standards ISO 9000 will contribute to the formation of a holistic information field on quality issues and the creation of a system for certification of information systems in terms of quality in the future. The presence of such a certificate, issued at the state or international level, will confirm that a certified IS allows organizing the processes of storage, processing, transmission of information, and its protection at the proper level. This ultimately raises the status of the organization-owner of IS in the eyes of their partners and customers.

According to ISO 9000-2011, "quality is the degree to which the set of inherent characteristics meets the requirements", for example, requirements established by a person or group of decision makers (DM). Thus, the quality of IS is a subjective indicator that directly depends on the requirements that the organization makes to the system [28].

A previous version of the ISO 9000 standard, dated 1994, states that reliability and safety are some of the elements of quality. In the case of IS, we can say that these two parameters relate to users and maintenance personnel.

In the Russian state standard of 1989, the term [29] "reliability" characterizes the property of an object to retain the values of all parameters characterizing the ability to perform specified functions under any conditions of use. At the same time, the document noted that reliability is a complex property, which, depending on the purpose and conditions of use of the facility, may include failure-free operation during the service life, longevity until the service life is reached, maintainability, or various combinations of these properties.

For IP, there are no standards that govern reliability indicators. The reliability analysis of IP is carried out separately for each of its subsystems. This takes into account the level of reliability of all its software and technical



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elements. The following indicators can be distinguished as indicators of IS reliability:

- reliability of the implementation of system functions.

This parameter can be characterized by single indicators (for example, the number of failures when performing the i -th function) or an integral indicator (for example, the system's readiness coefficient for performing the i -th function).

- danger of emergency situations in the system.

To describe the reliability of IP in emergency situations, they use complex reliability indicators:

- danger of an emergency during a time interval (for example, the probability of an i -th emergency occurring in the system per unit time).
- the danger of an emergency during an external impact (for example, the likelihood of an emergency in the system resulting from external influences).

To describe the durability of IS, you can use the indicator of the average resource of use and the average life of the subsystem or system as a whole.

At this stage, it should be noted that to evaluate the above indicators, you can use statistical methods or indicators at a specific given point in time.

In this case, it is necessary to take into account the parameter characterizing the security of IS for users (the state of user protection during operation of the system against threats associated with damage to mental and / or physical health).

To determine the list of secondary indicators of assessing the quality of IS, an analysis of foreign regulatory acts of the subject area and scientific literature was carried out, as a result of which integrity and structure were highlighted. It is important to understand that IS can have properties that are not inherent in its subsystems, which makes it possible to call IS an emergent system, therefore, quantitative indicators of IS properties may not be the sum of similar properties of its components and subsystems. In addition, the components can influence each other both from a positive point of view and from a negative one, strengthening or weakening each other's indicators. A striking example of this situation is the use of incompatible software, which paralyzes the operation of the entire IS. Therefore, it is incorrect to consider IS as a combination of its individual components.

The authors also note the functional properties of the information system, among which they highlight the suitability for completing the tasks. Separately, among the properties of IS, one can also distinguish integrability, divisibility and security.

IV. AGGREGATE QUALITY CRITERION FOR AN INFORMATION SYSTEM

For all the variety of disparate properties and definitions, in the scientific literature and legal acts there is no specific list of criteria for assessing the quality of IP. In this regard, an attempt was made independently, based on data obtained from various sources, to formulate the concept of "quality of IP" and its components (Fig. 1)

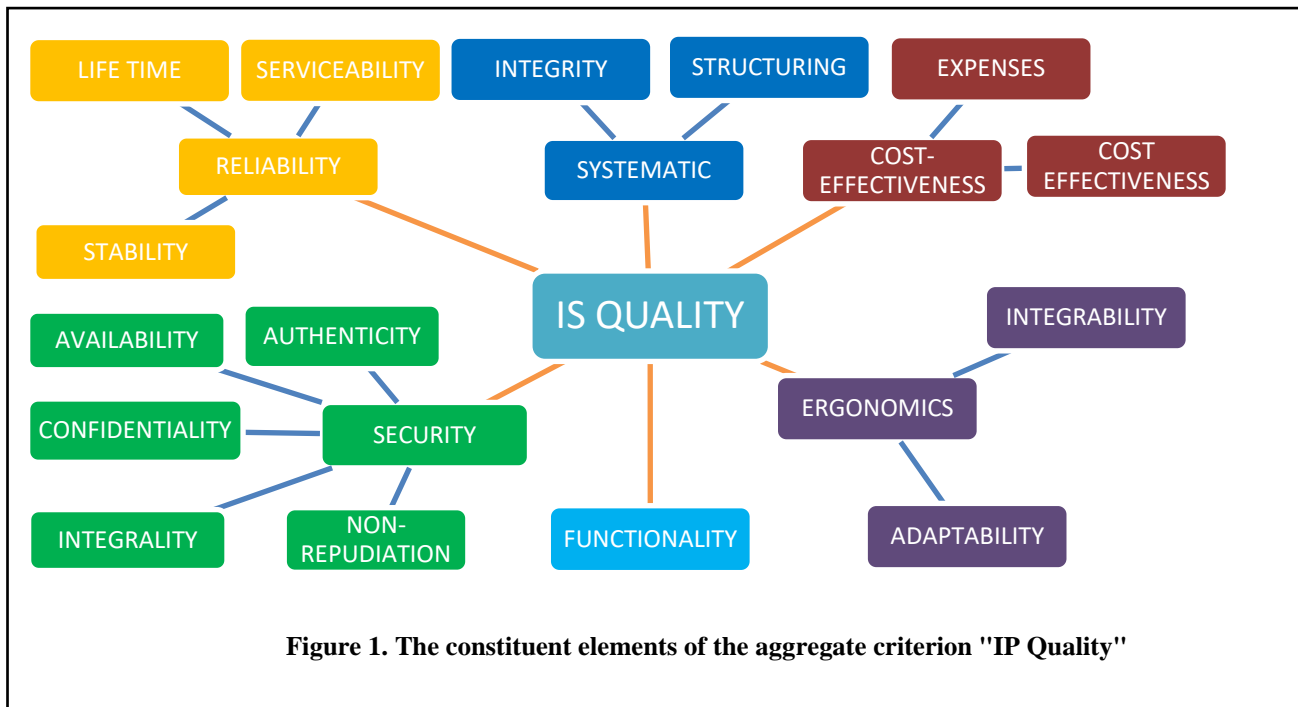


Figure 1. The constituent elements of the aggregate criterion "IP Quality"

Thus, as a result of the analysis of the scientific literature and regulatory legal acts, the criterion “quality of IS” was formulated, which is characterized by the following parameters: ergonomics, efficiency, systematicity, reliability, safety, functionality. In turn, each of them can be characterized by additional parameters. This makes it possible to define the term “IS quality” as an aggregate criterion.

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