# CONTENT OF INFORMATION SYSTEMS

In the structural-elementary aspect, any information system contains: * hardware;

* software;

* information resource; * human resource.

The actual content of each of these elements of the system and the nature of the relationship between them will be determined by many factors, both economic and consumer properties, and the technological order.



Hardware

Computer devices

Communication devices



Software

System

Application

**INFORMATION SYSTEM**

Fig. 10.1. The elemental composition of the information system



Information resource

Data

Metadata (Data of data)



Human resource

Usage

Maintenance

**Hardware,** i.e., **a set of technical means,** can form various hardware platforms for an information system: personal computers, servers, specialized computers (for example, database machines), mainframes, supercomputers and other computing systems and networks from local to global scales. Communication equipment in the IS provides data exchange between computers and the distribution of system resources to various users. It includes wired and wireless communication channels, network equipment, communication nodes (routers, etc.), transmit-receive devices (modems, antennas, etc.).

**Information systems software** is usually divided into system software (software) and application software.

System software includes:

* operating systems, device drivers, and operating shells that provide a given level of user interface;

* network software (network operating systems);

* programming systems (a set of tools for creating and operating programs on a specific programming for a computer class);

* utility software, system tests, control (monitoring) and diagnostics programs, active and passive data protection tools, and other system administration tools.

Application software includes:

* standard software - focused on task classes (text, table and graphic editors; general-purpose database management systems (DBMS) and report generators; web-servers; information retrieval systems; document management programs, etc..);

* specialized - software for a specific class of information systems or even a specific IP that has a narrow purpose (expert, accounting and other systems oriented to a specific subject area, as well as designed to support any particular business process).

**An information resource** is the main component of the domain model: all incoming, internal, and outgoing information in the IP, forming two categories - data and metadata. Data is a part of an information resource that is used by end users of IP. Metadata is a description of the properties of this data, which allows the information system to correctly operate with them (types of quantities, the set of valid values, valid operations, internal presentation formats, units of measurement, etc.).

For example, in text information systems, data are collections of documents written in natural languages. In this case, metadata is thesauri and specifications of ontologies (systems of concepts connected by various relationships).

In Web-based information systems, data is various XML documents presented on Web sites, databases, and other documents. Metadata - descriptions of XML document schemas, their semantics and ontology.

In information systems based on database technologies, the data itself are structured two-dimensional and multidimensional data arrays and the metadata are the schemes of these databases and descriptions of the properties of the data contained in them.

**A human resource** is the staff of an enterprise engaged in the operation and maintenance of information systems. The organizational and staffing of information system can be different depending on the scale of the enterprise and the characteristics of the IP subject area. However, information system personnel always function in the following areas of their production activities:

* maintenance of computer equipment and telecommunication networks; * development and maintenance of IP software;

* information processing, computing and data storage; * consultations and support for IP end users.

With significant amounts of processing and storage of data in the structure of the enterprise, such units as an information center (IC), a computer center (CC) and others can be formed as independent ones.

In the functional-technological aspect, the structure and content of the information system can be represented as a set of supporting subsystems (Fig. 10.2):



OBJECTS INFORMATION SYSTEM

Informational –

technological processes

Subsystems: Functional- technological maintenance

legal (laws)

staffing

ergonomically

Generating data results

organizational

Data processing

mathematical

linguistically

software

Generation of data arrays

technological

technical

informational

Collection and registration of data

The accumulation and storage of data

Data transmission

External environment

Subject of management

Fig. 10.2. Functional and technological content of the information system

Managed object

* **information support** is a set of decisions on the volume, location and organization of information circulating in information system. It includes elements of a unified system of classification and coding of information, unified documentation systems, a methodology for building databases and schemes of enterprise information flows. The basis of information support is an automated data bank, which is a repository of various kinds of information with a certain

mode of functioning of the system for protecting information from unauthorized access;

* **technical support** - a set of technical means, information systems hardware platform

* **technological support** – a set of regulations that determine the functioning and use of technical, software and information support, establish the sequence of actions leading to the receipt and use of the desired result, as well as sets of relevant documentation for technical means and technological processes necessary for the normal operation of IP;

* **software** – set of data processing system programs. General software includes operating systems, programming systems, utility programs. Functional software is the software implementation of specific functions of an information worker using various information technologies, that is, setting up automated workstations of various kinds, database management systems (DBMS), multimedia, expert systems, etc. using special programming tools. Service programs provide a range of services to ensure the operation of computers and software.

* **linguistic support** is a complex of natural and artificial languages with means of their support (lexical and translation dictionaries, thesauruses, etc.). Linguistic support serves to represent information resources (IR) in the system; descriptions of the properties of IR and the environment for an adequate interpretation of IR by an information system; ensuring user interaction with IP; * **mathematical methods -** models and algorithms for implementing the goals and objectives of information system, as well as the normal functioning of a complex of technical means. The software includes control process modeling tools, methods and tools for solving typical control problems, optimization methods of the studied management processes and decision making (multicriteria optimization methods, mathematical programming, mathematical statistics, queuing theory, etc.);

* **organizational support -** a set of enterprise units and regulations for their activities in the field of informatization, methods and means of interaction of personnel with information system and with each other;

* **staffing -** a set of human resources of a certain qualification and professional experience engaged in the operation and maintenance of a specific information system;

* **legal support -** a set of legal norms that determine the creation, legal status and functioning of information systems, their goals, objectives, structure and functions that govern the legal procedure for obtaining, converting and using information, as well as legal support for other types of activities related to information system;

* **ergonomic support -** a set of methods and tools used to create optimal conditions for highly effective human activities in the field of information technology (requirements for jobs, information models, working conditions for personnel, as well as a set of the most appropriate ways to implement these

requirements and carry out ergonomic examination of the level of their implementation; a set of methods, educational and methodological documentation and technical means designed to justify the formulation of the requirements knowledge of the level of staff training, the formation of a system for the selection and training of information personnel; a set of methods and techniques that increase the efficiency of human activities in AIT).

The composition of the supporting subsystems does not depend on the chosen subject area, and the supporting subsystems themselves, therefore, are common to the entire IS, regardless of the specific functional subsystems (such as, for example, ―accounting‖, ―logistics‖, etc.), in which these or other types of collateral apply. The orientation of the functioning of subsystems is to ensure the implementation of the goals and functions of the information system.