Modern approach to enterprise information systems

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Abstract. As computing systems and facilities evolved, and as they expanded into industry, it became necessary to integrate specific computing devices and information systems built on them into single information-computer environments. At the same time, the developers of information computation system (ICS) faced many problems.

1. Introduction
The variety of hardware, in terms of architecture, process control, processor capacity, command and data system, etc., led to the construction of physical interfaces that ensured the compatibility of different devices [3]. As the number of types of integrable devices increased, the complexity of designing a physical interface also increased significantly [4]. In heterogeneous programming environments, with a variety of operating systems, such features as differences in capacity required the creation of software interfaces between systems and devices. However, it has not always been possible to achieve the perfect compatibility of software products that have been developed in a particular software environment with those developed in another environment. At different communication interfaces within the “person-computer” complex it is necessary to constantly adjust software and hardware standards, as well as to ensure continuous re-training of employees [5].

2. Principle of openness
The principle of “openness” of the automated information system was formulated as a result of solving these problems. The compatibility among systems has led to a large number of international agreements and standards in the development of information systems. The so-called open systems have emerged.

The open system is now understood as many agreed international standards and requirements for information technology, as well as standards that define the specifications of interfaces, services and formats that support them. This ensures mobility and interaction between personnel, applications and data.

Based on this understanding, it is possible to unify the content of the open system environment for a variety of uses. The OASIS organization is now a generally recognized focal point for the development of open systems and harmonization of these standards.

Among the general properties of open systems, the following are usually identified:
• scalability/expandability ensuring a fundamental opportunity to expand the information system with new features or modify existing features with the remaining features unchanged [2];
• portability-mobility enables data and programs to be migrated when system hardware platforms need to be replaced or upgraded, and enables IT users to work with them without retraining in case of system changes;
• interaction: allows interaction with other information systems (technical means of the information system are combined into a network or several networks of different levels);
• standardization: design and development of the information system takes place on the basis of agreed international proposals and standards, while the realization of openness takes place on the basis of functional profiles (standards) in the field of information technologies;
• user-friendliness implies the unification of interfaces within interaction processes, which enables a specialist to work without special IT education.

The modern view of open systems is characterized by the fact that the listed properties are considered as interrelated and their implementation is carried out in a complex manner. Such an approach appears to be natural, as all of these properties are complementary. The problems related to design, development and implementation of modern automated information systems can only be solved through such an approach.

The following two main interacting components can be distinguished in the structure of any system:
• functional component, which includes programs implementing application functions;
• system component (or environment) that supports the execution of applications.

With such division, the following two sets of questions of standardization are interrelated:
• standards of interfaces related to the interaction between application programs and IS environment (API);
• standards related to the interaction of the information system with external environment (EEI).

Figure 1. Seven levels of the information system
These two sets of interfaces define specifications for the external description of the system landscape. The external environment interface specifications and interface specifications of the information system component are accurate descriptions of all required functions, formats, and services of a particular interface. The set of these descriptions provides a Reference Open System Model.

3. Reference OSI model
The reference model has been applied for many years and is set by special SNA (system network architecture) architecture suggested by IBM in 1974. It is based on 7 layers of the computing environment, and the interaction between layers is described by appropriate standards. There is also a link between levels regardless of how the level is designed in each implementation (Figure 1). The main advantage of this model is the detailed description of the relationships in the environment in the context of communication interactions and technical devices. However, it does not take into account the relationship in the context of software mobility.

For open systems, the OSE/RM model (which is a reference) sets the division of the information system into different applications (application programs and software packages) and the environment for the operation of these applications. Standardized interfaces (API) are defined between the environment and applications forming the necessary part of the profiles of each open system. You can also define interfaces in information system profiles to unify the interaction of the functional parts, as well as the interaction interfaces of the information system environment components.

Alongside with the information system environment models discussed above it is important to develop an information system model that takes into account users, data, functions and communications. This ensures the “end-to-end” process of system development and maintenance at all stages of its operation, as well as the possibility of correct selection of standards for IS development and documentation of projects.

Figure 2. Ontological view of a modern corporation

Any company is a complex ontological (conceptual) structure that consists of a given set of relationships and entities (Figure 2). A company’s activities include many interactions between structure elements that are defined by business logic and fixed in a set of business rules. The
information system is designed to “reflect” rules and logic, while transforming and organizing information flows, automating data and information processes, and visualizing performance in multiple reporting forms. Therefore, when you develop an information system, you create an enterprise business model. This model represents a formalized mapping of a corporation and its information system.

4. Conclusion
The “communication language” of corporate managers, developers, consultants and potential users is formed during model creation thus allowing developing a unified concept of the corporate management system.

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