BASIC PROCESSES OF TECHNOLOGICAL BASIS IMPROVEMENT OF INFORMATION-COMMUNICATION SYSTEMS

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Introduction

The end of the twentieth and the beginning of the new century was a time of rapid technological change in the information and communication sphere. Today, to a large extent, the market itself stimulats various technological innovations and changes, which are the necessary response to different consumer demands for voice, video, information and use of information resources. At the same time, the communication infrastructure is relegated to the background, giving way to a variety of services, databases and information resources implemented on the basis of that infrastructure. Essentially, there is a process of improving the technological basis of information and communication systems, that form and develop the intellectual superstructure of the information society [1, 2].

The main part

The evaluation of the results of the movement to the information society, achieved at different stages of the transition, is based on monitoring the development of the information environment with the help of different indicators. Some of them are evaluative in nature, while others are in the process of processing statistics. The most common indicators are correlated with the parameters of socio-economic development (GDP per capita, the share of spending on education in the state budget, the parameters of aggregate solvent demand for information products and services, the size of investment in high-tech industries, the percentage of employed in the field of information processing and information computing service). The other group of indicators characterizes the development of the technological base of the information society and its individual components directly. For example, the dynamics of growth in the number of Internet users, the number of Ukrainian-language websites and the Internet, the capacity of the information market can be used. For the same purposes, there should be used

statistics on the number and types of databases, the number of operating libraries, cultural information and educational centers equipped with computer equipment, the number of subscribers of these libraries and centers, including in remote regions, the number and types, communication channels, number and types of telecommunication networks and their connected terminals in the country as a whole, regions, regions, organizations and enterprises, forms of ownership. The positive dynamics of these indicators over an average of 10-20% over a year or several years will indicate a continuous development of the technological basis of the information environment. The extent and depth of consumption of information and communication technologies, information products and services in different spheres of public life should also be assessed: in the sphere of work and employment, organization of everyday life and leisure. Taken together, these exponents and indicators will characterize the country's consistent progress along the path to the information society [3, 4].

The process of formation and development of the information society in Ukraine has a global character and the inevitable entry of our country into the information community. In technical and technological terms, the main attention should be focused on: formation and development of information and communication infrastructure of the society, ensuring the implementation of processes of creation, preservation, dissemination and use of information and providing access to it by the general population; improvement and development of the system of national information resources and technologies of access to them (databases and databases, archives, libraries); improvement and development of computing resources (home computers, system and application software, service system, etc.); improvement and development of telecommunication resources (lines and channels of communication of all kinds, communication equipment, complexes of transmission systems and equipment, computer telephone communication); creation and development of new information, computer and telecommunication technologies that ensure the process of collection, accumulation, transfer of information, its integrity, accessibility and confidentiality); improvement and development of technical base and media technologies (computer equipment for electronic and print media, radio and TV studios, transceivers, etc.).

The national policy of development of the information society in Ukraine is based on the following principles: priority of the national-technical and innovative

development of the state; formation of the necessary legislative and favorable economic conditions; publicly available information infrastructure, information resources, and universal access to telecommunications services and information and communication technologies; promoting the diversity and quantity of electronic services, ensuring the creation of publicly available electronic information resources; improvement of human resources; enhancing motivation for the use of information and communication technologies; widespread introduction of information and communication technologies in science, education, culture, health care, environmental protection.

On August 21, 2019, a technology presentation "Electronic Ukraine" was held in Kyiv, in which the unique achievements of Ukrainian scientists, technologists and industrialists in the field of development and implementation of electronic ID-documents and IT-systems were presented.

They are all part of the Industrial Innovation Group (IIG), which is recognized as the world leader in this field. During the technological show, the IIG TOP Managers declared their readiness to set up an Electronic State system in record time in Ukraine. In confirmation of this, the Industrial Innovation Group of Companies demonstrated its technological and production capacities, emphasizing that in the process of creation of electronic Ukraine our state does not need any foreign technologies and any technological assistance: in the eyes of all present four documents were produced at once - ID-card , driver's license, foreign passport and vehicle technical passport. It is part of the range of services for the development of elements of "electronic Ukraine" and the closed cycle of production of electronic documents that create the technological basis for all services of e-government.

Today there is an active formation of a single global global economic, legal, information space to ensure the free and efficient business activity of all entities on the Internet.

The global information space includes a system of supports (services), the most important of which are:

• Data / Computation Services - means of placing data and transporting them between applications, access to computing and network resources;

• Information Services - means of submitting, processing, storing and accessing information;

• Knowledge Services - means of accumulating, submitting, restoring,

publishing, finding and processing knowledge.

Service is the economic category of process and product unity, characterized by the combination of processes of creating and consuming a service (material services), as well as the physical form of the process and product of labor in creating a service (intangible services). The service is a business activity aimed at meeting the needs of consumers.

An important type of information services are Web services provided to users through Web technologies. In a broad sense, with the support of ICT, Web services are a standardized way of integrating applications that operate on the basis of XML, SOAP, WSDL and UDDI standards. Web services serve to communicate heterogeneous applications based on the use of common standards and protocols. With Web services, the features of any application are made available over the Internet, meaning you can create distributed applications whose components will interact freely with each other. This makes it possible to provide joint services to enterprises without having to change their economic and technological base [2, 4].

Sometimes the terms "Service Oriented Architecture (SOA)" or "Web Services Architecture (WSA)" are used to describe Web services.

To implement Web services, you must provide:

• interoperability of information systems providing and receiving Web services;

• support for Internet protocols and technologies;

• standardization of interfaces;

• support for different programming languages;

• support for a distributed environment.

The standardization and specification of Web services contribute to the creation of a unified electronic environment, which is the economic and technological basis for globalization of the world economy and integration of business participants, information, business processes, production on a planetary scale.

It is advisable to distinguish the following principles of transformation of traditional business into electronic (known international concept "4C"): 1) commerce; 2) content; 3) community; 4) collaboration.

The ways in which transactions are concluded change - they become electronic; information is provided and processed electronically, and methods of interaction between organizations and people, businesses and markets are also

becoming electronic. The evolutionary process of development of the world economy can be demonstrated in the form of a diagram, which shows the stages of development, each of which, based on the previous, represents a new level of integration of business processes and the way of business organization (Fig. 1).

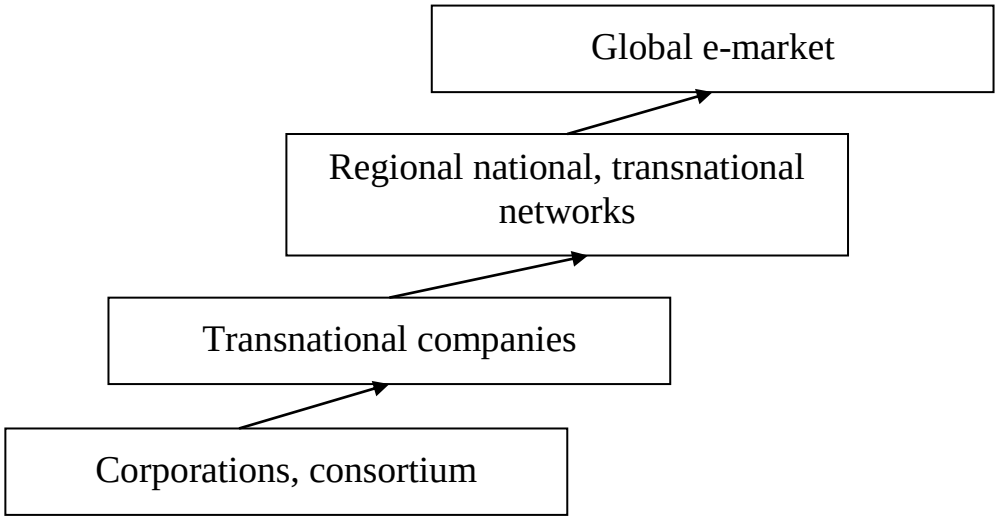

Fig. 1. **Stages of development of electronic business**

The modern era can be called the era of business process management, and the decisive factor in improving efficiency nowadays is the optimization of expanded business processes and unloading of business processes, covering both internal areas of activity of the enterprise and external.

Information and Communication Technologies (ICTs) are becoming more business-oriented, and the value of these technologies is measured not so much by their technological excellence, but by the quality of the business processes that are formed on the basis of these technologies. The global nature of ICTs and their widespread usage are increasingly determining the structure of the economic system, affecting labor productivity as a whole and the revenue generated. Businesses use tools that allow them to easily and quickly build optimal business process models around the strategy.

With the help of Web services, the company distributes component applications in such a way that they ensure efficient production activity of all business areas, taking into account the requirements of all structural units and even all participants of business processes.

Intermediary exclusion enables telecommunications and the Internet to select the most profitable suppliers and consumers, helping to successfully co-exist with

small businesses alongside large corporations. This factor attracts small and medium-sized businesses to the globalization processes, promotes the specialization of international labor.

Telecommunication business networks that carry out corporate governance of autonomous entities in the information economy are of particular importance.

The concept of Web services emerged in the late 1990s and has become the industry standard in the ICT field. Web service standards are developed by companies such as IBM, Microsoft, Ariba, Sun Microsystems, SAP with the support of the W3C Consortium. Within the W3C, the Web Services Architecture Working Group was set up to publish a glossary of terms in the field of Web services.

Web services use XML to communicate data across applications, regardless of operating system, hardware platform, or developer. A web service is a set of logically related functions that can be programmatically invoked over the Internet. Web service is a program that is identified by a URI whose interface can be represented in XML.

Web Services are a software-implemented system for supporting intercomputer communication of telecommunications networks, supported by the following standards: SOAP (Simple Object Access Protocol) - messaging protocol; WSDL is a language for describing Web services programming interfaces; UDDI (Universal Description, Discovery and Integration) is a classifier of Web services.

The ICT implementing the Web Services architecture is shown in Fig. 2.

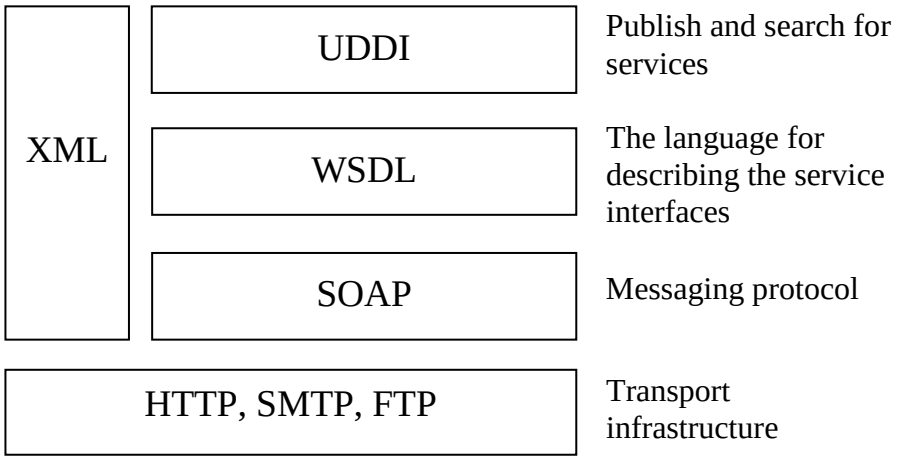

Fig. 2. **Technologies of implementation of Web-splitters**

Dynamic, flexible Web services simplify business processes for businesses and enable them to quickly find business partners. The concept of enterprise web cache architecture has the following advantages:

• optimization of enterprise management processes by simplifying procedures for combining information flows and business processes;

• the ability to create integrated end-to-end business processes that meet the requirements of the business, using both its own Web services and services of other enterprises;

• the possibility of flexible change and continuous improvement of business processes of enterprises due to the presence of a single methodology for supporting, controlling and processing information changes, greatly facilitates the process of making interconnected changes within the entire business architecture;

• simplified integration of new functionality into the corporate system by replacing some services with others, removing outdated ones and adding new ones while maintaining the choice of information services in the market;

• Data sharing and business functions - previously isolated systems will be able to interact with each other, giving business process participants new opportunities for collaboration;

• the ability to establish closer relationships with business partners, which reduces costs and improves the quality and quality of customer service.

The concept of service-oriented architecture emerged during the development of the Web Services concept. Web services architecture is one of the COA implementations (there are other approaches to COA implementation as well: Java RMI (from Sun Microsystems), CORBA (from OMG consortium), DCOM (from Microsoft), DCE (offered by Open Group Association), etc. COA has the following characteristics: distributed, wher function module interface is such, that the usage of the modules is independent of the technology or platform within they are implemented; dynamic search and connection of the required functional modules is possible; the architecture is based on generally accepted industry standards.

Service Oriented Architecture (COA) is the concept of designing, developing, and managing functional modules (services), where each of them is available over the network and capable of performing certain actions.

COA creates a communication environment for modules that implement application business logic. Module information is published in such a way, that

their usage does not require knowledge of the solutions and technologies used in them. The developer is not required to know how the program works, it is only necessary to understand what input and output are required and how these programs are called to execute.

The basis of a service-oriented architecture is the interaction of its participants: the provider, the consumer, and the service registry (Fig. 3).

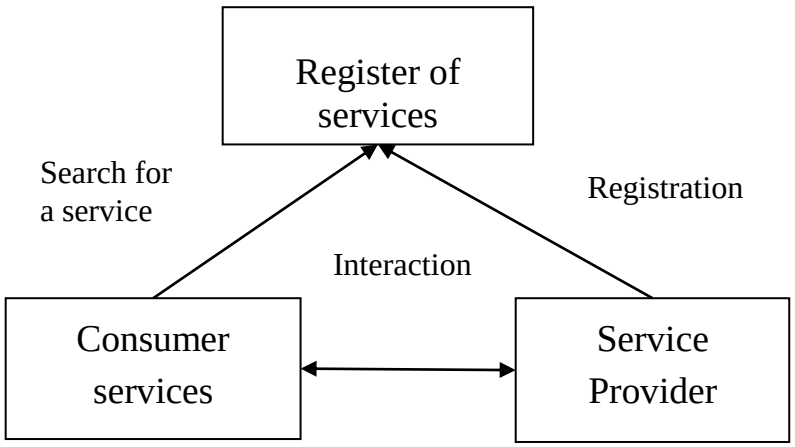

Fig. 3. **The scheme of interaction of the participants of SOA**

The concept of Web services means that they have some limited functionality. Multiple services need to be used to solve complex problems. Therefore, in the process of developing the architecture of Web services, the concept of layout of Web services and the flow of Web services arose, or else use the term orchestration (Web Service Choreography) and choreography (Web Service Choreography) Web services. These concepts reflect the interaction of services and the sequence of their delivery. Web-based applications are based on Workflow-based applications.

Distributed computing over the Internet causes a fundamental change in doing business, and it is Web services that provide an open mechanism for integrating business processes. Business processes are managed in an automated manner. So, using simulation methods, you can verify the correctness of the business logic presented in the diagrams, and then automatically get a description of these diagrams in XML languages for managing business processes.

This approach helps simplify the call to Web services from anywhere, based on business rules. Thanks to this, companies can implement rapid change of business rules.

The strategic value of Web services is to reduce project implementation time, increase productivity, quick integrate business systems and their applications.

Gartner predicts that a service-oriented paradigm will be the preferred practice of program design and development. And of course, a number of businesses in various industries, including financial services, insurance, aerospace, healthcare, pharmaceuticals, retail, public sector and industry, are launching their own Web services.

Conclusions

Various institutional structures on the Internet create their own information models through the Website, creating certain information and economic spaces by means of intellectualized software (multiagent systems or software agents as agents of economic agents) in a global electronic environment or object oriented Software (site, portal, e-mail box, etc.). It is the Web server, a kind of business card of an enterprise, representing a set of interconnected Web pages, presents the company and its services.

Today, Web2 and Web3 technologies are replacing Web technologies. They are based on social networks, a collaborative effort to develop information resources. The corporate blogs, Wiki encyclopedias etc. are functionating on these new technologies.

The new ideology of the Web-based production of the information industry helps to attract small and medium-sized enterprises to the electronic markets, enabling them to acquire reasonably priced, functional solutions that meet their objectives. The standardization and specification of Web services contribute to the creation of a unified electronic environment, which is the economic and technological basis for globalization of the world economy and integration of business participants, information, business processes, production on a planetary scale. The strategic value of Web services is to reduce project implementation time, increase productivity, quick integrate business systems and their applications.

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