

THE FEATURES OF REALIZATION OF THE INFORMATION-EDUCATIONAL ENVIRONMENTS OF THE AUTOMATED TRAINING

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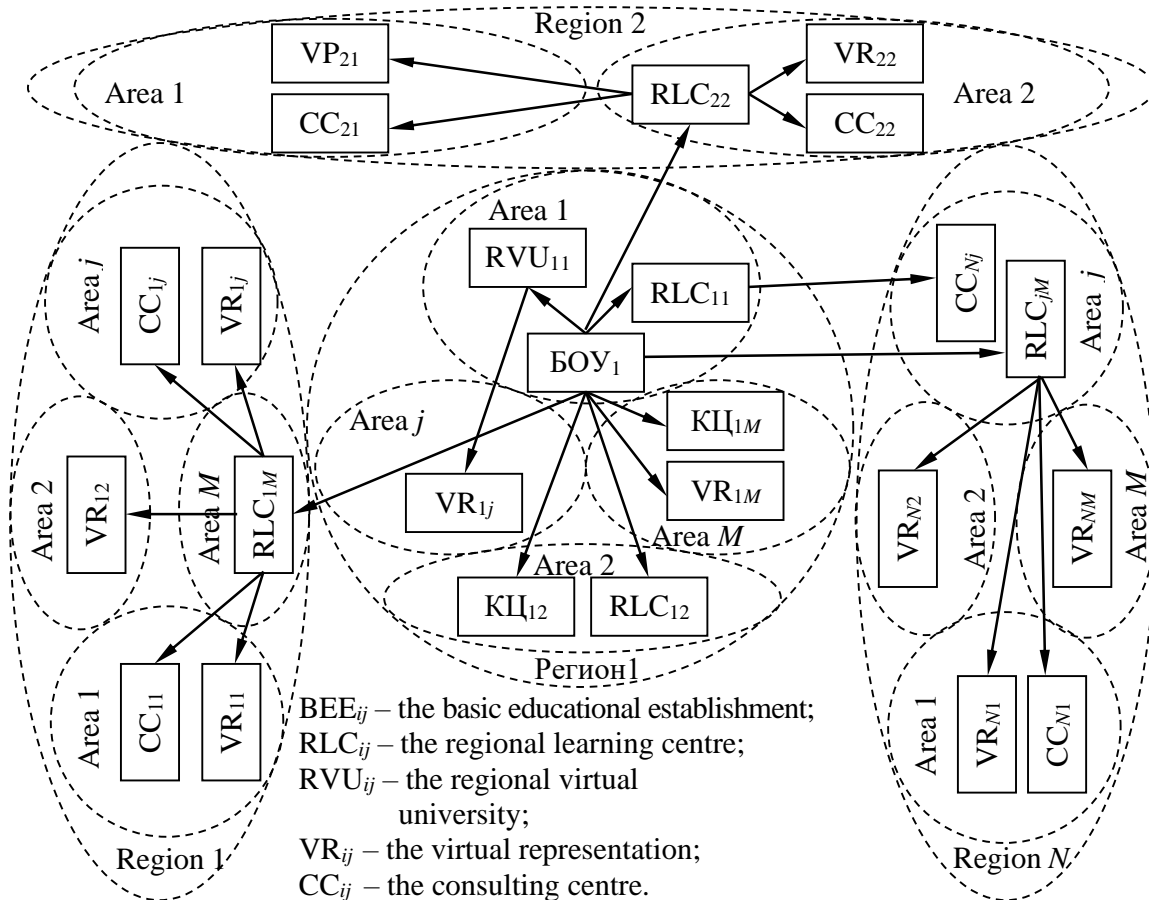
The annotation

The analysis of the features of the distributed information environment of educational centers of the region and area is carried out as an integral set of the organizational, hardware, software, technical and methodical support oriented on the realization of the automated training (at distance) by means of the achievements in the area of the information and communication technologies.

Keywords: the information-educational environment, the information technologies, the educational establishment (center), the (distance) training (education), the automated (remote) training system, the software.

The organization of the information environments of automated training (at distance)

The topology of organization of the information-educational environments (IEE) of the automated (remote) training (ART) in a country, region or area unites a row of educational establishments, their regional and virtual representative-offices, which provide a wide complex of diverse educational services to the differentiated contingent of consumers (the subjects of training) (pic. 1).



Pic. 1. The topology of organization of the distributed information-educational environment of the automated (remote) training

The globalization and the features of informatization of the information-educational environments

The globalization of the information environment has a significant impact on the creation, distribution and use of the information resources, products and services between the different categories of consumers (the subjects of the information environment) [1-3], at the same time the significant intensification of development and the emergence of the new (innovative) information and communication technologies (ICT) is observed, which provides the unification of the regional educational centers and establishments, and also the creation, dissemination and use of the distributed international IEE.

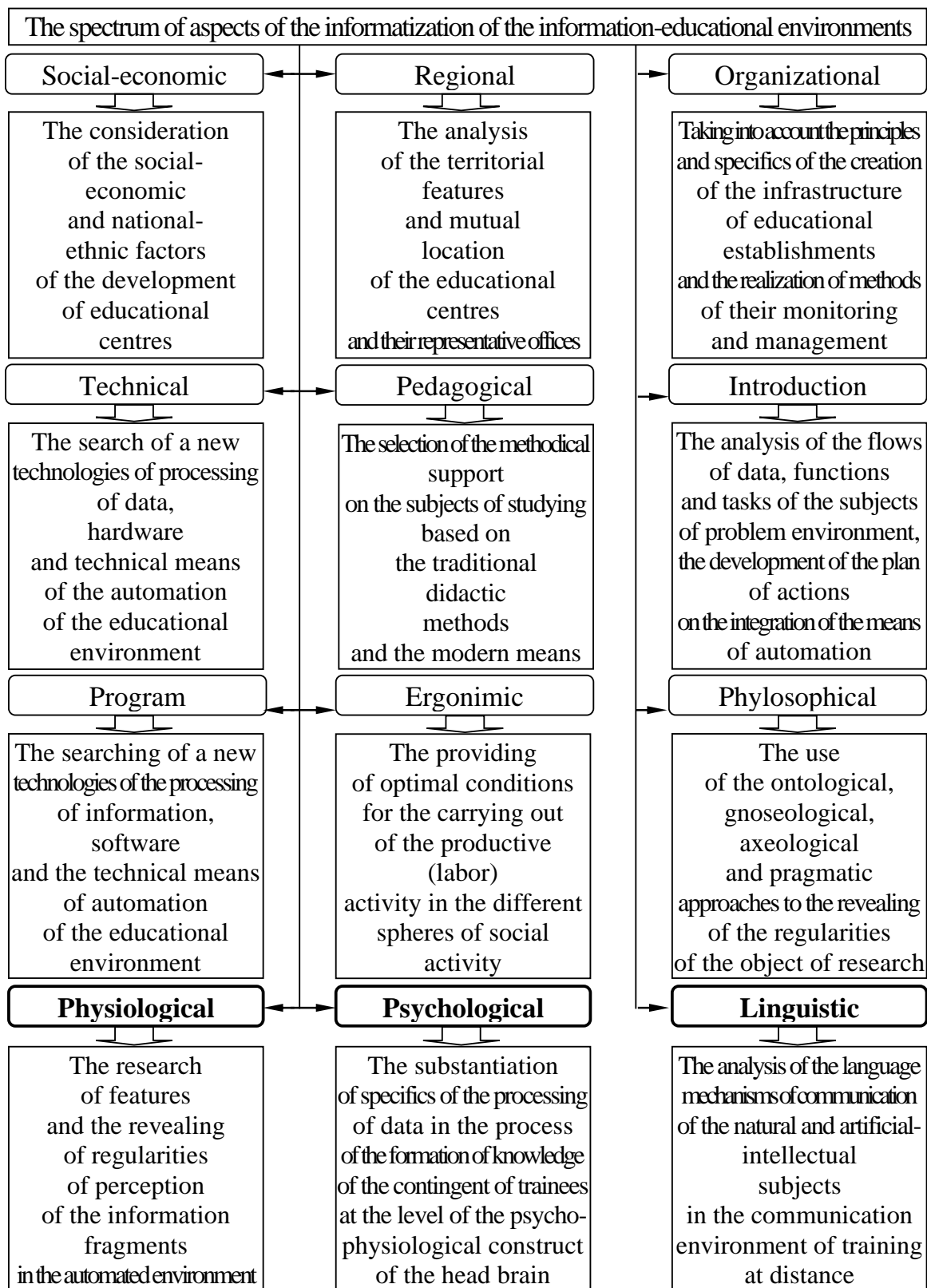
The use of modern achievements in the field of the information technologies (IT) allows to provide the open differentiated access of the different categories of users to the territorially distributed information resources, products and services, and also to the information storages, which contain the information on the subject areas.

The (distance) education systems of the developed (developing) countries of the world use the various groups of standards (requirements) in the area of quality of IEE and use at their basis two strategies of preparation of the contingent of trainees: the fundamental – the logical sequence of statement of the information (data) on the related objects of research (disciplines) from the various areas of scientific knowledge, providing the preparation of qualified specialists of a wide profile; the special – the building of specific educational trajectory with a focus on a certain specialization of the contingent of trainees in the context of the future profession.

In IEE of educational establishments (learning centres) of the various level of the innovative (distance) education systems directly use the traditional (classical) and computer technologies of training (at distance), at the same time they operate in the context of the various permissible forms of organization of the educational process as a controlled process of the formation of knowledge of trainees: the intramural – with the separation from the main activity of the trainee (the subject of training) in the classrooms of the basic educational establishment (the learning center) or its representative offices, the extramural – without separation from the main kind of professional activity with the division in time, the intramural-extramural – combines the both forms of the technological process of training (at distance) and is often used for the improving of qualification of the certified specialists.

There are many traditional approaches and directions of research of IEE: the organizational, technical and methodical support (Krupoderov R.I., Tikhonov A.N. and others); the problematics of introduction and use of ICT in the sphere of education (Dovgyallo A.M., Kinelev V.G. and others); the evolution of the system of education on the background of the crisis of national factors (Kashitsin V.P., Sadovnichy V.A. and others); the theory of open systems, the mathematical models and methods of analysis (Haken H., Eiserman M.A. and others); the theory of artificial intelligence and algorithmic support (Gurevich Yu.B., Pospelov D.A. and others); the modeling and algorithmizing of the process of training (Bespalko V.P., Clarin M.V. and others) and the theory of intellectual systems and the languages of knowledge representation (Andreev V.P., Pospelov D.A. and others).

The informatization of the diverse educational establishments (the learning centers) located in the one or more countries, regions and areas is the actual complex scientific problem and is achieved by means of the creation, introduction and practical use of the means of automation, which significantly increase of the efficiency (productivity) of functioning of IEE, that initiates the consideration of a wide spectrum of private scientific tasks and applied questions, related to the features of processing of the information of various sort, expressed in data (pic. 2).

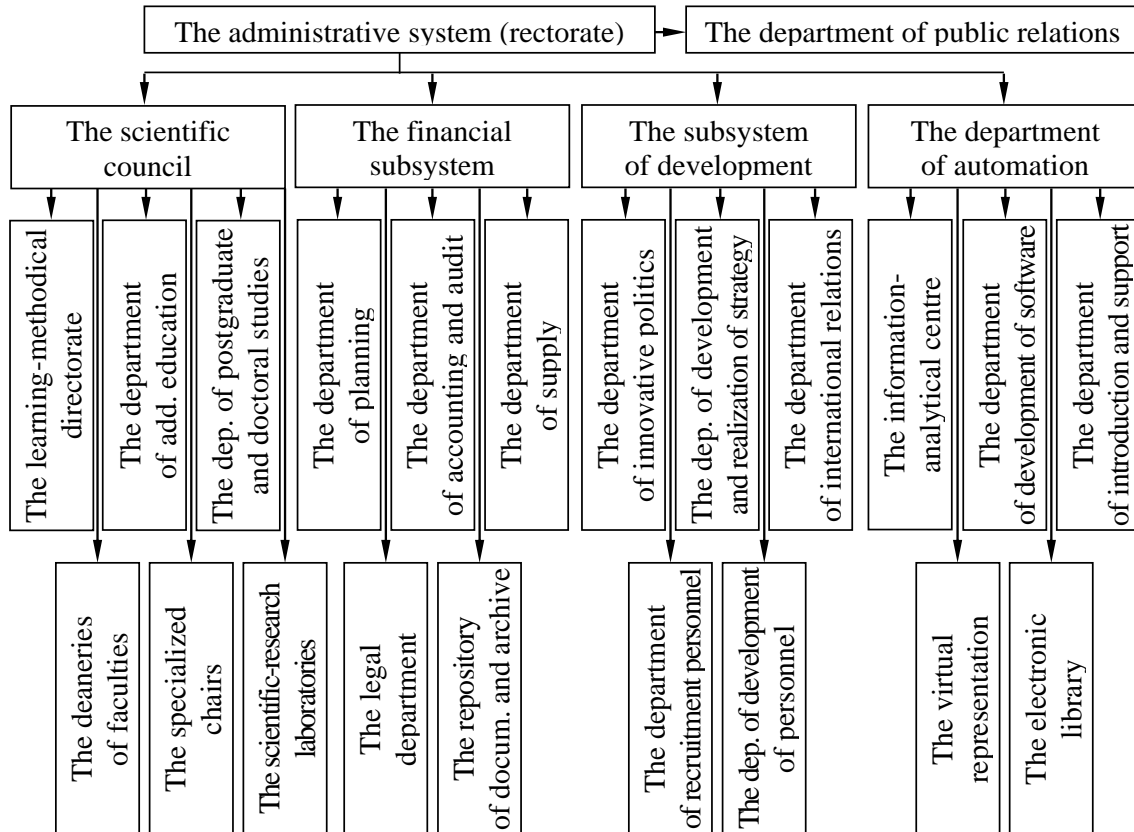


Pic. 2. The aspects and directions of informatization of the information-educational environments

The new scientific directions, studying the process of information exchange between the subjects and means of training acquire a significant actuality: cognitive informatics (the theory of information), psycho-physiology of perception (private physiology of sensory systems), cognitive psychology and cognitive linguistics.

The features of the organizational structure of the educational establishment (centre)

The features of the classical or innovative organizational structure of a certain educational establishment (the learning center) (pic. 3) depend directly from its level in the system of (distance) education, profile, specialization and a set of educational services, providing to the contingent of trainees, that implies the presence of systems, subsystems, divisions and departments, which perform a set of different functions (the production and non-production tasks), the automation of which allows significantly to reduce and optimize the transactional and time costs (in the limits of the technological reserves of production), which inevitably occur at the performance of operations by the personnel (the subjects of training).



Pic. 3. The organizational structure of the educational establishment (the learning centre)

The department of postgraduate and doctoral studies – carries out the conducting of the (electronic) documents of graduate-students (doctoral-students) and applicants as the wishing to receive the scientific degrees of candidate and doctor of the physical-mathematical, technical, economic and other sciences.

The information-analytical centre carries out the collection of statistical data for the analyze of the efficiency (productivity) of functioning of the (automated) IEE, reveals the dependencies and conducts the analysis of demand and supply in the market of educational services.

The department of development of software – modernizes the existing and develops the new architecture of (network) software, and also debugs the software realization of the components of IEE of ART system.

The department of introduction and support – provides the integration of software realization of the components of IEE of ART system and carries out their supporting during the life cycle of the program product, realizing the component of IEE.

The electronic library – contains a set of various information resources and high-technological information products for the provision of information services.

The modern condition of the information market in the sphere of education

The modern condition of ICT initiates the emergence of additional requirements to the organizational, technical, methodical and software, used in the sphere of the traditional and (automated) distance education [2, 3], the content of learning courses (the working programs) and the means of automation of the processes, associated to the activity of educational establishments (the learning centres) of different level.

The preparation and improvement of qualification of the service personnel (the subjects of training), in particular the curators of classes, held in the learning groups and computer classes, requires the development of proficiency skills of ECM for the efficiency use of the necessary diverse set of software (SW), which is sufficient for the support of the educational process (at distance) in the automated IEE and the formation of ethical standards of the social subjects, needed for the work in the local and global computing networks (Internet) is adequate to the level of information culture of the society achieved in the developed countries [3].

The intensification of growth of the cumulative aggregate of accumulated knowledge in the various subject areas (the natural, technical, humanitarian and other sciences) is caused by the increasing of quantity of the diverse sources of information and the needs of consumers.

A trainee (the subject of training) is required to prepare to the rapid mastery of skills of the practical use of the modern means of automation of data processing for the studying of large volumes of the information adequately to its individual features of perception (psycho-physiology of perception and private physiology of sensory systems), processing (cognitive psychology) and understanding (cognitive and applied linguistics) of the content of the subject of studying in the form of a sequence of information fragments.

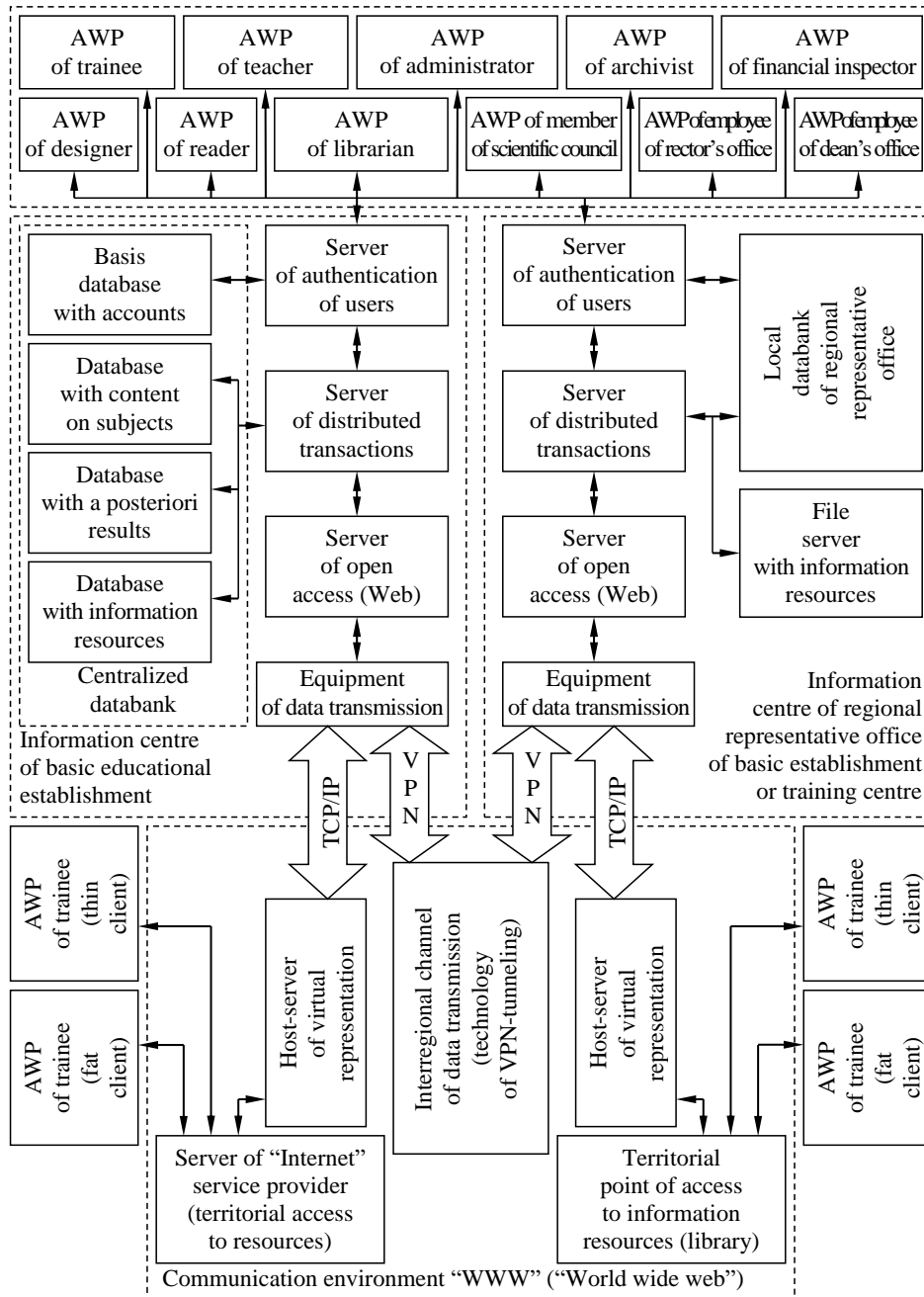
This problematics imposes a certain restrictions on the organization and technology of the process of training (at distance) in the audience, equipped by the means of IT [1-8].

The training is considered by the author and the various scientists and specialists [1-3, 4-8] as a technological process of the controlled formation of knowledge of the contingent of trainees, realized in the automated IEE by means of using of the means of automation, which perform the certain functions at the working of users of the different categories:

- the electronic textbook – displays the content of the subject of studying to the trainees;
- the diagnostic module – realizes the testing of the level of residual knowledge in the subject of studying and the individual features of personality of the contingent of trainees;
- the laboratory workshop – provides the studying of objects, processes and phenomena at the macro- and micro-level, which occur in the closed and open systems;
- the book of tasks – allows to study the approaches to the solving of typical and applied tasks;
- the simulator – provides the development of practical skills and the increasing of the level of experience and skill at the performing of the standard sequence of operations by the subject;
- the electronic library – contains the information resources, documents and the arrays of information, which allow to obtain and deepen the theoretical knowledge of the objects of studying;
- the cumulative package (case) – contains a set of methodical materials and information on their use (the various methodical instructions), which allow to study (at distance) a part of the subject of studying (discipline).

The infrastructure of distributed information-educational environment

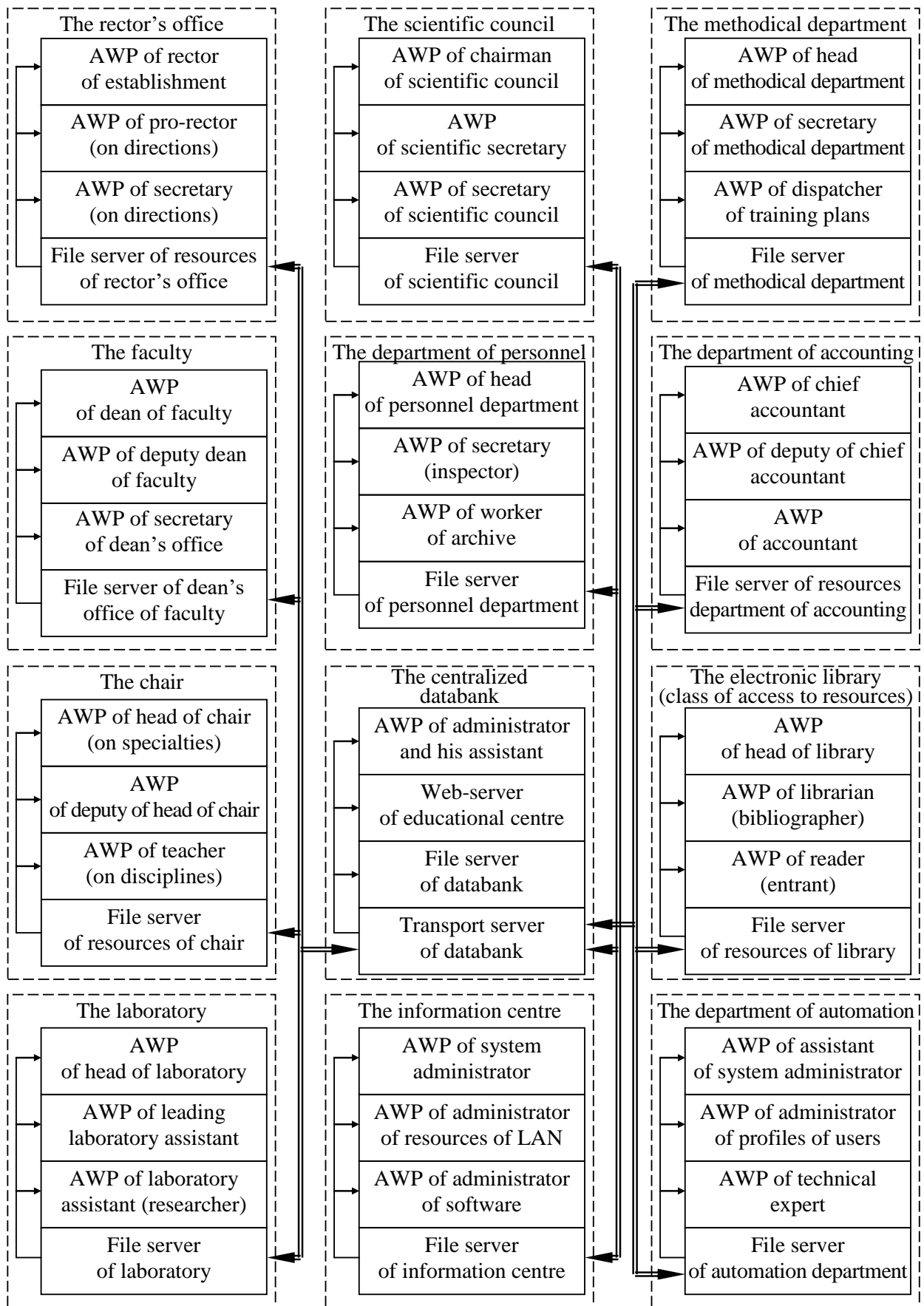
The introduction of the means of automation into the infrastructure of educational establishments at the different levels of the system of (distance) education, in particular HEIs, provides the increasing in the efficiency (productivity) of functioning of IEE, created on the basis of the diverse traditional and innovative IT, and also gives the possibility of introduction and practical use of the innovative methods, models and technologies for the realization of the controlled formation of knowledge (pic. 4).



Pic. 4. The structure of the information environment of educational establishment

The automated workplaces (AWP) allow to the different categories of users to gain the open access to the available information resources, products and services of the basic educational establishment, its regional and virtual representation (in the network Internet).

IEE of the educational establishment includes many diverse AWP (pic. 5).



Pic. 5. AWS of the subjects of the information environment of educational establishment

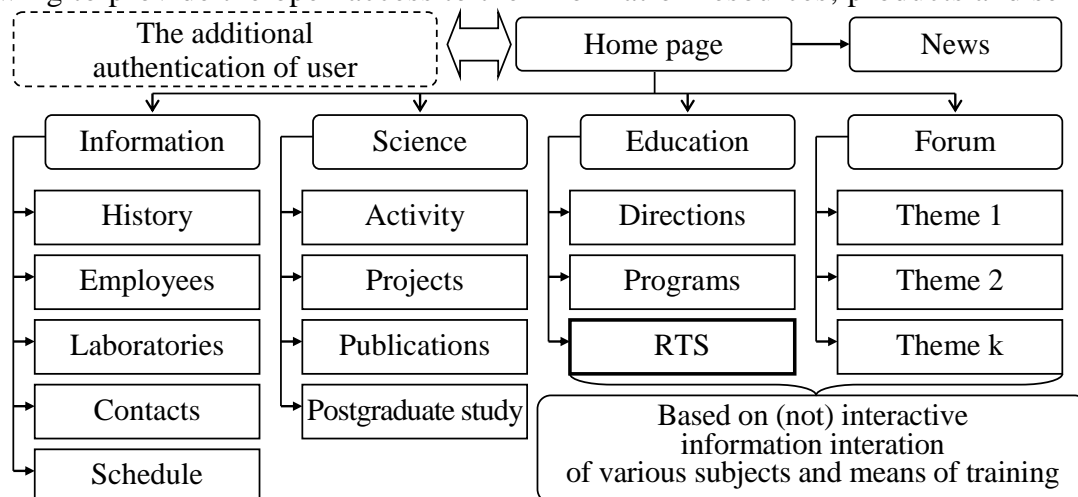
The features of the information environment of the automated training (at distance)

IEE of ART system has a row of significant distinguishing features, which are presented the diverse advantages and disadvantages, highlighted by the experts in the area of quality and the different categories of consumers of the services, provided by the traditional or innovative educational establishment:

- the process of the formation of knowledge is achieved by means of a set of training influences – the automated means of training operates on the basis of the algorithm and generates the information fragments, which reflect the content of the subject;
- the information interaction of subjects is realized by means of the means of IEE – the communicative limitation of duplex information interaction between the subjects and means is partially eliminated on the basis of the achievements of ICT;
- the necessity of technical and service support of ART system – the configuring and support in the operational mode of hardware and SW;
- the significantly heterogeneous contingent of subjects of training (at distance) – the subjects of (remote) training are differentiated by the age, sex, profession, the preferred time, allocated for the (automated) training by means of the use of the various components of the training system (at distance);
- the significantly heterogeneous composition of the (modern) hardware and software – there is a need of the additional training (at distance) to the techniques and skills of practical use of the means of IEE of ART system.

The use of the distributed data bank (the information storage) is justified in the case of the significantly branched structure of IEE, including the several territorially distributed educational establishment and their (territorial and regional) (virtual) representative offices, each from which specializes in a certain (limited) set of the diverse educational programs (the learning courses) and services (at distance), and also provides the support of several information resources, products and services, intended for the functioning of ART system (at distance) [3, 4, 6-7].

ART systems are realized on the basis of technologically expanded portals (pic. 6), located on Web-servers (the high-technological carriers of information), allowing to provide the open access to the information resources, products and services.



Pic. 6. The structure of the information-educational portal

The server of open access provides the processing of requests of the external consumers of the diverse classical and modern information resources, products and services, provided by a certain basic educational establishment, and also its various virtual or regional representative offices.

The software based in the basis of the automated training systems (at distance)

IEE of the educational establishment (regardless of type) involves the use of the standard and specialized SW of the various kinds and appointment [3-8]:

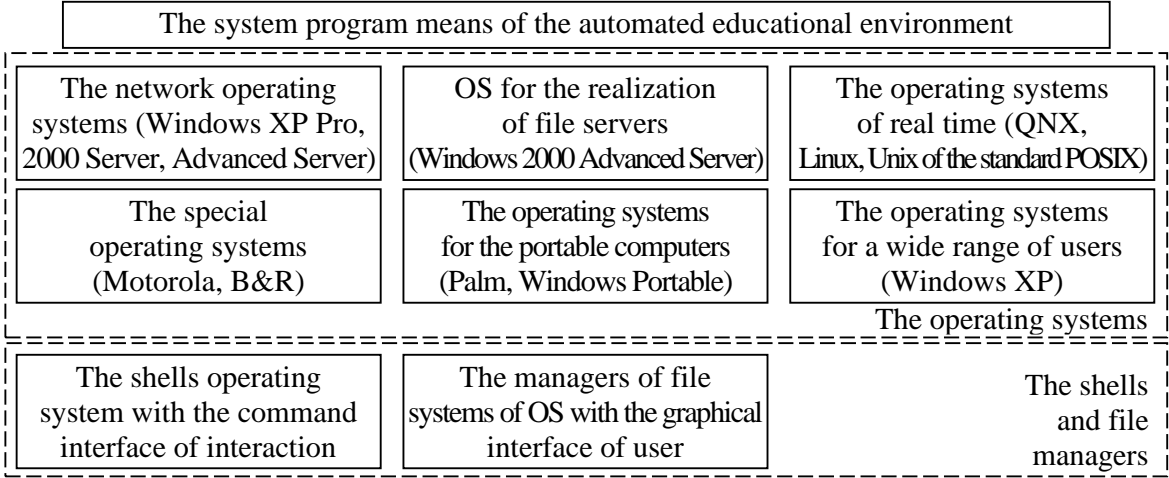
- the means of training – the hardware and SW installed on the different AWP and providing the performance of all tasks and functions of the final users in the course of the technological process of the (automated) training (at distance): the electronic textbook, the diagnostic module, the laboratory workshop, the book of task and others;
- the means of support of the departments of educational establishment – SW, realizing the automation of performance of the specific operations of employees of the rectory, the scientific council, the faculties, the chairs and laboratories, and also provides the (electronic) document-flow (at distance);
- the tool means – SW, providing the operational, service and technical services of the various AWP of users, and also the local and network means of training (at distance), including directly into the integrated ART system, and also used by the diverse (non)qualified personnel, not having the special preparation in the area of ICT and programming;
- the electronic library -- the division of the educational centre, providing the possibility of connecting to the information resources of local, regional and global computer networks, and also to the diverse catalogs of electronic libraries by means the channels of data transmission (satellite, fiber-optic, cable and others);
- the means of administrating of the components of IEE of ART system – the diverse SW, realizing the configuration of software components of IEE, and also the hardware and SW, located in the basis of ART system;
- the means of monitoring and control of the process of training – SW and the means of individual control of the level of residual knowledge, which were obtained and learned by the contingent of trainees at the working with the various program components of ART system;
- the means of working in the telecommunication environment Ethernet (Internet) – providing the access to the information resources of the basic HEI, and also its regional and virtual representative offices, located in the different geographical regions (countries and areas).

IEE of the educational centre involves the use of traditional SW (s y s t e m , a p p l i e d a n d s p e c i a l i z e d S W) , which provides the support of the period of execution of SW, used by the users at the different technological stages of cycle of ART.

The system SW (pic. 5) – the operating systems (OS) of different level and appointment, including a set of program components installed on ECM, which are located on AWP of various categories of final users:

- the unloaded and non-unloaded parts of kernel – the main and extended program modules, providing the processing of events, initiated by SW and the user at its interaction with the elements of interface of OS by means of manipulators;
- the local and network services – the diverse program components, providing the execution of different functions and tasks of the final user under the control of the certain local or network OS: the updating of program components of the various OS and SW, the formation of queuing and the printing of information on printing, the installing and uninstalling of SW, the installing of drivers of hardware, the processing of continuously arriving distributed transactions, the dynamic distribution of diverse network addresses, the setting of specifiers of the access to the resources of file server, the modifying of local and network politics of security, the multiple network login into the system, the fast switching of users, the remote assistance, the shadow copying of volume (of the logical disk), the service of local and network logical disks realized by means the drives on the flexible, hard, optical and electronic disks, the monitoring of performance and activity of the users in the network by means cable, fiber-optic, satellite and wireless technology, WWW-server, the manager of connections of the remote access, the secure storage, the telephony, the backup copying of volume, the network screen and the wizard of network connections.

SW for the supporting of configuring of the program environment of OS, and also the different utilities and SW for the diagnostics of hardware of ECM (pic. 5).



Pic. 5. The classification of the system software

The network operating systems (OS) provide the support of functioning of the local area networks and the access to their information resources: files, folders, the network and local peripheral equipment (the network concentrators, the network adapters and repeaters, printers, faxes, scanners, modems and the other peripheral devices).

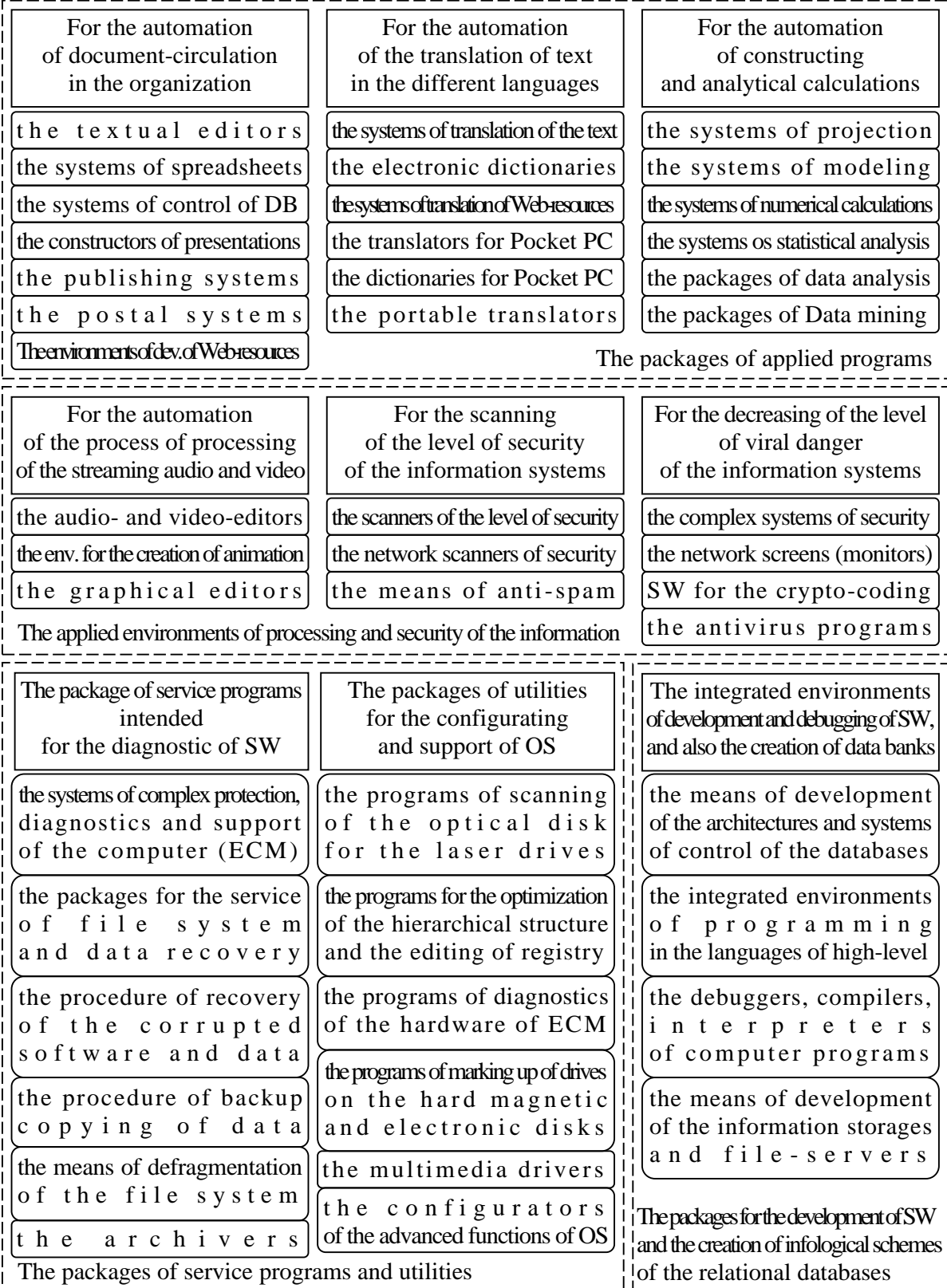
The special OS are used for the supporting of functioning of the industrial controllers and network systems of access control, used in the local and distributed systems of monitoring of the dynamics of certain diverse technological processes.

OS for the portable computers are contained in the mini-computers on the chips of non-volatile memory with the support of multiple rewriting, written by the manufacturer and updated by users of the corresponding devices.

The shells of OS supports the command interface of interaction with the user and at the same time realizes a row of functions of the graphical interface by means of using of diverse set of buttons, fields, windows, menus, icons and prompts.

The managers of file system for OS with the support of graphical interface of the user directly allow to work in the window mode and to carry out the navigation.

SW in the basis of IOS of ART has practically no the significant differences and realizes the automation of processes of the processing of information, the access to the information resources, the execution of applied and special SW for all categories of users (pic. 6).

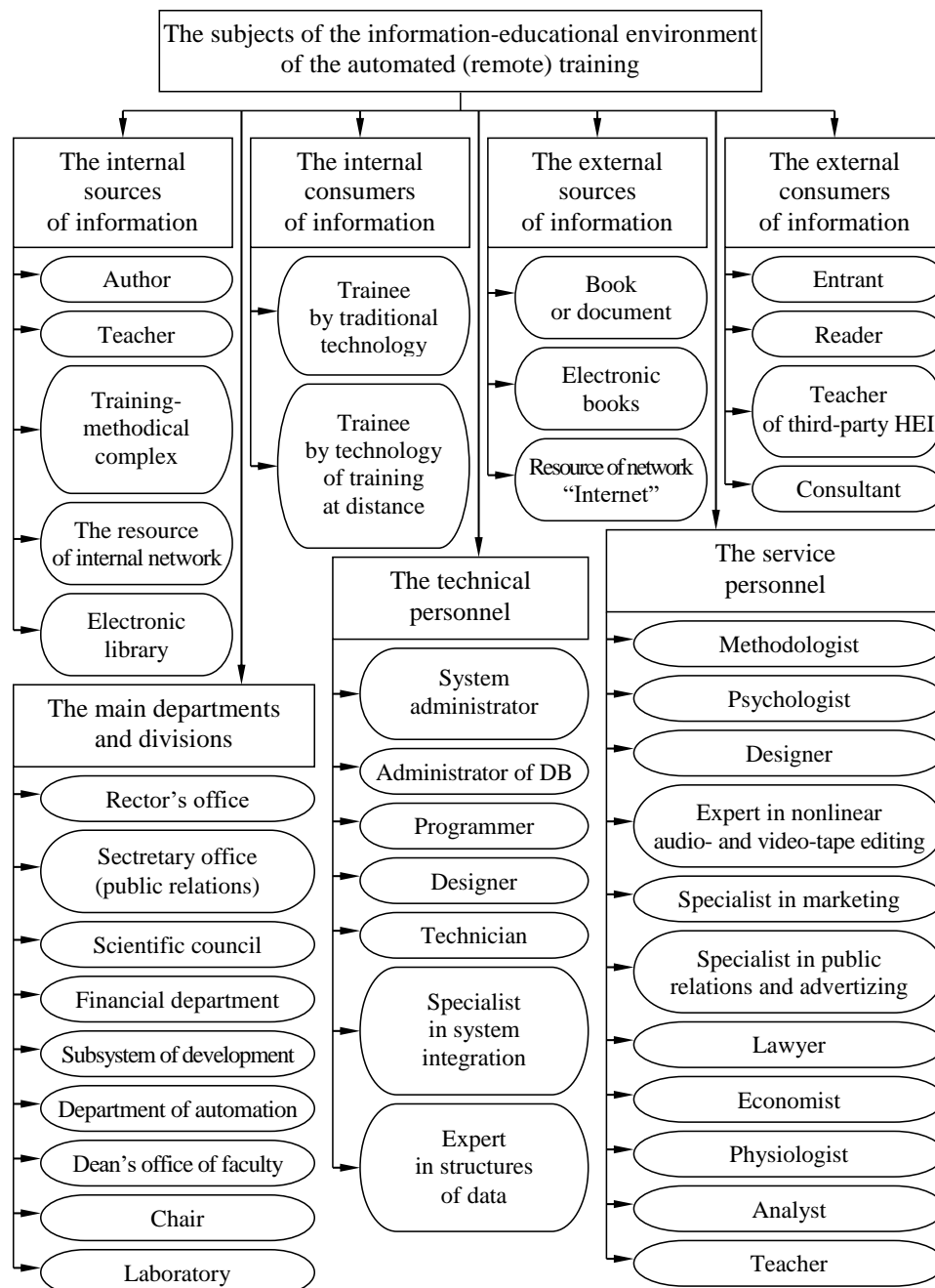


Pic. 6. The classification of the software of applied appointment

The information market and information industry in RF are located at the stage of formation, therefore the diverse SW is represented mainly by the foreign producers [7].

The subjects of the environment of automated training and the sources of information

The subjects of IEE of ART system (pic. 7) act as in the role of the internal and external sources and consumers of information of the various types and appointment, occupy a certain position in the organizational structure of the educational establishment and perform a set of job duties by means of AWP and a set of SW [3, 5, 7, 8].



Pic. 7. The classification of the subjects of the information-educational environment of the automated (remote) training

The conclusion

Despite the complex of problems, arising in the course of the informatization of the information environments of educational institutions and the territorially distributed centers of training, and also taking into account the regulated forms of educational activity and the features of organization of the process of training (at distance) in RF (intramural, intramural-extramural, extramural and distance), it is permissible to highlight a row of the important conclusions as a summary:

- takes on the particular actuality the introduction of various approaches, methods and technologies of ART, which allow to take into account the requirements of state bodies and a wide range of the differentiated consumers of educational services [6];
- increases the paces of scientific-technical progress and the level of development of ICT, expands the nomenclature of the means of automation for the different applied areas;
- expands a set of hardware, software and algorithmic support, which provides the automation of diverse functions and operations, accompanying to the educational and scientific activity, appear the new directions and possibilities of using of ICT for the increasing of efficiency of the formation of knowledge of the contingent of trainees [7];
- provides the possibility of creation of the distributed IEE, including the several educational (scientific) establishments, which jointly functioning on the market of educational services, increase the level of culture and awareness of the population;
- appears the technical possibility of intensification of all reserves (stages) of the technological process of training (at distance) in the automated IEE and the increasing of efficiency (resultativity) of process of the formation of knowledge of the contingent of trainees by means of introduction and use of the various program components of ART system [7, 8];
- allocates the diverse system, applied and service SW, including the utilities, the means of monitoring and support of the information systems, used in the education (science);
- achieves the possibility of realization of the individually-oriented environments [8].

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ОСОБЕННОСТИ РЕАЛИЗАЦИИ ИНФОРМАЦИОННО-ОБРАЗОВАТЕЛЬНЫХ СРЕД АВТОМАТИЗИРОВАННОГО (ДИСТАНЦИОННОГО) ОБУЧЕНИЯ

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Проводится анализ особенностей распределенной информационной среды образовательных центров региона и области как интегральной совокупности организационного, аппаратного, программного, технического и методического обеспечения ориентированного на реализацию автоматизированного обучения (на расстоянии) посредством достижений в области информационных и коммуникационных технологий.

Ключевые слова: информационно-образовательная среда, информационные технологии, образовательное учреждение (центр), (дистанционное) обучение (образование), система автоматизированного (дистанционного) обучения, программное обеспечение.