

# ACS University and Electronic University in the Age of Digital Economy

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## Abstract

The article underlines the role of Automated control systems for the university administration and the importance of Electronic universities in the context of digital economy development at universities. The meaning of the concept “education digitalization” is defined. The article also considers the possibility to use the platform principle of university management organization and to carry out the educational process by analyzing the certain information platforms.

## 1 Introduction

It is impossible to imagine the activity of the modern university without full-fledged support departments: Automated control system of the university (ACS University) and Electronic university (EU) [Kly042]. At the present time we deal with the stable distribution of the spheres of influences between ACS University and EU at the university. In its basic configuration the distribution of the roles and functions between them is as follows [Kov80, Gug13]:

ACS University:

- to create the united information environment of the university, its branches and colleges that ensures the information support of the main and secondary business process in the educational institutions (monitoring, analyzing and management);
- to integrate the management of all business processes within one united corporate system;
- to increase the effectiveness of management of the educational institutions due to

workflow automation, optimization of decision making procedures, reduction of total cost of system ownership.

EU:

- to develop and to implement educational technologies and various methods for organizing the educational process and to manage it on the basis of e-learning.
- to produce educational materials for training programs and study courses that can jointly form a meaningful, flexible and pedagogically efficient educational environment. With its help it is possible to achieve the objectives of the main educational programs for all students, regardless of the form of the education.

At the present moment the trends of development of the national economy are determined by the ideas of the digital economy (DE) [Sem17]. Scientific and educational sphere as part of the national economy is no exception. The basic principles of DE are [Sem17]:

1. Implementation of program and informational frameworks in production and business.
2. Formation of man-machine complexes based on the ideology of cyber physical systems (as contrasted with automation systems).
3. Development of Internet of things, which essence consists in Internet communication between things (technical objects, programs etc.) together with Internet of ideas and humans.
4. Use of modern information technologies:
  - nudge-technologies, that let the individual make a particular choice, or behave in a particular way;
  - blockchain, that can put the human activity into algorithm and ensure a convenient Internet based communication protocol;
  - intellectual analysis of big data that lead to the generation of new ways of thinking and

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automatic behavior in the life of an individual and the society in whole.

In the context of concepts and technologies of DE we shall understand the digitalization of education as follows:

- creation of cyber-physical systems at the university, both in the field of science and in the field of educational activities. It means, in the ACS University, as in the man-machine complex, the emphasis should be shifted from the automation of activities (carried out through a person) to the Internet of things;

- creation of specialized platforms, both for the management of the university, and to ensure the educational process within the EU.

- development of special nudge-technologies that incorporate employees and students into scientific and educational processes.

- introduction of blockchain in order to improve the communication (increasing objectivity, transparency and reliability) in various areas of the university activities: administration – employees, teachers – students, university – consumers of educational services, university – ministry, etc.

Digitization of a university begins with the introduction of DE technologies and models into the ACS University and EU. This inevitably raises the question of the nature of the transition from traditional positions to the ideology of DE. There are two strategies for such a transition:

- use of ready for service (professionally made) information platforms. In this case, a range of issues arise how to adapt a universal platform to the needs of a particular university;

- development of own (original) platform. Now the issues of adaptation disappear, but there are problems to ensure quality service, safety, reliability of the system. It requires the involvement of highly qualified programmers.

Analyzing the experience of introducing platforms in other areas of the economy and business, we can recommend the first strategy to be implemented in universities.

In this regard, let us consider, as an example, the possibility of using well-known professional platforms for the synthesis of ACS University and EU.

**Systems for the automation of the enterprise activity [Ruz18].** Currently, many such systems have been developed: Pyrus, Bitrix24, 1C, Dokumentooborot (*Document Flow*), BPM Online, ELMA, etc. They successfully accomplish the tasks assigned within a specific production and business. Each of the products has its own characteristics. For example, we shall consider the Comindware Business Application Platform (abbreviated as Comindware). It is designed to solve management problems.

Comindware is a flexible system that can promptly adjust to the ever-changing business needs.

In essence, a Comindware software solution is a platform, not a ready-to-use product. It means that:

- it will take some time to configure the software before users can work with it;

- when using the Comindware product, users are not limited to rigid frameworks; they can use platform tools and create various software solutions that fit their specific requirements.

As a special advantage of Comindware, developers point out that this platform allows business analysts and businesspeople to customize most of their capabilities, even without involving a programmer.

Let us consider the Comindware system as a tool for managing tasks, processes and documents. In principle, all these functions are part of the overall system and constantly “overlap” with each other, because the processes consist of separate tasks, and a document flow is a combination of tasks with documents.

Comindware is a fully browser-based solution. It means that the system does not have its own application or client program, which would need to be installed on user workstations. We can just open any convenient browser, specify the address of the system and go through authorization for working.

The system consists of two parts:

- administrative part intended for development;

- User part where users work.

To complete the work in the system, we must install all user settings; configure processes, tasks and documents. And only after business solutions are created in the administrator section, users will be able to execute them in their section.

From the point of view of the logic of building the work, the closest analogy is the 1C system: it also has programmer access to the platform (configuration creation) and subsequent user work within the configuration.

At the same time, in the Comindware system, the separation of user functions and capabilities of the administrator is very rigid, which can be considered as an advantage.

The system consists of the following main components: users; patterns; settings; communication channels; data transfer paths; reports.

Users are all future participants of the system, from the administrator to the ordinary performers. As with any system of this type in Comindware, we can create sets of user rights and assign a particular role with the selected rights to each user.

Two types of authentication are implemented for users:

- LDAP: it means the ability to access by using a two-way application (lightweight directory access protocol);

- Local authentication: traditional access with login and password.

The entire system is configured through three types of templates: process, record, case.

Let us consider in more detail the description of processes and records.

Process templates are described in BPMN 2.0 format. A business process template in this system can be created by a business analyst or business leader without the help of technical experts. Here are some features of the system in comparison with analogues:

- customization and set of rules are possible immediately for the start element (start form) and the start form will have its own nested forms;
- it is possible to set a detailed description of this action directly from the main template window;
- the form designer is very simple and intuitive;
- in the template editing mode (here it is called the designer) there is a very convenient button – Check. It helps to identify errors and logical contradictions in the process.

The entry in business modeling reflects the “essence”. These can be lists of employees, a list of classrooms, disciplines, orders for educational services, etc.

The record template setting contains: attributes – fields that can be filled; forms – consistency and appearance; operations that are valid for the type of records; toolbar (easy setting for users); access rights, settings, etc.

What settings are available in Comindware:

- possibility of grouping users into groups, both in terms of the level and types of access rights to the system, as well as by divisions in the company or by some other signs;
- side navigation setting (users see different menu bars on the left, depending on their level of rights);
- access rights assigned to groups of users;
- admin settings;
- backup. Backups in business systems are performed regularly in any company.

The administrative section allows configure various options for communication between agents:

1. Email. You can set up your own email. The mail interface is simple here, but the configuration also requires a minimum of knowledge. It is convenient to accept notifications and requests from customers directly to the system in many cases.

2. Web requests. This is a section for programmers, used when setting up automation, getting data through an API (a set of classes, procedures, functions, structures or constants with which one computer program can interact with another program), to receive notifications about important requests from applications or other systems.

Reporting in the Comindware system is very concise. To create own reports here is not provided. And the existing reports are very simple. They

describe the status of active processes, allow you to see what is happening in real time. To generate a report, we have just to select a process template or records and to see what is happening in this area right now.

If you need to view lists of projects in work, customers, the workload of employees, all this can be obtained by sorting the relevant lists.

Reporting in Comindware can rightly be considered as a “weak point.” However, in process systems other types of reporting are usually not needed and not used. The most important thing when working with processes is to understand which of them for some reason has stalled and at what stage. The system provides this feature with built-in reports.

Let us summarize the analysis of the positive and negative properties of Comindware (see Table 1).

Table 1: Analysis Of The Characteristics Of The Comindware Platform

<b>advantages</b>	<b>disadvantages</b>
<ul style="list-style-type: none"> <li>- easy to use;</li> <li>- sufficiently high speed of operation in comparison with analogues;</li> <li>- there is no need to use a native client (program installation);</li> <li>- availability of SAAS solutions (elements of the business model) and Standalone (private blog);</li> <li>- use of BPMN 2.0 notations (convenient standard).</li> </ul>	<ul style="list-style-type: none"> <li>- absence of some useful solutions that are available in more complex counterparts;</li> <li>- presence of a certain number of bugs (errors, malfunctions, malfunctions);</li> <li>- documents with holds;</li> <li>- the software product is still in the active development phase, which explains the small list of documents describing Comindware.</li> </ul>

Comindware software product refers to systems of the “Low-Code” type, it means that it does not require participation of the programmer in setting up a software product. In some cases, it may be necessary to run an external script to implement some special features not covered by Comindware, as well as to integrate with other systems (this feature is implemented in the C # system). In all other cases, even a person who is far from programming can, if desired, is able to set everything up and start the work independently.

Systems for the organization of educational activities [Dub17]. We shall consider two variations of platforms as such systems: getcourse.ru and antitreningi.ru.

First we consider the general technical characteristics and concepts used in this description: landing pages, CRM systems, widget, domain.

Landing pages are separate pages of an existing site or specially created one-page sites. They are actively using the nudge-technology: once on this site, the user is already difficult to "get out" and he is likely to become a client.

CRM-systems allow employees to discuss quickly tasks with each other, communicate with customers directly in the built-in messenger interface. There is no need to open mail, notes simultaneously and spend time searching for letters.

A widget is a small helper application that performs a specific function. Thanks to web widgets, visitors can log in to the site via a simplified system through social networking icons, share information and data, invite to the site, post their texts and pictures, run online games and much more.

Domain is a name for a site that includes all levels of nesting of a domain (all zones it belongs to), which is distinguished by its uniqueness. Indeed, it is more convenient to use the name net.blog.matmodelirovanie.ru than the IP address of the type: 108.162.192.0. So: net.blog.matmodelirovanie.ru is the fourth net-level domain, part of the third level domain zone "blog", which is included in the second level zone "matmodelirovanie" belonging to the first level zone .ru. So easily the educational programs can be structured.

### 1. getcourse.ru

This platform is convenient to use if there are social networks. Registration can be quickly made through synchronization with them. In the second step, the phone number is confirmed with the receipt of the code. Then we enter the internal office, where there is a link to the knowledge base.

The platform has a fairly clear design, without unnecessary bells and whistles and difficulties. It contains a working left panel with menus, as in many SAAS products, and a large main field of activity in the rest of the screen.

Unfortunately, there is no support inside the office of the platform getcourse.ru. There is no online support on the main site, but the creators are trying to cover it with the collected FAQ database. A special request is made and we can count on a response within five hours or two days.

### 2. antitreningi.ru

In this platform, registration is done via email. Obligatorily we have to insert the phone number and the country. Then we can enter the internal office, where there is online support (from 10.00 to 19.00).

Inside this platform there is also quite clear and simple construction. Similarly to getcourse.ru it has a workspace panel with a menu on its left and a large main field of activity in the rest of the computer screen.

Online support works within a group fairly quickly.

The results of a comparative analysis of some of the technical characteristics of the educational platforms getcourse.ru and antitreningi.ru are summarized in table 2.

Table 2: Comparison of the basic characteristics of the learning platforms getcourse.ru and antitreningi.ru

No	Characteristics	getcourse.ru	antitreningi.ru
1	Possibility to create your own domain (site)	Yes	Yes
2	Integration with third-party users	No	No
3	Possibility to conduct webinars	Yes	Depending on the fare
4	Widget technology	Yes	No
5	Possibility to create a landing page	Yes	No

## References

- [Dub17] Dubrovskaya O. *Kogda keysov skopilos' slishkom mnogo ...* [When there are too many cases ...] // Rusbase, 2017. <https://rb.ru/opinion/15-platform-dlya-onlajn-kursov/>.
- [Kly04] Klyuev A.K. *Novyye modeli upravleniya vuzom: shag vpered ili dva nazad?* [New models of university management: a step forward or two back?] // *Universitetskoye upravleniye: praktika i analiz* [University management: practice and analysis], 2004. – No. 5-6 (33). – pp. 53-61.
- [Kov80] Kovalenko V.E. *Zadachi analiza, planirovaniya i optimizatsii v ASU VUZ* [The tasks of analysis, planning and optimization in the ACS of the university]. – Moscow: NII VSH [Research Institute of Higher Education], 1980. – 40 p.
- [Ruz18] *Ruzalina. Obzor sistemy Comindware Business Application Platform* [Overview of Comindware Business Application Platform]. 08.02.2018. // <https://habr.com/company/trinion/blog/348618/>.

[Sem17] Semyachkov K.A. *Tsifrovaya ekonomika i eyo rol' v upravlenii sovremennymi sotsial'no-ekonomicheskimi otnosheniyami* [Digital economy and its role in the management of modern socio-economic relations] // *Sovremennyye tekhnologii upravleniya* [Modern management technologies]. 2017, no. 8 (80).

[Gug13] Dmitry Gugelia *Elektronnyy universitet: besplatnoye obrazovaniye v lyubom vozraste* [Electronic university: free education at any age] 05.2013 // <http://ria.ru/society/20130508/936413960.html>.