

Analysis of integrated university information systems

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Abstract

This report makes a comparative analysis of technologies used to design and develop integrated university information systems. The focus is on the modules for management of the educational process and the report on implementation of the various tasks. Appropriate criteria are selected, by which to evaluate the technological solutions implemented in the systems. It displays an approach for evaluating the integrated university information systems of class ERP.

Keywords: Integrated university information system, ERP– Enterprise resource planning, Software Technologies

1 Introduction

Modern integrated information management systems of universities are specific segment of the ERP systems of companies. In many universities in Bulgaria, as well as in St. Cyril and St. Methodius University of Veliko Turnovo, gradually over the years, information systems have been built with different range of management processes and activities, including various modules covering organizational-management structure.

The information systems are widely build on the individual model of operation of each university, they have similar functionality and offer similar services.

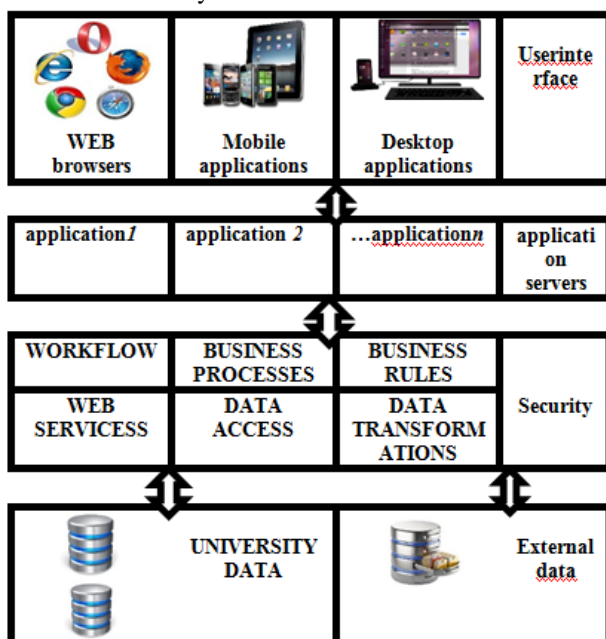


FIGURE 1 Functional scheme of Artificial Intelligence

Due to the specific and constantly changing conditions

and needs of each university, the integrated management information system must be specifically designed for the specific university environment, based on the integration of various technological systems for database management, observing the legal requirements and standards [1].

In [2] there is a detailed study of the existing information systems in higher education institutions in Bulgaria and analysis of known best practices, as well as the requirements for integrated information support of universities.

Fig. 1 shows a generalized architecture of the university integrated information system of the St. Cyril and St. Methodius University of Veliko Turnovo [4]. There are shown different levels and opportunities for access to applications (services) via user interfaces that perform various operational and business processes by strictly regulated business rules and procedures, ensuring their security and reliability.

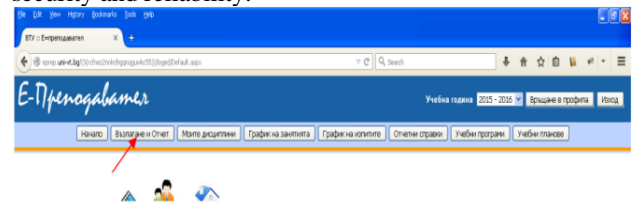


FIGURE 2 A view of the functionality of the system that are available for the lecturer (Lazarov, L., 2016)

Figure 2 shows the main functionalities that are available to the teacher's profile: assigning classes and reporting of hours, access to their own courses, schedule of classes and exams, accounting reports, educational programs and curricula.

The assessment of technological solutions in these types of systems in various stages of their development with appropriately selected criteria is an important issue, the resolution of which depends on the successful development and deployment. This work provides criteria and approaches for assessing the components of integrated information

systems of universities. Subject of analysis are two specific systems with a focus on the subsystems, related to the management of the educational process and the report on the performance of various tasks, related to its provision.

2 Analysis of technologies for the realization of integrated university information systems

There are different ways of evaluating software systems with different purpose [7].

For evaluation and comparison, the following criteria is offered:

1. Functionality (30);
2. Ease of use (25);

3. Corporate environment (20);
4. Flexibility (20);
5. Integration (20);
6. Reliability (20);
7. Security (15);
8. Scalability (15);
9. Deployment (15);
10. Support (15);
11. Technology (10);
12. Additional development (10);
13. Easy access (5),

with their weights indicated in brackets. These weights are determined by statistical experts in the evaluation of ERP systems.

TABLE 1 Expert evaluations of ERP1

№	Criteria	Rat.	Evaluation \bar{E}_j									
			E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
1	Functionality	1	240	90	60	180	60	0	180	150	180	0
2	Ease of use	1	0	225	25	200	100	150	75	0	125	175
3	Corporate environment	1	100	180	60	60	180	40	100	100	100	60
4	Flexibility	2	100	160	20	40	0	60	80	180	20	80
5	Integration	2	80	20	140	0	20	100	20	160	0	60
6	Reliability	2	180	100	120	60	160	0	100	20	0	140
7	Security	1	120	60	90	135	120	30	0	105	75	60
8	Scalability	2	120	105	0	135	45	45	60	60	105	120
9	Deployment	2	60	75	90	135	105	15	30	135	30	15
10	Support	2	135	135	30	75	75	15	90	0	105	15
11	Technology	1	20	40	20	30	90	40	40	70	20	30
12	Additional development	2	30	60	60	90	80	0	10	40	20	60
13	Easy access	2	40	0	0	40	30	35	35	5	30	40

Data with expert evaluations are shown in Table 1 and Table 2 for the respective systems - ERP1 and ERP2.

The model for processing of evaluations is described below. At first the evaluations of experts are calculated with the formula:

$$O_i^k = \prod_{i=1}^n E_i^k * W_j \quad (1)$$

$i=1..n; k=1,..,m; j=1,..,m$

where: $n=10; m=13; n$ – the number of experts, who evaluate; m – number of evaluation criteria; E - number evaluation of the i expert on the k criteria; W – the weight of the j criteria.

TABLE 2 Expert evaluations of ERP2

№	Criteria	Rat.	Evaluation \bar{E}_j									
			E1	E2	E3	E4	E5	E6	E7	E8	E9	E10
1	Functionality	2	210	90	90	120	120	60	240	240	120	30
2	Ease of use	2	225	125	75	0	75	50	125	150	200	100
3	Corporate environment	2	180	100	120	140	20	140	40	100	40	160
4	Flexibility	1	100	0	80	140	100	180	20	60	160	120
5	Integration	1	60	40	180	0	0	60	160	40	140	20
6	Reliability	1	160	100	100	0	20	160	40	20	20	120
7	Security	2	0	30	60	15	30	60	45	15	75	120
8	Scalability	1	135	15	75	105	0	60	30	60	60	90
9	Deployment	1	135	15	75	15	75	15	120	45	45	45
10	Support	1	30	45	135	120	120	45	120	105	15	135
11	Technology	2	30	50	0	0	70	80	30	50	80	10
12	Additional development	1	50	20	60	50	90	0	90	20	70	70
13	Easy access	1	5	35	10	10	15	35	15	25	30	15

Ranking by indicators is determined by comparing pairs j and p as the second is placed further down in the standings:

$$\begin{cases} R^i = 1, \text{ ako } O_i^j \geq O_i^p \\ R^i = 2, \text{ ako } O_i^j < O_i^p \end{cases} \quad (2)$$

3 Conclusions

The analysis of the integrated university management systems shows that the selected criteria allow to account many aspects of their work. They are related to the Law on Higher Education in the learning process. Moreover user

requirements and specifics when working in such an environment are taken into account. This is sufficient to detect inaccuracies and identify opportunities for improvement and development

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