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ANALYSIS OF INTEGRATED SOFTWARE SOLUTIONS MARKET FOR ROMANIAN HIGHER EDUCATION

Abstract.The paper will present the results of a first phase of a national research project, "Integrated Information Solutions for Competitive Management in Romanian Universities". The objective of this phase was to perform a study about the current state of the Romanian universities in the process of data and information systems integration, at the end of 2007.
Keywords: data integration, information systems integration, ERP system.

JEL classification: G1, I2.

1. INTRODUCTION

Romanian universities need accurate, clean, stable, current and historical data. For our universities to make informed decisions, to operate efficiently, and to offer their students the best educational experience possible, they need the best data possible.

Each university needs an integrated information system that supports all its business functions. Moreover, data must be available in real time to users across multiple departments and business functions. University faculty, staff, and students should find the system easy to use. Successful implementation of an integrated information system will allow the Romanian universities to standardize and centralize data storage, to standardize and modernize administrative functions, thus increasing the efficiency and effectiveness of business practices in a way that makes interaction with the University easier for applicants, students, faculty, and staff.

Our team achieved a study about the current state of the integration of information systems and data within Romanian universities. We used the list of accredited Romanian universities (56 public universities and 56 private universities) available on-line at http://www.edu.ro/.

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2. STUDY RESULTS ANALYSIS

We began with an analysis of survey data from nearly 35 of Romanian universities including both public and private institutions and the full range of Carnegie segments (29 public universities and 6 private universities). This can be considered a representative sample of Romanian universities, encountering a percent of 31.25% of total accredited universities.

This study addressed a number of questions such as:
- What kind of information systems was developed within Romanian universities and for what functional areas?
- Which is the integration level of these systems?
- Do these information systems succeed to fulfill the information requests of Romanian universities?
- Which are the major suppliers of software solutions for Higher Education Management on Romanian market?

Today in our universities are a plethora of information systems. Every department/faculty has own applications with their different operating systems, different databases, different interfaces and maintenance requirements. These applications don't provide an integrated view of all activities in a university. Also autonomous software acquisition by departments/faculties within the university, results in shadow systems. Almost every department/faculty had a shadow system to track human resources. This has resulted in inefficiencies such as:
- additional training because of the different interfaces,
- inconsistencies in data since each information system has its own database and complex maintenance strategies,
- redundant data,
- problems of data integrity,
- complex tools for data access,
- inconsistent reporting results and wasted time,
- increased information systems investment.

At a deep analyses of the systems structure which were implemented we can see that were generally used personal systems, using less performing and cheaper technologies, but which were adapted at really specific requests of each university:

All universities which were analyzed have implemented a financial module. Considering universities which bought such a module, 36%of universities chose *SICOB solution*, 12% of them chose *Naum solution* and 52% of them have developed personal solutions for financial module especially because of reduced cost.

77% of Romanian universities have implemented a module for students' administration. In the last time 41% of them chose *UMS solution*, 11% chose *Gesco solution*, 11% preferred *Naum solution*, but 37% of them have a self-developed solution.

Except from the solution provided by Naum Consult, none of the other presented solutions can offer support for human resources module. Most of them are solutions implemented in house.

Also we observed that the public universities have financial module and Human Resources module, either commercial, either self developed solutions. Small universities do not use commercial solutions, because of budget restrictions. Many of the universities which already implemented scholars' administrative solutions are compatible with transfer credit system (ECTS).

Concerning Romanian market structure we can see that big European players are completely absent and some local solutions start to be developed, modestly at this moment, but with the advantage of having a client portfolio and having a deep knowledge of actual legislation:

SICOB (Integrated System for Budgetary Accounting) was a result of a project financed in 2001 by the Ministry of Education and it was developed by a Romanian software company and includes three modules: Financial, Research and Payments.

University Management System (UMS) is an integrated information system provided by RedPoint Company since 2004. The system is organized in modules and sub modules for learning process management, students, academic staff, tuition fees, admission and graduation exams, scholarships, diplomas. The system uses high performance technologies such as Java, J2EE, SWING, JSP, Struts, EJB and client-server architecture. In the future, the Redpoint Company will develop in collaboration with SAP the following modules: Financial, Payroll, Virtual library.

Naum Consult system was developed by Naum Consult SRL and has been provided since 2003. The system has modules for: accounting, provision management, assets management, student management, HR, financial.

GESCO 2001 is an information system for the management of higher education institutions schooling process developed by a Romanian company, Genisoft Group SA. The system offers many facilities such as: student performances management, budget assessment at department, course and allows a correlation with data from SICOB accounting module.

The main problem of these systems is the small integrated level, resulting:
- an excessive use of paper documents;
- missing of real time information;
- redundancy concerning information inserted;
- lack of transparency.

UMS and Gesco have a data level integration. Next years UMS system will probably be a fully integrated solution for university management. Naum solution uses a common relational database for different modules. SICOB is a simple accounting solution, and the integration is made only external, by another application or support platform. Table 1 presents a comparison between these software solutions for Higher Education Management, on various criteria such as:
- available modules,
- operating system and database,

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- development tools,
- reporting and analysis.

Table 1. A comparison between the main software solutions for higher education

	Gesco	UMS	Sicob	Naum
Operating system	Windows 2000 Server	Windows 2003, Unix, Linux	Sun Server	Windows xx, XP, Millennium
Database	SQL Server	Oracle, SQL Server, MySQL	Progress Workgroup DB	Oracle 10g
Development tools	Microsoft .NET (ASP, Web, XML, C)	Java, J2EE, SWING, JSP, Struts, EJB	Progress Actuate Developer	Visual FoxPro 9.0
Reporting and analysis	Embedded, based on XML, self transfer in .pdf or .xls	Embedded, integrated with MS Office		Embedded
Scope	Curriculas management, Schedule, Financial	Learning process management, students, academic staff, tuition fees, admission and graduation exams, scholarships, diplomas, Financial	Financial Research Accounting Payments	Financial Students Payments Human Resources
Installed base	6 clients	17 clients	35-45 clients	5 clients
Languages	Romanian	Romanian English	Romanian	Romanian
Major Carnegie segments	Big universities	Medium universities (private)	Public universities	Public universities
Compatibility with European Credit Transfer System	yes	yes	yes	

3. WHAT ARE THE BENEFITS OF ERP SYSTEMS FOR UNIVERSITIES?

ERP systems or enterprise systems are software systems for business management, encompassing modules supporting functional areas such planning, manufacturing, sales, marketing, distribution, accounting, financial, human resource management, project management, inventory management, service and maintenance, transportation and e-business. ERP systems enable the integration of transaction-oriented data and business processes throughout an organization.

For universities, ERP is an information technology solution that integrates and automates recruitment, admissions, financial aid, student records, and most academic and administrative services.

The adoption of an ERP system within a Romanian university will provide an opportunity to introduce new procedures that will eliminate existing inefficiencies. Universities are seeking opportunities to enable students to perform query and update functions via the Internet (ex. changing and confirming enrolment in courses). The ERP systems offer:
- improved services for faculty, staff, and students;
- administrative, academic, and student data are standardized;
- university data is globally accessible over the Internet;
- and involve less cost and risk than legacy systems.

ERP systems are based on the client/server architecture. Today all universities have a network infrastructure.

The following modules would be included as part of the ERP core for the university:
- Financials Management (General Ledger, Budget, Accounts Receivable, Accounts Payable, Billing, Cashiering, Assets Management, Inventory, Purchasing/e-Procurement, Travel & Expense Management);
- Human Resources/Payroll;
- Student Information;
- General (Campus portal).

The following non-core add-on modules are potential future enhancements to the ERP for the university:
- Facilities Maintenance & Scheduling;
- Grants Management;
- Library Cataloging;
- Business Intelligence/Analytics and Data Warehouse;
- Student Housing & Dining.

Most of the big ERP vendors provide solutions for higher education, including SAP, Oracle, SunGard, PeopleSoft and Jenzabar. The PeopleSoft Internet-based ERP solution consists of student administration, financials and human capital management.

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SAP's Higher education &Research solution consists of financial accounting and controlling, human resource management, facilities management and Student life cycle management.

The SunGard Higher Education (Banner) product suite is a completely Internet-based ERP system for the higher education market. The six base modules comprising this suite are Banner General, Banner Advancement, Banner Finance, Banner Financial Aid, Banner Human Resources and Banner Student.

Oracle offers Financials, Human Resource, Student, Grant management and Advancement modules.

Jenzabar ERP solution includes applications for accounts payable/receivable, admissions, alumni development, communication management, enterprise reporting, financial aid, general ledger, payroll and personnel, purchasing, student &course registration and student life. Jenzabar's CX is one ERP component of its "Total Campus Management" framework, which integrates back-end systems with a front-end portal (Jenzabar Internet Campus Solution) [1].

4. CONCLUSIONS

For the moment our universities are forced to use in house developed information systems or to buy cheap software solutions from small vendors having no experience in the field because of budget restrictions. These information systems have a low integration level. Also it is a gap between user needs and the functionality provide by institutional information systems.

One solution for solving the main problems of information solutions within Romanian university environment could be the acquisition of mature information systems, which are already used in developed countries. Because of capital missing from educational system it is difficult to take a decision to implement a complete ERP solution. Considering this particular situation, having a political sustainability within Romanian Government seems to be a very important, until now, the most important initiative of Romanian Government was the SICOB solution, in 2001.

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