Student Management Information System for Polish Universities at its Tenth Anniversary

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1. INTRODUCTION

Development of the *University Study-Oriented System* (USOS, http://usos.edu.pl/) began in 1999 under the Tempus Phare Joint European Project (UM_JEP-14461-1999). The system is owned by *University Centre for Informatization* (MUCI, http://muci.edu.pl) ─ the unit created by the Conference of Rectors of Polish Universities in 2002. Nowadays over forty percent of students of Polish public higher education institutions use this system and its associated applications. The main task carried out by USOS is administrative support of the teaching and learning process, which begins with the recruitment and ends with a presentation of diplomas and assistance in launching students careers. In this article we summarize ten years of system development and deployment and present our experience gathered in the specific environment of higher education. For this purpose, we use the results of the survey, which was carried out at participating universities in the beginning of the year 2010. The main aim of the survey was to show system position at institutions and what effort should be put to deploy the system.

2. Functionality of USOS and associated applications

A ten-year history of the development and use of the system allowed us to to fulfill expectations reported by higher education institutions of various profiles. Selected elements of the system ─ the most innovative ─ were also presented at EUNIS conferences by its developers. In 2007 the system got EUNIS Elite Award for excellence in implementing information systems for higher education (http://www.eunis.org/activities/b_practices/award/MUCI.pdf).

The main functional parts of USOS are the following:

- **USOS-Admin** (First deployed in 2000) ─ an interface of management system for handling most aspects of university education like students and teachers personal data, study programs, plans and requirements, course of study, degree certificates (all processes support ECTS credit system and diploma supplements), student financials (scholarships and fees), teaching lessons, survey and reporting.

- **USOSweb** (First deployed in 2003) ─ the first web-based student and academic-centered user interface with the large number of services. It provides many electronic operations and procedures performed by academic teachers and students concerning documentation of the study, for example presentation of students' results and achievements, filling in questionnaires on the teaching process, participating in the elections, communicating with other participants of groups and their teachers. However, the main use is course registration which supports individual education plans and multiple methods of registration for classes. It can be called the virtual deanery.

- **Admission/Internet Registration of Candidates** (First deployed in 2002) ─ supports the admission process with self-service functionality and gives full information about status of the qualification for registered candidates. Administration, measurement and analyzing recruiting effectiveness becomes very easy.

- **Central Registry for Results of Maturity Examinations** (Deployed in 2006, https://krem.uw.edu.pl) ─ allows universities which signed an agreement with the University of

Warsaw to get candidates' data essential for the recruitment process (of course this is done with the agreement of the candidates).

- **Course and Diploma Catalog** (First deployed in 2006) – systems which are fully compliant with requirements of the Bologna Declaration. The first of them as an electronic brochure contains essential information about the university, programs of study offered by the university, recruitment, and practical information for students. The next one is used for the following purposes: management of data on graduate thesis, information about the topics, authors, maintainer of the data units, search and view thesis, carrying out the process of review and evaluate thesis authorized by a person and storing electronic versions of written reviews.

- **Mobility** (First deployed in 2007) – three applications which cover main aspects of student and staff mobility:

  - outgoing mobility of students and academic teachers within the EU projects ranging from recruiting, arrangements with coordinators (Learning Agreement) and returns with the Transcripts of Records. After two years of collaboration with partners from Italy (CINECA), now we are able to exchange electronically structured data by calling web-services (http://usos.edu.pl/Mobility/). The Mobility Project gathers consortia of European universities (e.g. MUCI, SIGMA, HIS, Ladok, etc.), individual universities and companies,

  - arrivals of foreign students involve registration which includes choice of courses offered by the university (integration with Course Catalog), upload of necessary copies of documents and supports the process of qualification,

  - central registry of domestic exchange under the program "MOST" (deployed in 2010, https://most.uka.uw.edu.pl/). In this program (similar to original EU SOCRATES) participate most Polish universities.

- **Career Office** (Deploy 2008, https://biurokarier.edu.pl/) – covers conducted by colleges and universities the promotion and guidance for students. This tool gathers data from many universities (of course, only those students who agree to share their data) and uses the advantages of USOS (e.g., reliable data on students' acquired skills and achievements). Therefore, CVs of students presented in this system are more valuable for the employers than those available in typical employment agencies. System allows employers to submit bids for practices and jobs, review the data and contact with students and alumnus.

- **Statistics** (deployment in progress) – the management information system which uses solutions available in the Business Intelligence Applications. This system gathers information from USOS and Admission primarily dedicated to the management staff that provides the knowledge obtained on the basis of data collected from many volumes (originating from many sources). This knowledge is presented in various cross-sections, to help in the process of decision-making.

All USOS web-based applications are available with full functionality in English language version. Locally operated university applications can use CAS to authenticate their users.

3.   USOS in numbers

The USOS is used by 27 public higher education institutions, which constitutes 20 percent of the universities in this category and 40 percent of their students (see Table 1). With consortium MUCI is associated more HEI, some of them actually begin to deploy the system.

Table 1. USOS and Educational Market in Poland

Categories of HEI Deploying USOS	Quantity	Participation in educational market	Participation in handling students
public	27 from 131	20,61%	40,00%
non-public	3 from 325	0,92%	0,74%

In particular, eight of 12 largest Polish universities (over 30 thousand students each) belong to this group (see Figure 1). Figure 2 illustrates the types and numbers of universities participating in the project.
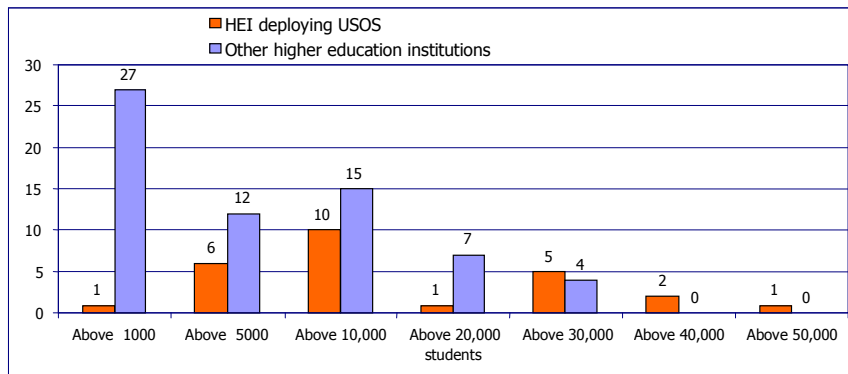
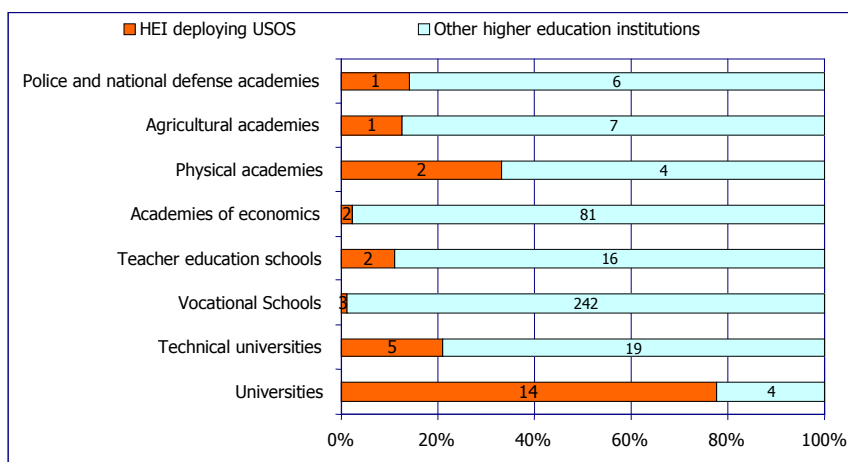Figure 1. Higher education institutions by number of students in Poland

Figure 2. Types of higher education institutions in Poland

Furthermore, universities deploying USOS are distinguished by their high quality education. For example three of them took three first places and further two were in the top ten in the Ranking of Higher Education Institutions published in 2009 year by magazines Rzeczpospolita (http://www.rp.pl) and Perspektywy.pl.

The system is developed by the experienced programmers, IT graduates with good knowledge of specificity of the higher education. It therefore offers effective solutions and can compete with commercial products available on the education market. Table 2 contains selected figures describing the project. Data has been gathered during the survey mentioned in the introduction.

Table 2. Selected figures describing the USOS project

Total number of	Quantity
applications associated with USOS/installations	8 / 65
servers for main databases and associated applications	79
defined fields of study/courses	5702 / 528087
developers/people deploying the system	from 5 to 10 / 89
people in team deploying the system — minumum — maximum	2 at 7 HEI 7 at 4 HEI
users from HEI's administration/academics/students per one developer per one deploying system	3693 / 26798 / 497185 369 / 2679 / 49718 41 / 301 / 5586

Institutions participating in the project can, according to their needs, free to choose and use the associated applications. Figures 3 and 4 illustrate associated applications (local and domestic) which are used by higher education institutions.
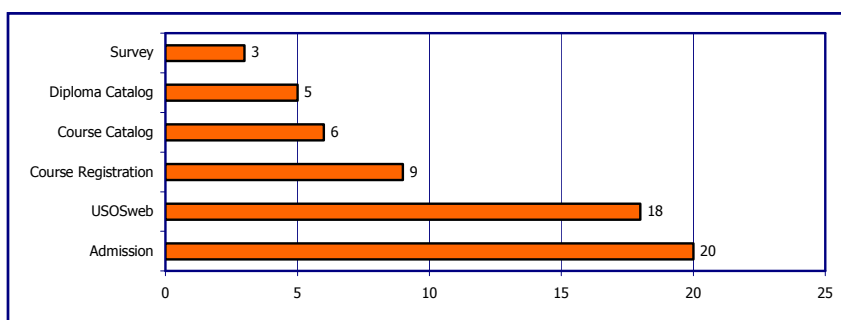

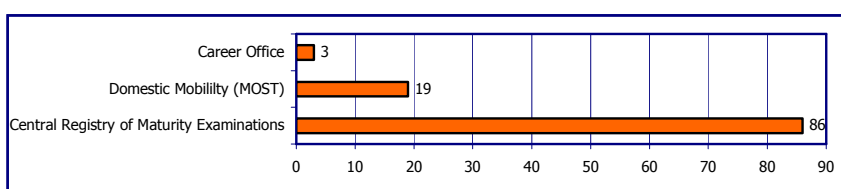Figure 3. Quantity of most popular applications associated with USOS installed on HEI

Figure 4. Quantity of HEI benefiting from the central applications

Higher education institutions have a wide variety of IT applications which support their activities. It is necessary to exchange data among these systems. Table 3 shows how many universities carried out a process of integration and what methods were used. This task becomes the main objectives of the future development of the system.

Table 3. Main systems integrated with USOS and methods of integration

Category of system	Number of HEI	Methods used
Human Resource Management	6	▪ CSV files
Financial Accounting and Management Information	4	▪ own scripts
Library Management	6	▪ table views
Student Mail Accounts	10	▪ special applications

4. Partnership and exchange of experience - base of USOS development

Business model of USOS development is quite different from other systems available on the educational market. First, the owner of the system is a non-profit organization. The base license fee and annual fees are very low. All the collected funds are spent on the application development. Furthermore:

- expectations of the universities determine the main directions of development of the system, all this occurs through discussion leading to consensus, partnership allows to create the flexible solutions,
- software development principles and methods are similar to those used in open-source society,
- source code is available on request for project participants, local changes and often developed own modules can be incorporated into the official version of the system,
- prototype versions of selected modules are developed by graduate students, which allows them to gain the first experience, provides good recommendations, accelerates implementation of new expected features at lower cost, furthermore, it involves academics in development of the system,

- developers have support of scientific staff, who are developing new algorithms and solutions, for example applying artificial intelligence to the registration of classes,
- people deploying the system get assistance and support of colleagues from other universities in solving technical and organizational problems, they can participate in many newsgroups, created to exchange of experiences, reporting demands and shortcomings.

5.   People and their best practices

During production of every module of the system developers use the well known best practices of software engineering, such as preparation of specification of requirements, technical and user's guide, CVS repository for every element of the system, the complete database schema as hypertext for authorized users. But more interesting are other activities, for example:

- any element of the system (starting from assumptions, requirements, design and code) is reviewed by the leader of the project and the development team,
- every new module before transferring to the production use, passes two-level additional testing: first on sample database and second at university which is an author and implements a prototype,
- system installation package also contains a reference sample database with the latest structure and full but anonymous data, it can be used for testing and training,
- sample scripts for data migration from old university databases are available on demand,
- the status of tasks is described by the project leader on a daily basis,
- access to bugtracker and testing tool (https://bugzilla.usos.edu.pl/) is given not only to the developers of the system, but also to the representatives of major users; it is also used to suggest new ideas, exchange views and gather support for new projects,
- free training courses and workshops are offered to cooperating universities; on not only about USOS and its subsystems, but also on other solutions used in universities, for example LDAP,
- documentation describing an implementation of the system is constantly updated, it contains not only a specification of the system, but also all aspects of implementation (for example schedule of all activities, conducting training, legal acts, etc.) which helps in successful implementation of the system,
- each institution carries one additional activities to support local users of the system (see Table 4).

Table 4. Examples of methods of supporting users

Method	Quantity of HEI
prepare its own dedicated documentation	15
access to local web pages	18
run discussion lists	6
formal help-desk	all

Developers and user representatives are a harmonious team, which meets 1-2 times a year to present achievements and make plans for the next period (last but not lest to play bowling together).

6.   Benefits and challenges

Decade of development of USOS and their associated applications helps us to:

- standardize and document processes carried out in higher education and influence them through changes in national law (e.g., Regulation of the Minister of Science and Higher Education for the documentation of the study),
- change the university administration, making it more effective and efficient (e.g., uniform and clear division of responsibilities),

- improve management of human resources, educational buildings and rooms (e.g., planning teaching, filling classrooms),
- improve communication among teachers and students (e.g., modules U-Mail, Exam); maximize value of teachers with functions (e.g., Erasmus Coordinator, Catalog Editor, Course Coordinator),
- make deploying and maintaining IT more efficient with lower cost.

After this time we have obtained the possibility of using solutions to exchange data with other institutions:
- admission using data collected in Central Registry for Results of Maturity Examinations,
- domestic and international cooperation and student mobility,
- applications gathering data from many HEI's in one system (a system to support duties of a university Career Office and monitoring professional careers of graduates).

There are new challenges:
- developing better tools for data mining and visualization,
- provide better services for students, faculty, and staff — more self-service functionality with 24x7 system access,
- better integration and data exchange with other university information systems (see Table 3),
- it is also time to rethink earlier technology decisions – parts of the systems will be rewritten using new technology platform.

7. Summary

After ten years of development, USOS is a mature system with a strong position on the market of management information systems for higher education in Poland. The number of installations in Polish HEI's is substantial and grows steadily.

Acknowledgements

REFERENCES

Czerniak, M., & Mincer-Daszkiewicz, J. (2009). *Implementation of USOS*. Warsaw: MUCI (in Polish).

Czerniak, M., (2010). *A survey — the state of deploy of the USOS*. Warsaw: MUCI (in Polish).