Computer system support for the Bologna process at Warsaw University

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Abstract

In 1999 Poland, together with many other European countries, signed the Bologna Declaration. The process of implementing the objectives of the agreement started almost 6 years ago. Despite many efforts the achieved results have not been spectacular. However on the first of May Poland joined the European Union and the situation changed rapidly. The task of implementing requirements of the Bologna Declaration is not possible without substantial support from the integrated computer system. The purpose of this paper is to present the organizational and technical aspects of the procedures which allow us to believe that by the end of the academic year 2004/05 Warsaw University will become fully eligible for DS and ECTS labels.

Keywords: Bologna Declaration; University Study-Oriented System (USOS); ECTS Label; diploma supplement

1 Introduction

In year 1999 Poland, together with many other European countries, signed the Bologna Declaration. The main idea of the agreement was to co-ordinate the policies to reach, in the first decade of the first millennium, the following objectives:

1. adoption of a system of comparable degrees, also through the implementation of the Diploma Supplement;
2. adoption of an education system essentially based on two main cycles, undergraduate and graduate, with the second leading to the masters or doctorate;
3. establishment of the system of easily transferable credits, such as ECTS;
4. promotion of mobility by overcoming obstacles to the effective exercise of free movement;
5. promotion of European co-operation in quality assurance with a view to develop comparable criteria and methodologies;
6. promotion of the necessary European dimensions in higher education, particularly with regards to curricular development, inter-institutional co-operation, mobility schemes and integrated programmes of study, training and research.

The process of implementing the listed objectives started almost 6 years ago. Pilot projects were launched and many Polish universities voluntarily took part in them ([1]). At the same time, a legislative initiative had started, whose aim was to create legal frames for the implementation of the Diploma Supplement. Despite these efforts the achieved results have not been spectacular. One of the reasons was that Poland was still a part of East Europe — inter-university cooperation and student mobility was not as easy and wide spread as in West European countries. However on the first of May Poland joined the European Union and the situation changed rapidly.

In August 2004, a new regulation of the Minister of National Education and Sport on the types of professional titles and specimens of diplomas awarded in higher education came in force, by which Polish higher education institutions are obliged to issue Diploma Supplement from January 1, 2005. The number of foreign students coming to Warsaw University in 2004 almost doubled in comparison with the preceding year and similarly the number of WU students going abroad. Warsaw University was faced with the obligation to get prepared in a short time for full implementation of the objectives of the Bologna agreement.

This task is not possible without substantial support from the integrated computer system. An institution applying for the **ECTS label** should correctly implement ECTS in all first and second cycle degree programs. One of the criterias is to build each year Course Catalogue (preferably on-line) with clear course descriptions and course diagram showing ECTS credits allocated. A **DS label** is for institutions which issue the Diploma Supplement in a widely-spoken European language, free of charge to all students upon graduation in all first and second cycle degree programs. Supporting students mobility means, among others, the necessity to handle in an electronic way students personal data, course registration, financial aid, accomodation, and — last not least — gathering statistics.

In Warsaw University a student management information system, called **USOS** (**University Study-Oriented System**) is in use since year 2000. However, since system deployment at facutlies was mandatory and was not coordinated by any central regulations, until academic year 2004/05 only a subset of WU student personal data, study programs, courses, diplomas, grades, credit points has been collected in the central system database. All system modules were fully deployed at only one of all 58 university organizational units. This situation should have changed and it recently did!

The purpose of this paper is to present the organizational and technical aspects of the procedures which allow us to believe that by the end of the academic year 2004/05 Warsaw University will become fully prepared to apply for DS and ECTS labels.

The painful process of gathering personal records of present and former WU students is outlined in section 2. Ways to build university-wide course and diploma catalogs are described in sections 3 and 4. Section 5 deals with diploma supplement. At the end we look at the problems with handling students mobility. Some conclusions are drawn in the last section.

2 Student records

USOS is an university-wide computer system based on a central Oracle database. It is mature, consists of many modules, with functionality covering basic needs of a higer education institution (see e.g. [4, 5, 3]). However the system can only be of use and get fully operational if its repository contains the necessary data. For the student management information system like USOS the key data are student personal records. Warsaw University, with its almost 60 thousand students, is the largest Polish university. Over the last years, the number of candidates applying each year for the university places exceeded 40 thousand, from which about one third was accepted. Gathering such a huge amount of data in a short time is a real challenge. Doing it manually at the university student offices would be simply impossible.

2.1 Second, third and fourth year students

In the academic year 2003/04, with the initiative of the Center for Foreign Language Teaching and the Physical Education and Sports Center, a new course registration module was implemented in USOS, supporting registration for courses offered to all students of the university ([6]). On-line registration was the only possible way for students to get accepted for foreign language and physical education classes. The data of all students entitled for such courses had to be entered to the system. These few faculties which have already been using USOS, earlier gathered student records in the repository. Other data was either transferred from local database applications (if available), obtained from the student admission system database or entered manually. Some data was recovered from the old database of the Center for Foreign Language Teaching. It was a long and painful process but in that way the data of about 37 thousand students was gathered during summer 2003, right in time to start course registration.

During this process two other important actions were undertaken: about 150 USOS clients were installed at university student offices and many USOS users were trained in system operation.

2.2 First year students

From 2002 Warsaw University has used web-based student admission system ([7, 2]). The system is based on the idea that candidates register remotly, enter all necessary information (also their personal data) by themselves, and have on-line access to it throughout the whole registration and assessment process. In 2004 the admission system was integrated with USOS

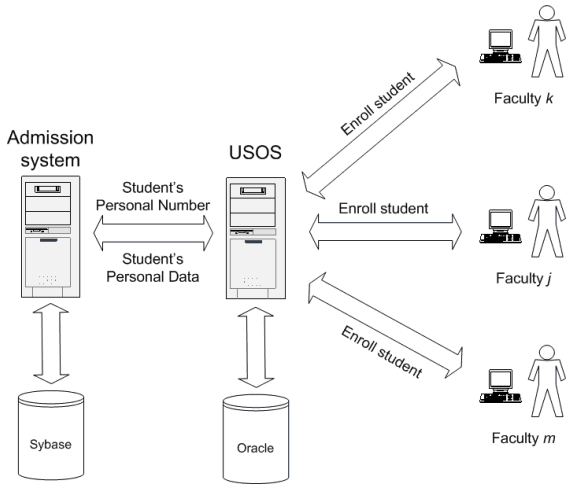

Figure 1: USOS — student enrollment. Student data are obtained on-line from the admission system

(see fig. 1). First basic dictionaries of study programs, specializations, secondary schools, area codes, nationalities etc. were exported from USOS to the admission system. Then a special Oracle form was designed and implemented for USOS, and a simple connection was built between USOS and the admission system, which allowed the USOS operator to import on-line the chosen candidate's data from the admission system with just one mouse click (see fig. 2). When the admission procedure was finished, the data of the accepted candidates were imported to USOS on individual basis, verified against the paper documentation submitted by the candidate to a student office, corrected if necessary, and officially approved.

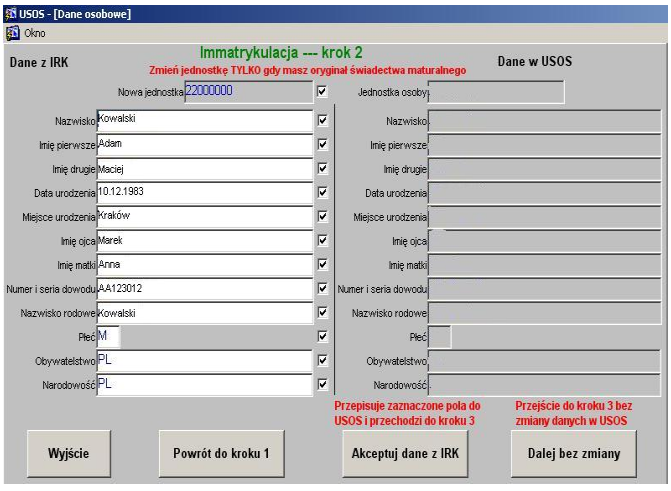

Figure 2: USOS form with data obtained electronically from the admission system — on the left. Data already available in USOS (if any) is displayed on the right for comparison.

The process took part mostly in August, September, and partly in October. From the 1st of November the central bureau of student affairs started final verification of the data of first year students, locking it to block further modification at faculties.

At the end of this process the registry of all new students of Warsaw University, required by law, has been printed.

In such way the records of newly accepted students were gathered in the central repository at the beginning of the new academic year, opening the possibility for further data processing, on the regular basis, during the academic year.

The important part of the whole procedure is that the data was entered into the system by the candidates. Data verification was carried by university staff, but this was not so time consuming. The data became available early enough so it could be used e.g. for course registration and printing various documents needed by students at the begining of the academic year.

Another important aspect is that in contrary to earlier activities concerning USOS and its deployment at various faculties, which were done on voluntary basis, 2004 student enrollment was preceded by the official regulation issued by the vice-rector for student affairs. Faculties were made responsible for gathering in the system data of newly accepted students. However, the whole process was prepared carefully, all parts of it described in detail and suported by the computer system. Distribution of work among candidates made it implementable in a planned time. The final result was a full success.

2.3 Graduating students

In the beginning of the new academic year 2004/05 the vice-rector issued another important regulation. Faculties were made obligated to start building the electronic diploma catalog. Since at Warsaw University each issued diploma has to be officially signed by rector, it was easy to work out an argument making faculties interested in implementing the regulation right away — the rector announced that starting from the 1st of November he would only be signing certificates printed from USOS.

In fact this new regulation was meant to serve three purposes. First it had been the starting step for getting prepared to handling diploma supplements. Second, by Polish law, universities should maintain one central diploma catalog, but until 2004 only local versions were available at Warsaw University faculties. Third, diploma catalog was also a first step in building an electronic archive of diploma theses, making them available on-line for authorized users, also with the aim to check them for possibility of plagiarism (p. 4).

Of course the side-effect was that the missing records of graduating students should have been stored in the computer system. Fortunately we already had the experience with first year students and the quick decision was made to apply the similar procedure. We hadn't closed the admission on-line system but kept it available for the students. Of course the "admission" part of it had been switched off since we needed it only for gathering students' personal data. The overall procedure was already well know to faculties and had been well tested, so the process went on smoothly with the new task. Each year about 8500 diplomas (master and bachelor) are issued at Warsaw University, but this is spread in time, so the increase in workload for student offices was neglectable, especially when part of work was done by graduates themselves.

3 Course catalog

Warsaw University wants to apply for ECTS label and Diploma Supplement label. Both these certificates require full catalog of degree study programs, issued diplomas and offered courses. The first two will be described in the next section (4). Building course catalog is definitely not an easy task. At the average size faculty each year about 400 courses are offered, from which about 200 are new selective courses. Two important elements of the course catalog should be regarded and handled. First, courses should not only be entitled and characterized by some attributes (like ECTS points), but also be delivered with the description of their content and syllabus. The descriptions and syllabuses should be formulated according to some common pattern. Quite often these descriptions are already available in paper versions, edited with some common text editor, however their construction and language needs improvement. At the Faculty of Mathematics, Computer Science and Mechanics we started to work out a pattern which would be approved by faculty members and authorities but this is a long process raising a lot of emotion.

Second, the course catalog should also have its English version (see fig. 3). It should be readable for foreign students who plan to carry part of their studies at Warsaw University. It also should be a source of necessary information for English version of diploma supplement printed for WU students who plan to study or work abroad.

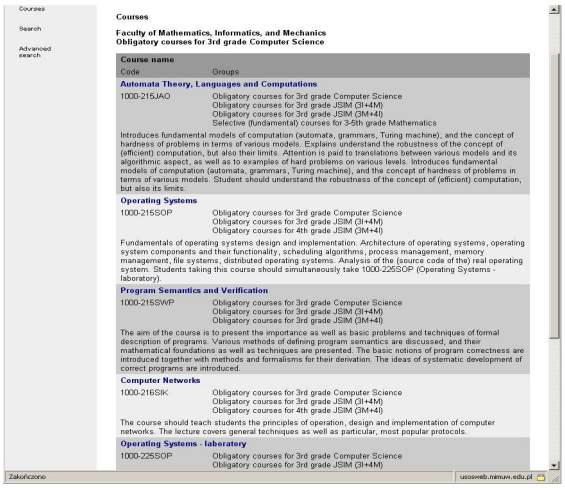

Figure 3: List of courses in English (a course name is a link to another page with more details about the course)

In first order the current course catalog with courses offered in academic year 2004/05 should be collected in the database. This will allow to verify — at the end of the year — whether students fulfilled requirements of study programs and automatically promote them to further stages. Also on-line course registration becomes possible. Again, regulation issued by the

vice-rector of student affairs obliged faculties to collect data in a predefined time. The simple stimulus was that only courses displayed in a course catalog are officially approved, can have rooms and labs assigned and be taken into account in calculation of didactic obligations of faculty members. The regulation comes into effect from summer semester so at the end of the academic year full course catalog of current courses should be available in both language versions.

Support which can be offered to faculties is the mechanism to transfer data from old local databases or spreadsheets. Content descriptions and syllabuses can also be copied from text editors.

It is not so easy to collect courses which were offered a year, two years or ten years ago. They are however needed in the database for transcripts of records and diploma supplements. The amount of data to gather is tremendous. Student offices would not be able to enter it into the system in a reasonable time. Equally difficult would be to define in a globally accepted and unified format all course attributes like codes, descriptions, syllabuses etc. The possible solution to this problem is described in section 5.

4 Diploma catalog

The next step towards printing diploma supplements is building catalog of degree programs and diplomas awarded upon completion of the required program curriculum. The first catalog is not difficult to obtain. Degree programs are well understood and defined, necessary information should anyway be available, for example in on-line admission systems. Some maintenance was necessary in order to work out convenient coding system and unified description format. In fact this catalog had to be build before first student records could be stored since every student should have been enrolled in some study program. The only extra work imposed by implementation of the Bologna process was to prepare English version of the catalog.

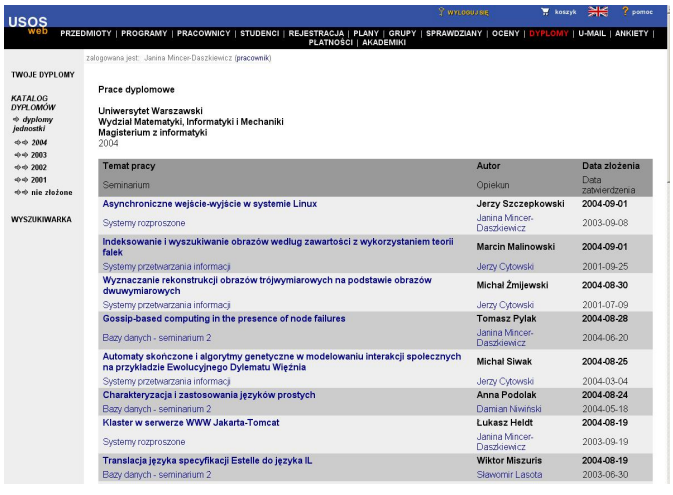

Figure 4: USOSweb: Part of a diploma catalog for a chosen faculty and academic year

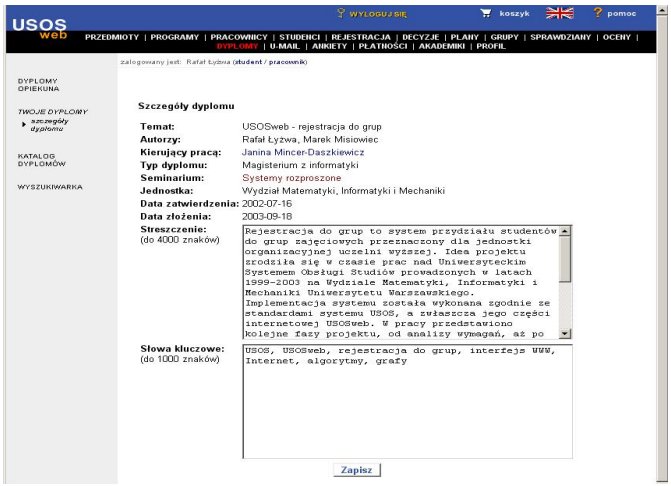

Figure 5: USOSweb: Page with a description of a chosen thesis ready for edition of thesis summary and key words

Diploma catalog is another story. Until October 2004 diplomas were handled locally at faculties, where they are awarded. The new computer support for the diploma catalog consists of a few elements. New Oracle interface was developed for entering into the system basic data about the issued diploma, like title of the thesis, awarded degree, and date of issue, information about persons involved (student, thesis supervisor, thesis referee) and thesis defence (date, final grade). Extra module was built into USOSweb, the Internet subsystem of USOS, which gives access to stored data to the academic community. The catalog of all awarded diplomas is available on-line to every user after logging in, classified according to faculty, diploma degree and specialization (see fig. 4). An academic teacher has access to a personal page with information on all supervised theses. A student has access to a personal page where he/she can browse his/her diplomas (possibly more than one) and enter into the system, if necessary, thesis summary and key words (see fig. 5). This possibility was prepared to make the process of entering this data less error-prone. The author of the thesis is much better acquainted with this information than a clerk from a student office. Theses summaries and key words can be used in electronic archive system for browsing and searching. They are also printed on so-called **thesis control card**, and verified by thesis supervisor during thesis defence.

As was mentioned in p. 2.3, diploma catalog is also a first step in building an electronic archive of diploma theses. There are many reasons for archiving diplomas in an electronic form. First, after defence they may become available for browsing and reading, as other items from university electronic libraries. Second, before defence they may be made available for thesis supervisor and referees who could check them against materials available on the net. It unfortunately happens that students copy parts of the thesis from the materials posted in Internet without properly citing sources. Such cases are regarded as plagiarism, are illegal, should be traced and punished, to discourage possible followers. Application handling an electronic

archive (work in progress) will be periodically getting from USOS information on graduating students and submitted diplomas and will open for the authorized student the possibility for remote upload of the thesis (in PDF and text formats).

Diploma catalog is constructed steadily during the academic year. Extra workload is bearable. Necessary computer support is available for students, academic teachers, and student offices. Data are entered into the central repository, what makes them available for further processing, like printing or posting on the net university diploma catalog, or getting statistics.

5 Diploma supplement

Diploma supplement is the most important certificate issued by higher education institutions in the United Europe. It is designed to provide a description of the level, context, content and status of the studies that were pursued and successfully completed by a diploma holder, and a precise description of the competencies acquired during the study period. Important is that it is easily comparable abroad, giving an easier access to opportunities of work or further studies. The diploma supplement is composed of eight sections, one of which contains information on the content of a study program and results gained. This is the most difficult part of the supplement to compose and print, since it requires the detailed history of the studies. This history is what is missing in the USOS repository. The faculty of Mathematics, Computer Science and Mechanics, which is using USOS since 2000, will soon have the full history data for students enrolled 5 years ago. But there are many students who study longer then expected or even return to university after a long break. It is hard to state the upper limit. We lack detailed information about taken courses, lecturers, grades, ECTS points. There is of course paper documentation at the university archive and students have transcripts of records. This is however massive data, it is even hard to estimate amount of work needed to collect in an electronic forms all historic data for all students of the university who might come some day and ask for the diploma supplement. And by law university is obliged to print it to every alumnus, starting from January 1st, 2005.

Again, the solution is in a proper work distribution and computer system support. The new software project was launched and the new module of USOSweb was deployed in March 2005. A student after logging in sees all data needed for his/her diploma supplement which are gathered in the USOS database. He/she also have the possibility to enter the missing data. Taken courses which are available in the course catalog may be selected from the list and only missing grades delivered. When courses are also missing they may be entered with all needed information but only as text data. Of course all delivered information will be stored in auxiliary tables and will wait for further approval. Only approved data will be regarded as part of the student's history. This text data will not become part of the university course catalog which can contain only properly classified data, with appropriate codes and full descriptions, but will be attached to the record of the student who entered the data.

Faculties welcomed the new module. It looks as the only reasonable way of fulfilling requirement of the regulation of the Ministry of Education and Bologna Declaration. The student might of course argue that it is university duty to print diploma supplement without any entry conditions, but with the alternative to either help and get the supplement in a week or not help and wait two months it is generally expected that most will be willing to cooperate.

Important is that the new module will serve not only for delivery of missing historic data but also in cases when a student carries part of study somewhere else or just takes a few courses outside home university in the same or other city or country. After these courses are approved by authorities as partial fulfillement of requirements of the study program, they should be attached to the student' study record in the USOS database. The same software module may be used for collecting such data in the university repository.

Diploma supplement printed from USOS is shown in fig. 6.

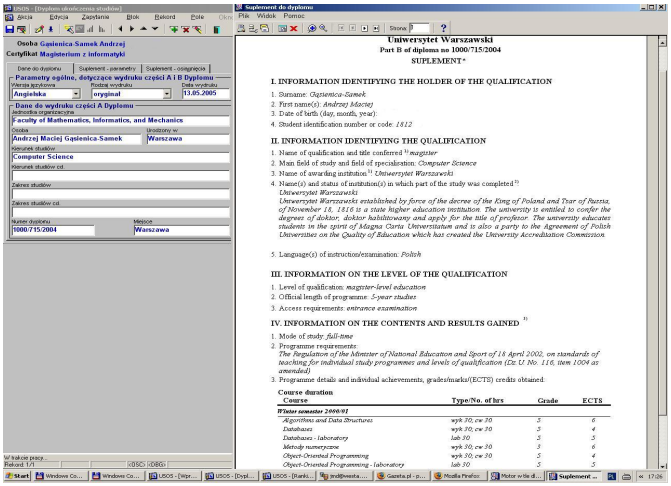

Figure 6: USOS — diploma supplement (on the right) printed from Oracle form (in the background)

6 Student mobility

One of the main attributes of the new style of study supported by the Bologna Declaration is student mobility. More and more WU students carry part of their studies abroad, despite the fact that the obtained scholarship usually covers only part of the involved costs. The number of foreign students coming to Warsaw University also grows steadily. As these activities intensify, computer support becomes necessary. Static WWW forms and e-mails are no longer sufficient support tools. The International Relations Office asked for help and worked hard with USOS developers to design a new module for handling applications of foreign students willing to study at Warsaw University. The module is web-based (see fig. 7), delivers all information in English and supports the whole work-flow processing, starting with application delivery until the final decision is made and student is registered in USOS.

The process of handling student movement in the opposite direction will be supported by another application (the work is in progress).

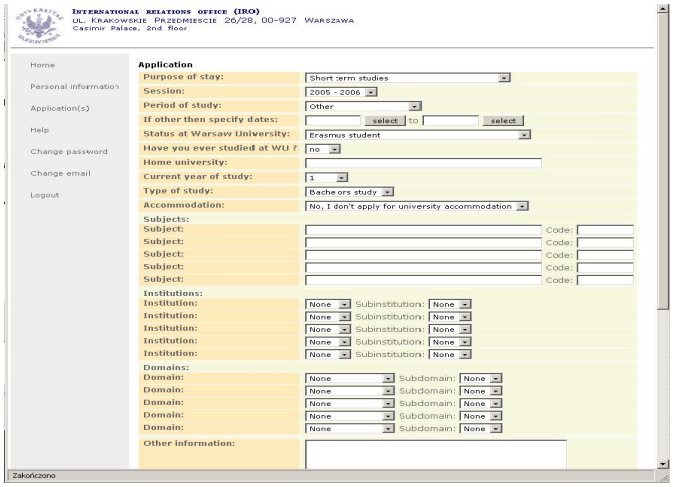

Figure 7: Web-based module for foreign students applying for study at WU

7 Summary

ECTS and DS labels are a must for higher education institutions which want to compete for students in the United Europe. Warsaw University, being the largest and most recognized university in Poland should be among the first to implement ideas of the Bologna Declaration. The challenge has already been undertaken by the university authorities. This difficult task however could not be realized without substantial computer system support. The most important aspects of the succesful computer system are university-wide data repository filled with all necessary data concerning students and details of study programs. The task of building the computer system is equally difficult to the task of gathering massive data in a reasonable time. There may be various ways of getting the data: entering it manually at students offices, importing from old desktop applications, importing from the admission system. Data can also be delivered by students themselves (especially at the early stage of system functioning), and moved to the central database after being verified and approved at the student office. The student management system needs special web-based modules for remote access and data delivery by authorized students and other modules for data verification and approval (or correction) by authorized administration officers. Such modules have been built into USOSweb and USOS, making the integrated system used at Warsaw University especially helpful in implementation of objectives of the Bologna Declaration.

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