

# International Cooperation and Mobility in Higher Education from IT Perspective

Janina Mincer-Daszkiwicz<sup>1</sup>

<sup>1</sup>Department of Mathematics, Computer Science, and Mechanics, University of Warsaw, Banacha 2, 02-097 Warszawa, jmd@mimuw.edu.pl.

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## 1. EXECUTIVE SUMMARY

Poland became officially part of the European Union on May 1st, 2005. Polish higher education system is practically part of European higher education since at least 1999 when, together with many other European Countries, Poland signed the Bologna Declaration. An important aspect of this presence in Europe is international cooperation concerning student and staff mobility in the area of education, research and training. Polish higher education institutions play an active role in many European programs, like LLP-Erasmus, Erasmus-Mundus, or Leonardo da Vinci.

### 1.1. Background

University of Warsaw, the biggest Polish university, considers international cooperation an important element of its mission. Student and staff mobility involves processes, which more than any others, are carried out in a distributed environment and - due to many relations with the outside world - build an image of the institution. This also means that more than any others they need IT support. This is not, however, an easy business domain for IT specialists due to very diverse needs, high variability and international context. Processes in the area of international cooperation involve daily routines of university administration, so the IT support for them should be strictly integrated with the mainstream software for student and study management.

### 1.2. Main subject of the paper

The main subject of this paper is the software to assist daily activities of university *International Relations Office* (in short: IRO). Main tasks of the system involve cooperation and agreement management (keeping track of partner institutions, exchange programs, projects, and co-operation), mobility management (taking care of outgoing and incoming students and staff, recruitment, registration for courses, transcripts of records, funding, accommodation, etc.). For many years IRO worked with only minor IT support, like spreadsheets for keeping track of international programs, agreements, students and staff mobility, finances etc. New software incorporates modules for IRO employees and web-based services for students and academic teachers, and is fully integrated with *USOS (University Study-Oriented System)* used by about twenty Polish universities.

### 1.3. Conclusions

The paper describes work in progress. New modules of the system are being developed and deployed successively, since 2005. Substantial progress was made during the last academic year. There is still a lot to be done, but the effects obtained so far prove that we have chosen the right approach. The alternative - buying and deploying ready to use general software system, like *movein* and *moveout* - would definitely shorten the way to the final solution, but would not give us what we regard as an extremely important aspect of the university information system - strict integration of all supported processes and easy daily access to up to date central data repository.

## 2. INTERNATIONAL COOPERATION AND MOBILITY AT THE UNIVERSITY OF WARSAW

University of Warsaw, the biggest Polish university, considers international cooperation an important element of its mission, according to which "*The University is an institution, which assists the dialogue between the integrating societies of Western Europe and its Eastern neighbours*". It plays an active role in many European programs, like LLP-Erasmus, Erasmus-Mundus, or Leonardo da Vinci. International cooperation is managed and organized by International Relations Office (in short: IRO), which hires 15 employees. They are responsible for cooperation and agreement management (governmental, bilateral and multilateral agreements, educational programs), and mobility management (short-term arrivals and departures of students, academic teachers, and other staff, for studies, internships, teaching, research). They have to handle finances of international cooperation and prepare all types of statistics for the university authorities, partner institutions, program sponsors, and governmental agenda like Central Statistical Office. They also help to promote university didactic offer among partners.

Here are some statistics for academic year 2007/2008, showing the amount of work done by IRO in the range of Erasmus program, one of many (all numbers are approximate):

- a. number of Erasmus partners: 345,
- b. number of Erasmus agreements: 1500,
- c. number of outgoing students:
  - part-time studies: 1200,
  - internships: 70,
- d. number of incoming students: 450,
- e. number of outgoing academic teachers: 215,
- f. number of outgoing staff members (internships): 175,
- g. Erasmus budget (only scholarships and grants): 2.786.457 €.

Altogether it is app. 2000 people to handle in one academic year (more than 3500 if taken into account that at the same time arrivals and departures planned in the previous academic year take place, with the total budget for two consecutive years 5.078.263 €). The numbers are growing every year.

## 3. IT SUPPORT FOR IRO AT THE UNIVERSITY OF WARSAW

### 3.1. First steps

For many years IRO fulfilled its expanding duties with only minor IT support, like spreadsheets for keeping track of international programs, agreements, students and staff mobility, finances etc. Later a small local database application (in FoxPro) was built to handle finances. In recent years, due to the growing number of incoming and outgoing students and academic teachers, remotely accessed HTML pages were used for spreading information on exchange possibilities. More interactive tools became soon inevitable to handle growing amount of data - simple web-based forms helped to gather in local repository data delivered on-line by students and academic teachers.

### 3.2. From local tools to an integrated system

These ad-hoc methods and tools on one hand were important and useful since at least partly helped to handle short-term IRO tasks, however looking from the long-term perspective we might also observe some negative effect: they made IRO employees expect what seemed from the first glance quick and 'easy' problem solutions. Doing serial correspondence in word processor IS quick and easy, as well as adding a new spreadsheet calculating some statistics or developing simple static HTML page. Even delivering web-based form gathering data from unauthorized users doesn't take too much time. Building the same functionality into an integrated tool, with all necessary data control,

verification, authorization, and authentication, as part of some system data flow is not that quick and easy, should be preceded by a thorough analysis of requirements and re-thinking of old procedures.

The main source of the problem from the IT perspective was that these local tools and methods were limited to only one aspect of university activity and separated from the mainstream task which is management of students affairs and study programs. For IT staff it was obvious that they will not scale with the growing 'workload', that the only reasonable solution for the future is to build the needed support into an integrated system having full access to data already gathered in a central repository of the student management information system, and already delivering many functionalities needed by IRO 'clients', like transcripts of records, diploma supplements, course registrations, electronic student identity cards for incoming students and learning agreements as part of curricula for outgoing students. It may take some time to discuss, re-think, design, develop and deploy software for supporting the most basic and crucial tasks of IRO, but then we may expect that quite a lot can be obtained just as a bonus of being part of the university information system, with the full benefit of all its modules and tools, like central system for university administration and many web-based branches for students and staff.

## **4. REQUIREMENTS ANALYSIS**

### **4.1. Background**

It was also clear from the beginning that, due to many reasons, designing and implementing tools for IRO is not an easy task:

1. From IT perspective widely geographically spread international cooperation means extra level of complexity stemming from the obligation to support many languages, to extend dictionaries by the information on foreign higher education institutions, towns, countries, to handle foreign address (area code) templates, identity documents etc. One of the main practical problems is how to uniquely identify a person coming from abroad. Names, surnames, passport numbers - none of these are unique, and even if by rule unique you hardly have any method to enforce uniqueness not losing flexibility of the system. Usually there is also no sense in asking 'is this your first visit to UW?' Of course you can always accept data in simple text format, but then you should expect many duplicates, literal errors, or just incorrect data, which ruin further statistical analysis.
2. Programs of international cooperation change every couple of years, new programs are initiated, which operate on totally different conditions, new reports and statistics are to be delivered to sponsors and authorities. Again, either you turn off data validation and forget about data hierarchy and structuralization jeopardizing quality of the data or you turn it on risking that after a year or two you would have to substantially redesign software.
3. Financing of international mobility is a real challenge for IT designers. Almost every program has its own specific financial rules. A system has to handle foreign currencies and changing exchange rates. Mobility means that scholarships should go to foreign bank accounts (quite often these accounts are opened on the last minute). In a couple of years Poland may adopt EURO as national currency, so despite current needs serious changes may become inevitable in the future.
4. A system should handle very diverse 'clients'. These are students and staff from almost all over the world coming to Warsaw and local students going abroad. All these people have various expectations, habits, background, goals. Exchange programs cover short-term studies, language courses, internships, didactics, research. All these areas of interest need special treatment.
5. Last but not least the student management information system used at the University of Warsaw is deployed in about 20 Polish higher education institutions. Their specific needs should also be taken into account.

Software designers look for common ground and general solutions. They need to know not only current needs, but also expectations for the years to come. They *design for - predictable - change*, but hate unpredictable.

IRO employees are the main stakeholders of the system to be designed. They are the only specialists in the 'business' domain, are heavily occupied all year round, and used to old routine methods and procedures (mostly paper-based). They look for quick solutions of current problems and do not have time nor patience to imagine and discuss future needs.

Students and university staff are another group of stakeholders. They expect personalized software best suited to their individual cases. They ask for friendly interface, which often means 'let me enter in this field any data I wish'.

Altogether this is what system designers and developers regard as a real challenge.

## 4.2. Requirements

Requirements analysis starts with recognition of business domain and activities of all stakeholders. Main business areas of IRO are the following:

### 1. Cooperation and agreement management

This involves keeping track of partner institutions (including contact details and internal structure of the institutions) and all types of international cooperations and exchange programs, their hierarchy (programs, projects inside programs, exchange agreements inside projects, bilateral agreements, etc.) and changing status (to be signed, active, expired, etc.). Cooperation ranges from students and staff mobility to research programs, and is subject to intensive reporting. Agreements involve agreed number of places and duration periods, internal and external coordinators, concerned fields of study (identified by the Erasmus code), agreement target groups.

### 2. Mobility management: arrivals and departures

*Arrivals:* management of student application and admission process, importing data of accepted students into the student management information system, handling student lifecycle at the university, starting from course registration, accommodation, and issuing of electronic student identity card, and ending with the print of transcript of records, and gathering final evaluations.

*Departures:* online publication of exchange possibilities, online applications with support for departmental coordinators and qualification commissions, supporting the process of negotiating learning agreement between the student and home and abroad coordinators. Courses agreed upon in learning agreement should automatically be incorporated into study program requirements for the student and finally grades obtained at partner institution should find their way to diploma supplement (together with the information on student's study abroad).

Although most of mobility means students coming or going for short-term studies (like semester or academic year), other forms of mobility are also possible and gaining popularity: internships for students and staff, academic teachers going/coming with lectures, staff research exchange, administration personnel going/coming to exchange experience.

### 3. Finances

International cooperation is possible due to substantial funding by European, national, and international institutions. IRO is responsible for allocation and redistribution of grants. They start with calculating monthly base grant amount for specific group of exchange countries (depending on the cost of living), then plan monthly payments per capita according to length and time of stay, and finally generate electronic money transfer orders accompanied by many paper reports. All financial procedures and activities need to be securely managed and controlled, strict cooperation with financial authorities is necessary.

### 4. Statistics

Reports and statistics showing level and intensity of international cooperation are used to verify how university mission is being put into practice. Many statistics have to be delivered

to university authorities, grant funders, Ministry of Education, Central Statistical Office, and many other institutions.

## 5. SOFTWARE DESIGN AND DEPLOYMENT

### 5.1. Introduction

Requirements analysis took a long time and was not an easy task. It was very hard not to go the easiest way and reproduce in software existing organizational procedures. More general thinking was necessary to not only recognize current needs, but also to foresee future ones.

The first module was implemented in 1995. It was web-based admission system for incoming students willing to study at the University of Warsaw, which supported the whole work-flow processing, starting with application delivery until the final decision was made and a student was registered in USOS (see [Mincer-Daszkiwicz, 2005]). This year the system is being used for the last time, starting from 2009 its functionality will be taken over by the central admission system, supporting all types of applications: for short-term studies, long-term studies, degree programs (bachelor, master, doctoral), non-degree post-diploma programs, etc.

The next important step was made in the previous academic year. First, common dictionaries for all future modules were recognized and prepared. Dictionaries gather data such as countries, names and addresses of higher education institutions from all over the world, other institutions involved in international cooperation, names and electronic addresses of people from these institutions engaged in common activities, banks, types of grants, types of funds, currencies, sector codes, and many others. Second, all possible ways of cooperation were recognized and finally the hierarchical model comprising international programs (like LLP Erasmus), projects (like Erasmus 45834), and agreements (like bilateral agreement number 354/E/XI06, signed between University of Warsaw and Aarhus Universitet) was designed and implemented (see fig. 5.1). This module constitutes the necessary base for all others since every activity is carried out within the confines of some agreement and is limited by its settings.

The screenshot shows a web application interface for managing cooperation conditions. It is divided into several sections:

- Umowy (Agreements):** A table listing bilateral agreements. The table has columns: Rodzaj, Numer, Data podpisania, Data rozpoczęcia, Data ważności, Status. The data rows are:
 

Rodzaj	Numer	Data podpisania	Data rozpoczęcia	Data ważności	Status
Bilateralna	245/E/XI06	27.11.2006	01.07.2007	30.09.2010	podpisana
Bilateralna	282/E/XI06	04.12.2006	01.07.2007	30.09.2010	podpisana
Bilateralna	188/E/XI06	14.11.2006	01.07.2007	30.09.2008	podpisana
Bilateralna	203/E/XI06	20.11.2006	01.07.2007	30.09.2008	podpisana
- Erasmus Details:** Fields for 'Kod Erasmus' (F PARIS014), 'Uczelnia zagraniczna lub instytucja zewnętrzna' (Institut d'Etudes Politiques de Paris (Sciences Po)), 'Kraj' (Francja), and 'Projekt' (Erasmus 45834).
- Warunki współpracy (Cooperation Conditions):** A table with columns: Typ, Wzrost, Dziedzina, Data rozpoczęcia, Data zakończenia, Kraj A, Poziom stud., L. os. Mies. Tyg. Godz, Kraj B, Poziom stud., L. os. Mies. Tyg. Godz, Poprzedzająca. The data rows are:
 

Typ	Wzrost	Dziedzina	Data rozpoczęcia	Data zakończenia	Kraj A	Poziom stud.	L. os. Mies. Tyg. Godz	Kraj B	Poziom stud.	L. os. Mies. Tyg. Godz	Poprzedzająca
studenci-studia	14.1		01.07.2007	30.09.2008	PL	drugi	3 30	FR	drugi	3 30	
studenci-studia	14.0		01.07.2007	30.09.2008	PL			FR	drugi	3 30	
nauczyciele akac	14.1		01.07.2007	30.09.2008	PL		1 1 8	FR		1 1 8	
- Dla kogo (For whom):** 'Dla kogo' (Studenci), 'Jednostka' (21020000), 'Nazwa jednostki' (Instytut Nauk Politycznych).
- Warunki współpracy poprzedzającej (Preceding cooperation conditions):** Fields for 'Dla kogo', 'Kod jednostki', 'Opis jednostki', 'Nazwiska lub liczby', 'Opis tematów', and 'Uwagi' (dotyczy również I STOPNIA).

Figure 5.1. Conditions of cooperation according to an agreement

Other modules are described in more detail in the following sections.

## 5.2. Arrivals

Web-based admission system for incoming students, mentioned in the previous section, guides the students who want to come to Warsaw for short-term studies. Applying students have to complete and submit an online application form on the university website. A PDF version of the application is then printed and signed by the students and the responsible coordinators at the student's home institution. Paper documents are sent to IRO, whereas data from the applications are imported electronically into the central information system for further processing (see fig. 5.2).

Osoby		Program	Etap	Cykl dydaktyczny	Miejsce	Filter
Nazwisko	Imię	PESEL	Jednostka osoby	Email	Obywatelstwo	Filter
	Natalia		04010000		szwedzkie	Osoba
	<b>Beatriz</b>		<b>04010000</b>		<b>hiszpańskie</b>	Programy osoby
	Alexander		04010000		niemieckie	Szukaj po indeksie
Przyjazdy						
Kod Erasmus	Uczelnia zagraniczna lub instytucja zewnętrzna	Kraj	Kontynent	Osoba zewnętrzna		
E MURCIA01	Universidad de Murcia	Hiszpania	Europa	Esteban Abad Angeles		
Umowa	Rodzaj umowy	Uczelnia zagraniczna lub instytucja zewnętrzna	Typ współpracy	Numer tezki		
328/E/XID6	bilateralna	Universidad de Murcia	studenci-studia			
Dziedzina	Opis dziedziny	Forma kształcenia	Rodzaj studiów	Rok studiów		
14300	Ekonomia	studia				
(*) Rok akademicki przyjazdu	(*) Typ przyjazdu	Planowany czas pobytu	Czy kurs Polonicum			
2007	studia	Rok	Nie			
(*) Data rozp.	(*) Data zak.	Data przyjazdu	Data wyjazdu	Przedł./skrótanie	Powód	
01.10.2007	24.09.2008	01.10.2007				
Stan osoby	Status za granicą	Status w kraju	Czy zakwaterowanie	Miejsce zakwaterowania	Prywatne	
Przyjechała	Student	Student	Tak		<input checked="" type="checkbox"/>	
Opiekunowie   Jednostki przyjmujące   Uwagi						
Uczelnia przyjmująca						
Opiekun organizacyjny		E-mail	Telefon			
Opiekun naukowy		E-mail	Telefon			

Figure 5.2. USOS - record of data for an arriving student (some data was erased to ensure privacy)

From that time the incoming student gains access to all needed resources, like course registration system or university mail server. The obtained data is used to print electronic student identity card, which also serves as a library card, get access to university web modules and - after a semester or a year - to print transcript of records comprising marks obtained during studies in Warsaw.

## 5.3. Departures - application process

Recruitment for outgoing mobility is carried on at faculties. Exchange opportunities are displayed on the web in the information system dedicated to students and academic staff, which is an integral part of the central student management information system. In the module called 'Student mobility' a list of agreements and conditions of cooperation valid in the next academic year is posted. This is the same data which has been entered in IRO using interface described in section 5.1.

The module is still under construction so in 2007 student applications had to be delivered on paper and the recruitment process was carried on off line (this will change next year, see section 5.6). After the recruitment commission had made the final decision, the rest of the procedure could be carried on-line. For each of the accepted applications, the program coordinator assigned an open position to a qualified student. At the first step the student is found in the student's catalog (see fig. 5.3) - student's personal data and information on his/her academic career is already available in the system and need not be entered (this allows to avoid a lot of potential mistakes).

## Step 1. Academic year and student selection

Fill in the form and click "Continue"

Choose the academic year during which outgoing mobility will take place:	2007
Student:	student's name 
<b>CONTINUE &gt;&gt;</b>	

Figure 5.3. Assigning outgoing student mobility - step 1. The operator enters the student's name in the white field with a watermark and clicks CONTINUE

At the second step the agreement and the specific conditions of cooperation are chosen and assigned to a nominated student (see fig. 5.4). At step three either the student or the coordinator fills the details of the application, like period of stay, preferred method of communication. Entered data is verified on the fly.

## Step 2. Selecting the agreement

Data supplied so far

Sending faculty/unit: Faculty of Mathematics, Informatics, and Mechanics		Superior unit: University of Warsaw	
Student's surname: Kowalski100000	Name: Jan100000	Sex: M	
PESEL number:	ID number and serial number: DB1111111		
Student number: 123485271	Email address: kowalski100000@usos.pl  send a message (with U-MAIL) 		
Academic year: 2007			

Select agreement from the list below 

Country	Erasmus Code	Institution name	Status	Id	From	To	Options
Szwecja	S UPPSALA01	Uppsala Universitet	podpisana	202/E/XI06	2008-11-11	2010-09-30	select and continue 
Litwa	LT VILNIUS01	Vilniaus Universitetas	podpisana	215/E/XI06	2007-07-01	2013-09-30	select and continue 
Niemcy	D SAARBRU01	Universität des Saarlandes	podpisana	283/E/XI06	2007-07-01	2010-09-30	select and continue 
Niemcy	D MUNCHEN01	Ludwig-Maximilians-Universität München	podpisana	464/E/XII6	2007-07-01	2010-09-30	select and continue 
Niemcy	D DARMSTA01	Technische Universität Darmstadt	podpisana	540/E/I07	2007-07-01	2010-09-30	select and continue 
Holandia	NL AMSTERD02	Vrije Universiteit Amsterdam	podpisana	466/E/XII06	2007-07-01	2010-09-30	select and continue 
Hiszpania	E VALENCI01	Universidad de Valencia	podpisana	462/E/XII06	2007-07-01	2010-09-30	select and continue 
Hiszpania	E BARCELO02	Universidad Autónoma de Barcelona	podpisana	654/E/II07	2007-07-01	2010-09-30	select and continue 
Wielka Brytania	UK EDINBUR01	The University of Edinburgh	podpisana	465/E/XII06	2007-07-01	2010-09-30	select and continue 
Wielka Brytania	UK BATH01	University of Bath	podpisana	520/E/XII06	2007-07-01	2009-09-30	select and continue 
Francja	F PARISO13	Université Paris Nord (Paris XIII)	podpisana	282/E/XI06	2007-07-01	2010-09-30	select and continue 
Francja	F PALAISE01	Ecole Polytechnique	podpisana	521/E/XII06	2007-07-01	2010-09-30	select and continue 
Austria	A WIEN01	Universität Wien	podpisana	517/E/XII06	2007-07-01	2010-09-30	select and continue 
Dania	DK ODENSE01	Syddansk Universitet	podpisana	659/E/II07	2007-07-01	2010-09-30	select and continue 
Dania	DK ARHUS01	Aarhus Universitet	podpisana	193/E/XI06	2007-07-01	2010-09-30	select and continue 

Figure 5.4. Assigning outgoing student mobility - step 2. The student's data is shown at the upper part of the screen, the operator chooses and appoints the agreement

## Assigned outgoing student mobilities

- print list
- turn all the filters off

**FILTER OPTIONS**

Status: (all)

Academic year: 2007

Institution name:

Erasmus Code:

Country:

OR

**SELECTED STUDENT**

  

Items 1..30 of 50 <input type="checkbox"/> SHOW OPTIONS							
Surname	Name	Country	Erasmus Code	Institution name	Academic year	Status	Options
Kowalska100021	Ewa100021	Dania	DK ARHUS01	Aarhus Universitet	2007	Filling out (student,coordinator)	<input type="button" value="i"/> → fill out → cancel
Kowalski100069	Jan100069	Szwecja	S UPPSALA01	Uppsala Universitet	2007	Filling out (student,coordinator)	<input type="button" value="i"/> → fill out → cancel
Kowalska100086	Ewa100086	Francja	F PALAISE01	Ecole Polytechnique	2007	Final verification	<input type="button" value="i"/> → change → cancel → finish
Kowalska100091	Ewa100091	Francja	F PARIS013	Université Paris Nord (Paris XIII)	2007	Final verification	<input type="button" value="i"/> → change → cancel → finish
Kowalski100005	Jan100005	Holandia	NL AMSTERD02	Vrije Universiteit Amsterdam	2007	Final verification	<input type="button" value="i"/> → change → cancel → finish
Kowalski100070	Jan100070	Austria	A WIEN01	Universität Wien	2007	Final verification	<input type="button" value="i"/> → change → cancel → finish
Bąk Jan8093		Wielka Brytania	UK BATH01	University of Bath	2007	Finished	<input type="button" value="i"/> → view
Kowalska100001	Ewa100001	Holandia	NL AMSTERD02	Vrije Universiteit Amsterdam	2007	Finished	<input type="button" value="i"/> → view
Kowalska100002	Ewa100002	Litwa	LT VILNIUS01	Vilniaus Universitetas	2007	Finished	<input type="button" value="i"/> → view
Kowalska100004	Ewa100004	Szwecja	S UPPSALA01	Uppsala Universitet	2007	Finished	<input type="button" value="i"/> → view
Kowalska100020	Ewa100020	Litwa	LT VILNIUS01	Vilniaus Universitetas	2007	Finished	<input type="button" value="i"/> → view
Kowalska100022	Ewa100022	Litwa	LT VILNIUS01	Vilniaus Universitetas	2007	Finished	<input type="button" value="i"/> → view
Kowalska100040	Ewa100040	Holandia	NL AMSTERD02	Vrije Universiteit Amsterdam	2007	Finished	<input type="button" value="i"/> → view

**Figure 5.5. List of students nominated for outgoing mobility. Right arrows give access to further actions, status describes current stage of the application processing**

The list of students nominated for outgoing mobility is shown in fig. 5.5. It is available to the coordinator throughout the whole process. The list can be filtered by countries, universities, fields of study, etc. In the column on the right available actions are shown: nomination can be filled out, cancelled, or approved. After approval - which is the final step - the application should be printed, signed by the coordinator and the student, and finally delivered to IRO, with the list of all applications (also printed from the system). This obligation is still a part of the old procedure and is not necessary from the technical point of view, since data of approved applications are transferred automatically to the central information system. From that time they cannot be cancelled nor modified, only viewed or printed.

Even this year's limited version of the module was very warmly accepted by the program coordinators and IRO officers since for the first time data from applications was delivered to IRO in an electronic form, on time, and - what is most important - correct, verified, and immediately available for further processing (see the next section).

IRO employees have supervisor rights in the module so they can observe progress of the procedures carried out in faculties. When this part of the process is over, they may redistribute left-over offers among students from other faculties.



The individual plan of payments of a particular student is shown in fig. 5.6. Rows correspond to various funds, and columns to months. The currency and status of payment is shown in the bottom part of the screen.

The initial calculation of payments is verified when a student comes back. The exact period of stay is already known (some students extend their stay, others come back earlier than initially planned). The system calculates the amount of money to be either returned by the student to the university or the opposite way. It may also happen that at the end of the academic year some money for student mobility is left over and it is divided proportionally among the outgoing students.

The system supports all described procedures. At every moment the money paid out and left-over can be displayed. System dictionaries deliver all necessary data. Students' email addresses are available at the finger tips, and emails can be sent straight from the system.

The procedure as it is implemented now, is very student-oriented. It takes much more time to define individual plans of payments than it would be necessary to generate one plan for all students, according to some common rule (as it is done in case of social stipends paid to students in Poland). However IRO employees decided to use more laborious but also more student-friendly procedure. Unfortunately, all exceptions from common rules - like extra stipends for students with disabilities or final stipend updates - complicate the system. It is also not clear how stable the implemented rules are, it may happen that totally new solutions will have to be implemented in years to come.

## 5.6. Plans for the future

As was mentioned before, the whole qualification process for outgoing mobility will be supported on the web. A student will apply choosing a couple of possible target universities. Also letters of recommendation will be delivered electronically. Members of the qualification commission will have on-line access to all information. The system will allow to sort applications according to stated criteria and build the final list. Applications from the top of the list will get accepted. The system will allow to send emails informing about each stage of the process.

According to program coordinators, the process of negotiating learning agreement between a student and coordinators from both universities is the most painful part of the whole procedure. We want to automate as much as possible. The proposal delivered by the student will be available on-line to both coordinators. Each will have an opportunity to read it and made comments. The final approved version of the agreement will automatically become part of the student's study program requirements at home university. The obtained grades will be entered to the system by the student, approved by local authority on the basis of the delivered paper documentation and imported to the central information system. This part of the procedure is already supported by the system, but the final version will be more smoothly integrated with other modules. Finally the grades and the information about the part-time study abroad will be printed on a diploma supplement.

The important last step of outgoing and ingoing mobility is an evaluation delivered by students. We also want to build into the system a module for gathering evaluations from the students and delivering a summary report.

The ambitious plan would be to get rid of all papers along the process. In the era of electronic signature elimination of paper documents seems possible. Student paper folders might be totally replaced by electronic folders. The problem can be easily solved from the technical point of view, however it will take a long while to convince authorities. We hope that development of general procedures for e-government which involve digital signature, like tax form returns, will stimulate the progress also in other areas, like student management information systems.

## 6. ALTERNATIVES

The described solution is an integral part of the large proprietary software used by about 20 Polish higher education institutions gathered in MUCI consortium. The alternative would be a generic software delivered by one of the companies available on the market. Probably the most popular are *movein* and *moveon* (see [moveon, 2008]), property of *unisolution* ([www.unisolution.eu](http://www.unisolution.eu), founded in 2001), which provides software and consulting services for institutions of higher education in the areas of internationalisation and recruitment. *moveon* is the standard software for the management of international co-operations and mobility. *movein* is the standard tool for the management of the

student application and admission process. This software is used in about 300 institutions across 13 European countries, and 2 outside Europe. *unisolution* also runs *moveonnet* ([www.moveonnet.eu](http://www.moveonnet.eu)), the online guide to higher education worldwide: more than 4500 IHEs and more than 800 institutions are registered and update their details in the online portal. It serves as a community platform for IROs.

Software delivered by *unisolution* supports most of the processes described in this paper. However it lacks something which - in our opinion - is the most important aspect of the solution: integration with the central university information system. *moveon* and *movein* utilize their own local databases. *unisolution* offers - as extra service - data transfer to and from university databases. This however does not solve the main problem: daily data validity and integrity. Information in university data repositories changes dynamically. Today student applies for outgoing mobility, tomorrow he/she fails an exam and becomes not eligible for the exchange program. He/she changes bank account, creates new mailing address, modifies learning agreement. Information about mobility is part of history of his/her studies in the university and should be kept together with all the other relevant data.

Even the best generic system will not provide the needed level of integration with the university information system and will always be subject to data inconsistency.

## 7. SUMMARY

International cooperation and student and staff mobility are important activities of higher education institutions, and their intensity grows every year. The involved processes, more than any others, are carried out in a distributed environment and - due to many relations with the outside world - build an image of the institution. This also means that more than any others they need IT support. This is not, however, an easy business domain for IT specialists, due to very diverse needs, high variability and international context. These processes in many areas involve other daily routines of university administration, so - in our opinion - the IT support for them should be strictly integrated with the mainstream software for student and study management.

The paper describes work in progress. New modules of the system are being developed and deployed successively, since 2005. Substantial progress was made during the last academic year. There is still a lot to be done, but the effects obtained so far prove that we have chosen the right approach. The alternative - buying and deploying ready to use general software system, like *movein* and *moveout* - would definitely shorten the way to the final solution, but would not give us what we regard as an extremely important aspect of the university information system - strict integration of all supported processes and easy daily access to up to date central data repository.

Our goal was to give some idea on how to build such systems, what are the specific needs of IRO, how to co-operate with system users during the requirements analysis, what new organizational procedures have to be worked out, how to deploy the system in an academic environment in running conditions. We hope that the general perspective of the involved methods and solutions are of some interest to a wider audience.

## 8. REFERENCES

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