

Exchange of data on mobility between higher education institutions and the national agency for coordination of EU programmes in Poland

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Keywords

Students and staff mobility, EU programmes, *National Contact Points*, electronic data exchange, identity management, CAS, on-line surveys, USOS.

1. INTRODUCTION

Over the last couple of years many Polish higher education institutions (in short: HEIs) opened up to the international education market and intensified cooperation with other European institutions within the framework of programmes sponsored by the European Union. This trend could not be ignored by the suppliers of student management information systems. One of the leading systems for higher education institutions in Poland is USOS ([USOS]). System managers started a couple of projects to support the new demands ([JMD2008]). International Relations Offices (in short: IROs) obtained software supporting their daily duties: cooperation and agreement management (keeping track of partner institutions and exchange programs), mobility management (taking care of outgoing and incoming students and staff, recruitment, registration for courses, transcripts of records, funding, etc.). Departmental Erasmus coordinators got equipped with electronic tools for recruiting outgoing students and supervising the qualification process. A new admission software for handling incoming students has been built as part of the general admission system used for recruitment of candidates for diploma programmes.

There is still a lot to be done to support processes at the local level, however it also becomes clear that the most cumbersome part of these processes is now the exchange of data between local systems and the outside world. For example universities have to exchange with their partners data on international cooperation, student nominations, courses taken and grades obtained by outgoing students at partner institutions. The *Mobility Project* undertaken by the *Rome Student Systems and Standards Group* aims at standardizing a format for the exchanged data and building a prototype network of web servers which would carry out electronic data transfer ([AMDS2009, JMD2010]).

In Poland universities have to exchange data with the national agency responsible for coordination of EU programmes. This agency is run by the *Foundation for the Development of the Education System* (in short: FiDES, see [FiDES]) which implements a range of initiatives to support educational reform and development of the education system in Poland. In particular the Foundation supervises *National Contact Points* for EU Programmes like ERASMUS MUNDUS or TEMPUS IV.

Managers of USOS got in touch with FiDES and offered their help in building a system supporting some activities of FiDES resulting from the mutual cooperation. The idea was that such initiative would give them an opportunity to influence the system's design and in particular the formats and tools for the exchange of data. The designed system is the subject of this paper. It is called GISE-2, from the Polish name *Gielda Informacji Studentów Erasmusa*, what means *Information Auction for Erasmus Students*; number 2 distinguishes the newly developed system from the previous version. Business processes are shortly outlined in section 2, design goals and system requirements are listed in section 3. In section 4 main implementation aspects of the new application are discussed and some screen shots are shown. Conclusions are gathered in the last section.

2. BUSINESS PROCESSES

FiDES supervises EU programmes in Poland, in particular distributes funds and gathers annual reports from HEIs to combine the results of the programmes and finally report them to Brussels. The important part of this activity is the survey carried out among the outgoing students and researchers which gives valuable feedback to all involved parties (in particular funders of the programmes and their contractors in Poland). The following main business processes should be supported by the designed software:

1. Handling annual reports

Each university should deliver an annual report on the activities involved in student and staff mobility. Such reports are presumably obtained from the information system of HEI (like USOS). Format of the report is announced in advance. Up to now it was defined as a enumerated list of fields. More formal definition would allow to carry out automatic data validation. Correct data would be a basis for valuable statistics which might be displayed in the system on demand.

2. Managing surveys and statistics

Each year a new survey is designed (although FiDES is willing to change this practice and design a survey which would stay unchanged for a longer period). Outgoing programme participants after return are obliged to fill the survey. Results of the surveys are of interest for the Agency (which wants to improve the involved procedures) and for students and staff - prospective participants of the exchange programmes. Employees of IROs from HEIs might want to extend the questionnaire with own questions (to improve procedures carried out at the university level). Results of surveys should be available in a readable form for various groups of users.

3. Supporting electronic data exchange

Annual report is not the only data exchanged between FiDES and HEI. HEI should deliver a list of outgoing programme participants, who have to fill the survey after return. HEI may also be interested in getting results of surveys in an electronic form for further processing.

3. DESIGN GOALS AND REQUIREMENTS

Requirement analysis was conducted by the team consisting of USOS developers, stakeholders from FiDES (programmes' coordinators, system administrator, programmers), stakeholders from the IRO of the University of Warsaw, which plays a leading role in designing software for other HEIs in Poland. The following design goals were stated and requirements recognized (only the most important are listed):

- GISE-2 should be implemented as a module of CMS used in FiDES (open-source Drupal).
- The users of GISE-2 are: superuser, employees of FiDES, employees of IROs from all HEIs, students and staff - participants of the programmes, the general public.
- Participants of the programmes are authorized in the system in one of the following ways: by identity management system of HEI or on the basis of accounts (logins, passwords) created in GISE-2 automatically or manually.
- Supersuser can upload an XML file with the definition of the format of the annual report.
- HEI can upload a final report, its validity is checked against the format defined in the XML file.
- HEI can upload a list of outgoing programme participants for the given academic year/semester with the relevant details of their stay (e.g. host institution, discipline of study, period of stay, exact departure/arrival dates). This is the target group for the survey.
- FiDES can define a survey for the given year. The survey can be extended by each HEI with questions for local participants.
- A participant can fill in the survey within a stated time frame (in one or many steps).
- A list of participants who filled the survey can be exported by HEI (to be imported to a local student management information system).

- Each HEI can export survey results of its students and staff.
- Answers to the survey's open questions can be moderated by FiDES.
- Survey results are made available to the general public (in particular prospective outgoing students), displayed in a readable form (closed numerical questions in easy to follow diagrams and figures).
- All files are imported/exported in either XML or CSV open formats, so that software suppliers can integrate file handling into the developed student management information systems (like USOS).

4. IMPLEMENTATION

Some aspects of the design and implementation of GISE-2 are discussed in this section.

4.1. Identity management

Identity management is an important aspect of the system. GISE-2 is available for large groups of users from various higher education institutions in Poland. In the academic year 2008-2009, 253 universities took part in the Erasmus programme (out of approximately 400). There were 11 784 students going out for part time studies and 1 618 for internships. Out of these numbers there were 1 097 (studies) and 74 (internships) students from the University of Warsaw (the biggest Polish higher education institution). The number of filled surveys was 10 920 (studies) and 1 457 (internships). Numbers of outgoing academic teachers and researchers are smaller but should not be neglected. Groups of programme participants change each year. Only eligible users are allowed to fill surveys. They have to be authorized. They need accounts, which should be made available promptly (students and researchers coming back home have to fill the surveys before finalizing all formal procedures in the home IRO, deadline is usually app. two weeks after return). It is obvious that creating these accounts manually would be very tedious and error-prone. There is also a problem of distributing details of the new accounts. We decided to support the following scenarios:

1. If HEI hosts local installation of a central identity management system (like CAS), it needs only to define in GISE-2 the address of the CAS server (see Figure 1).
2. IRO prepares the list of outgoing participants. This list is probably available anyway, student management information system like USOS should deliver it with one click.
3. The list is uploaded to GISE-2.
4. Two scenarios are now possible:
 - a. For CAS users: GISE-2 automatically creates internal accounts with logins equal to CAS logins of the participants and sends them email with the information about the new account.
 - b. For non-CAS users: GISE-2 automatically creates internal accounts with logins equal to emails of the participants, generates passwords and sends them to the participants by email. Passwords are valid for one log-in only after which have to be changed.

In both scenarios the IRO staff needs only to upload the list of participants to the system. The CAS option is more user friendly and easier to manage, no extra password handling is necessary. Additional bonus is single sign-on into GISE-2 and university web applications, registered in the CAS server.

Central identity management is not yet widely implemented in Polish universities. To change this unfavourable statistics, USOS developers will soon start distributing an easy-to-use package containing a virtual platform with preinstalled CAS server, LDAP repository, and a synchronization tool automatically synchronizing account data from USOS Oracle database with LDAP repository. Student and staff accounts available in USOS and used for authorization in USOS web applications will by side effect become available for authorization in other systems, like GISE-2.

Ustawienia serwerów CAS
Ustawienia serwerów

Dodaj kolejny serwer autentykacji CAS

Uczelnia:

Wpisz nazwę swojej uczelni, której serwer CAS ma zostać skonfigurowany.

▼ Uniwersytet Warszawski

Aktywny
Gdy zaznaczony, uczestnicy tej uczelni będą mogli logować się za pośrednictwem CAS

Wersja CAS:
 1.0
 2.0

Adres serwera CAS:

Miejsce w sieci za pomocą którego przeprowadzana będzie autentykacja CAS.

port serwera CAS:

443 jest standardowym portem SSL. 8443 jest standardowym portem SSL dla serwera Tomcat.

URI serwera CAS:

Jeżeli serwer CAS nie znajduje się bezpośrednio pod podanym wyżej adresem, doprecyzuj lokalizację w tym miejscu (np. /cas).

Figure 1. GISE-2 – configuring CAS server for HEI

It is also possible to use Federated Identity Management. There is a test FedIdM server for Polish universities, available at <https://aai.pionier.net.pl/DS/>. It will make sense to use FedIdM when the number of HEIs using central identity management systems increases. When this happens step 1 in the scenarios described above will not be needed.

Last but not least if some HEI sends abroad a small amount of participants (let say up to ten) and/or does not have an electronic list of nominations, there still is a possibility of manually creating accounts for students and researchers by entering the data straight to web forms of GISE-2.

There is also a question when exactly the list should be uploaded and accounts created. Participants go and return all year round, for time periods of very different length, some of them more than once (e.g. for studies in winter semester and for internship in summer semester). Accounts in GISE-2 should not be activated too early. It was decided that the responsibility of preparing the relevant (for the given moment) list of participants lays on the side of the university system. In USOS the list contains the mobilities which have already started. GISE-2 have to check against data duplications when the list is uploaded, each participant should have only one account, possibly with more than one outgoing mobility attached, but each individual mobility has to be represented only once.

4.2. Surveys

Handling surveys is the key functionality of the system. The following aspects should be taken into account:

- Questions are defined in the system using a set of predefined templates. Various types of questions are possible (e.g. open, close, header, text) and various types of answers (e.g. text, numerical, multiple-choice list, radio-button); questions may also be defined as optional or obligatory.

- Surveys consist of questions. Questions may change every year but most of them remain the same. It should be possible to build a new survey starting with the old one.
- Many surveys may be available in the system at the same time.
- Surveys are defined by FiDES employees.
- IRO employees may extend the set of questions. They are only visible to the students of the HEI represented by this IRO.

Handling of surveys is a functionality available for FiDES and IRO employees. First idea was to support surveys delivered in XML files, but after some discussions with users we have chosen a solution which allows users who are not computer science professionals to handle questions and surveys by themselves. Questions and surveys are now defined using easy to use web-forms, question templates are chosen from the list, questions inside a survey may be sorted by drag & drop (see Figure 2), whole surveys can be copied and then individually edited.

Figure 2. GISE-2 – defining surveys, an order of questions may be change by drag & drop

Building the interface for survey editing we had to take into account two conflicting requirements. On the one hand creation of the new survey should be as simple as possible. In fact the simplest way would be to enter each question from scratch or copy-paste from the dictionary and then update it freely. However if we want to trace answers to particular questions across academic years to look for trends we have to retain links between the same questions from subsequent surveys. This complicates an interface since we have to keep a list of questions, handle the list separately, construct a survey by choosing questions from the list. Users can not freely delete or change questions from the list since they might have been used in previous surveys. The survey is more difficult to handle but in that case we could not compromise one of the key functional requirements. In fact the task of preparing a survey for a new academic year is trivial if only the survey questions

don't change, what is reasonable anyway from the point of view of the quality and usefulness of statistics in a broader time range.

Employees of IROs are also interested in the surveys, in particular might want to extend the questionnaire with own questions (to get some feedback on the procedures carried out at the university level). Questions added by the university are available only to participants from this university. The answers to these questions can be downloaded by this university together with the other survey data.

Surveys are generally active within a time period defined by FiDES. The IRO staff may manipulate the start and end dates individually for each participant, but within the defined time limits.

Filling the surveys changed substantially in the new system as compared to the old one. Previously participants logged in using one account common for all (the password was passed from FiDES to IROs and from IRO employees to participants - confidentiality of such information was illusory). First part of the survey consisted of questions about participant's personal data, home university and programme of study, details of the outgoing mobility. A participant had to spend extra time entering information which in fact was sooner or later delivered to FiDES by universities in a form of annual reports and stored in its repositories. However this data was not linked to the survey data. This was a source of extra mistakes and extra effort of all involved parties. IRO employees had to browse a system for the list of participants who already submitted surveys to formally finalize the handling of the outgoing mobility. Now totally automatic and asynchronous (from the university side) system of notifications is possible - e.g. GISE-2 might call web-service posted by the university system and send information about the submitted survey.

GISE-2 chooses a survey for a participant on the basis of the academic year in which the mobility took place and type of the mobility (studies/research or internships, students or academic teachers). There can be only one such survey with unique values of these attributes. A participant may fill the survey partially, save it, come back to it after some time, complete, and finally submit. After submission, the survey is available in read-only mode. Figure 3 shows a survey being filled in by a participant.

3. UZNANIE AKADEMICKIE OKRESU STUDIÓW ODBYTYCH ZA GRANICĄ

16*. Czy przed wyjazdem na stypendium zostało uzgodnione w formie pisemnej „Porozumienie o programie zajęć” (Learning Agreement) (dokument z wykazem przedmiotów do zrealizowania w uczelni partnerskiej)?

17*. Czy przystępowałeś do egzaminów w zagranicznej uczelni partnerskiej?

18*. Czy w Twoim przypadku zastosowano system ECTS?

19*. Czy okres studiów odbytych za granicą zostanie Ci zaliczony przez uczelnię macierzystą?

20*. Czy otrzymasz punkty za ukończenie kursów językowych?

4. PRZYGOTOWANIE JĘZYKOWE

21*. Język(i) w jakim były prowadzone zajęcia, w których uczestniczyłeś w uczelni partnerskiej:

- angielski
- bułgarski
- czeski
- duński
- estoński
- fiński
- francuski
- grecki
- hiszpański
- irlandzki
- islandzki
- litewski
-

Figure 3. GISE-2 – filling a survey with various types of questions

Survey results should be available on-line for browsing. Internauts looking for information often want to get in touch with the authors of displayed opinions however privacy of students filling the surveys has to be ensured. Email of such person is displayed to the public only under her permission. Statistics are built on the basis of numerical questions and are freely available since they present accumulated (anonymous) data. Survey results are also available for download - they may be imported to professional statistical tools for more sophisticated analysis.

4.3. Annual reports

Up to now, in GISE-1, annual reports were delivered by email or uploaded as uninterpreted flat files. The format of the report was defined by enumerating the list of columns (Figure 4 shows fields of the annual Erasmus report for the academic year 2008/09). In GISE-2 the report is defined formally by XML schema and uploaded to the system as CSV file. The data is validated on the fly, only the correct records are accepted. The whole procedure of gathering data may be carried out more smoothly. Data from all reports are used for calculating statistics which may be shown in the system.

S1: ID Mobility;S2 : Home Institution;S3: Country Code of home institution;S4: EUC;S5: ID Student;S6: Family name;S7: First name(s);S8: Date of Birth;S9: Age;S10: Gender;S11: Nationality;S12: Subject Area;S13: Level of Study;S14: Years of Study prior to Erasmus study period;S15: Type of mobility;S16: Host Institution;S17: Country of host institution;S18: Country of Placement;S19: Work Placement Enterprise;S20: Size of the Enterprise;S21: Type of Placement Sector;S22: Actual Length of Study Period abroad in months;S22a: Length of Study Period abroad (in months) initially agreed;S23: Actual Length of Work Placement in months;S23a: Length of Work Placement (in months) initially agreed;S24: Early return;S25: Date Study Commenced;S26: Date Work Placement Commenced;S27: Number of ECTS credits study;S28: Number of ECTS Credits Work Placement;S29: Total number of ECTS credits;S30: Supplement for severe disability - SEV;S31: Taught in Host Lang;S32: Language Taught;S33: Linguistic Preparation;S34: Study grant

Figure 4. GISE-2 – Fields of the annual Erasmus report for 2008/2009

For the users from IROs who use USOS, the procedure is very easy to handle: the report is generated automatically from USOS and can be uploaded to GISE-2. Other vendors of student management systems may deliver the same functionality, since the format of the data is delivered by FiDES in GISE-2 and can be downloaded from the interface of HEI.

5. Acknowledgements

Many thanks to Sara Wilczyńska, Grzegorz Biatek i Adam Ruka - implementors of GISE-2, to employees of FiDES who took a risk of hosting the project, and to employees of IRO from the University of Warsaw for many valuable ideas.

6. SUMMARY

The project is in an early stage of conduct. At the end of December 2009 the requirements analysis was finished and the requirements specification delivered to the stakeholders. Some prototype screen-shots have also been designed at this stage to better recognize expectations and state priorities of the stakeholders.

At the end of February 2010 the *Identity Management* module and *Survey* module have almost full functionality and were delivered to FiDES for integration with their CMS and for user tests. Other modules are under development.

The full preliminary version is expected to be available at the end of June 2010. The system will go into production the next academic year.

The scale of the project is quite large due to the large (and growing) numbers of mobility programmes. As it was said, in the academic year 2008-2009 the numbers of users to handle were: 253 accounts for IRO's, 11 784 plus 1 618 new student accounts, a couple of hundred new teacher accounts. It would be interesting to know how many prospective candidates have visited the previous portal of FiDES browsing the filled surveys, but such numbers are not available. As can be seen the target audience is quite large and will become even larger if a more friendly interface enriched with statistics and results of analysis is delivered.

This - in some respect - pioneer project in Polish higher education started not as the result of the decisions taken by some high level authorities but was driven by needs of the end users, and made possible due to close contacts, cooperation and trust between stakeholders. It is the first step towards some form of integration of computer systems running at HEIs and various national educational agencies in Poland. Many other possibilities of interfacing academic systems exist, various well known and widely used technologies (like web-services) and/or newer emerging integration tools (like service busses) might be used. Some attempts of such integration in the education field have been undertaken on the global scale by various European and American institutions (see e.g. recent initiatives of EdUnify and Terena Geant projects).

To move these solutions from research to practice first the way of thinking about academic systems has to change among authorities and users. Systems can talk to each other but first people have to start seeing the common goal and begin to talk.

The final outcome will be the more smooth and less administratively tedious handling of study and research mobility and more united Higher Education Area in Europe.

7. REFERENCES

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