Abstract: The aim of this paper is to present modern model of the educational system which utilizes advanced information systems. In the article the case study of Center of Open and Distance Education (CODE) of Warsaw University of Technology (WUT) and its seven years' experiences in implementing, operating and improving of e-learning solutions are described. Both organizational and technical aspects of operations that take place in the Center are described. The actual status and plans for further development (taking into account new requirements of students and new technologies) of the project are outlined.

Keywords: e-learning, distance education, higher education

I. INTRODUCTION

Center of Open and Distance Education (CODE) is an interfaculty unit of Warsaw University of Technology which takes active part in development of e-learning for universities in Poland. It is also active participant of Polish and international academic and business e-learning society.

CODE’s activities focus on promotion of e-learning at universities, support for new didactic processes and methods at WUT and support for academic teachers that are developing and conducting courses via Internet. Such initiatives are supported in two dimensions: essential and organizational what is important for achieving effectiveness of its realization.

According to the idea of distance learning Center objective is to make it more effective, easily and widely accessible and cheaper. Courses that are included in CODE’s offer are actually one of the biggest project in the area of academic e-learning in Poland.

1.1. History of distance learning in Poland

1776 is said to be the date of the first distance learning project in Poland, when Cracow University established correspondence courses for craftsmen. Later, in 1886, “Flying University” was founded in Warsaw. Other institutions that were operating in scope of distance learning, such as Society of Academic Courses for Women and Public Academic Lectures, were formed in the end of 19th and beginning of 20th century. [1]

In the 1960 first educational TV program called “School’s program” was emitted. [3] It was experimental edition, but later it had been turned into regular. In this program, well-known researchers and scientist from big academic centers were starring. During the period of 1966-1971 TV University of Technology was running in Poland. This TV University offered courses for candidates to be a student and supporting materials for students.

Since the 80’s development of remote education in Poland is parallel to the evolution of this type of education in the world.
In the 90’s very sharp increase of the significance of Internet and multimedia is observed. People paid more attention to the strengths and opportunities of remote education, what effected in formulation of e-learning that now is seen by many students as a very attractive educational offer.

1.2. E-learning initiatives in Poland

2001-2007 was the period of very dynamic evolution of e-learning in Poland. Many universities added such type of education to its offers (unless there were no legal regulations in this area). Commercial e-learning was also evolving very fast. Actually, there is ca. 20 projects involving e-learning at the level of higher education in Poland. The most known, the biggest and the most successful initiatives are:

i. Center of Open and Distance Education of Warsaw University of Technology – CODE,

ii. Center of Extramural Education of University of Technology in Gdansk – DECTUG,

iii. Center of Warsaw University – COME.

II. PRESENTATION OF THE CENTER OF OPEN AND DISTANCE EDUCATION

2.1. General information

Center of Open and Distance Education (CODE) (http://www.okno.pw.edu.pl) is an interfaculty entity of Warsaw University of Technology established in 2000. It is one of the oldest polish entities that offer remote learning via Internet.

The founder and the first head-master was professor Bogdan Galwas (current Dean of Faculty of Information Technology and Electronics of Warsaw University of Technology). CODE promotes access to academic education taking advantages of new information technologies. Simultaneously it promotes activities in the scope of open education, leads multimedia courses and research studies on different methods of putting in practice and the effectiveness of making use of modern education techniques. The Center also prepares academic staff to the requirements of the new education methods. CODE makes usage of the latest information technologies and methodical support for any interested institutions, especially for other universities.

Portal of the Center of Open and Distance Education is recognized by e-learning society in Poland as a one of the most advanced e-learning projects offered by polish universities.

2.2. Executed tasks: didactics and research studies

CODE offers non-stationary Internet studies on the following levels:

– Engineer,
– Master of Science,
– Post Graduate,
– Specialist Courses.

The system of studies is compliant with The Bologna Declaration on the European Space for Higher Education. CODE offers program of studies compliant with requirements and education standards of the faculties of Warsaw University of Technology.

The studies that are currently offered via Internet (SPRINT) enable an individual program. The academic year is divided into 4 half-semesters lasting 8 weeks each. The form of the completion of the lectures during studies is the stationary exams. Such exam is being led in a traditional way on the university. Laboratories and selected projects are managed during weekly on-site conventions.

CODE education offer has been specified in the chart 1. The offer is based on cooperation of Center of Open and Distance Education with three faculties of Warsaw University of Technology.
One of the Center’s activity is organization of the conference. It is called “Virtual University” (http://vu2008.okno.pw.edu.pl/). The conference is being held continuously for 7 years. The conference takes place based on settlement between three universities placed in Warsaw: Warsaw University of Technology, Warsaw University and Polish-Japanese University of Computer Science. The conference audience are “academic and research staff from universities and other institutions of higher education, teachers, especially those working in the area of distance education, students from universities and other institutions of higher education, specialists from companies responsible for in-company training programmes as well as journalists and writers, producers and sellers of computer software, staff from educational institutions, Internet providers, managers, anyone who thinks that e-learning is the chance for education development”. [2]

### CHART 1. DESCRIPTION OF CODE COURSES

<table>
<thead>
<tr>
<th>Course title</th>
<th>Specializations</th>
<th>Faculty</th>
<th>Duration/fee</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Extramural Engineering Studies</strong></td>
<td><strong>1.1. Electronic Systems and Telecommunication:</strong></td>
<td>Faculty of Information Technology and Electronics</td>
<td>4-8 years depending on the chosen duration of the studies ca. 5500,00 EUR</td>
</tr>
<tr>
<td></td>
<td>- Computer Engineering</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Multimedia Techniques</td>
<td></td>
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<tr>
<td></td>
<td><strong>1.2. Computer Science:</strong></td>
<td>Faculty of Electrical Engineering</td>
<td>4-8 years depending ca. 5500,00 EUR</td>
</tr>
<tr>
<td></td>
<td>Applied Informatics</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>1.3. Automatics and Robotics:</strong></td>
<td>Faculty of Mechatronics</td>
<td>4-8 years depending ca. 5500,00 EUR</td>
</tr>
<tr>
<td></td>
<td>Industrial Informatics</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2. Extramural Interfaculty M.Sc. Studies</strong></td>
<td><strong>2.1. Computer Science:</strong></td>
<td>Faculty of Information Technology and Electronics</td>
<td>4-8 years depending on the chosen duration of the studies ca. 5500,00 EUR</td>
</tr>
<tr>
<td></td>
<td>- Internet Systems Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Information Management Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Postgraduates Studies</strong></td>
<td><strong>3.1. Computer Science and Internet Techniques</strong></td>
<td>Faculty of Electrical Engineering</td>
<td>2 semesters ca. 1700,00 EUR</td>
</tr>
<tr>
<td></td>
<td>- Internet Systems Engineering</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Information Management Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>3.2. Computer Science and Internet Techniques edition for teachers</strong></td>
<td>Faculty of Electrical Engineering</td>
<td>3 semesters ca. 1700,00 EUR</td>
</tr>
<tr>
<td></td>
<td>- Internet Systems</td>
<td></td>
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<tr>
<td></td>
<td>- Information Management Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>3.3. Computer Science and Internet Techniques (e-Business edition for businessmen</strong></td>
<td>Faculty of Electrical Engineering</td>
<td>2 semesters ca. 500,00 EUR (which is 20% of the total fee - the rest of the fee is sponsored by The European Social Fund)</td>
</tr>
<tr>
<td></td>
<td>- Internet Systems</td>
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<tr>
<td></td>
<td>- Information Management Systems</td>
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<tr>
<td></td>
<td><strong>3.4. Tools and Techniques of Virtual Education</strong></td>
<td>Faculty of Information Technology and Electronics</td>
<td>2 semesters ca. 1700,00 EUR</td>
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<td></td>
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</table>

**2.3. Project recipients**

The very first on-line studies were launched by CODE in the academic year 2001/2002. Currently in the Center of Open and Distance Education study approximately 700 students.
The offer of remote studies is directed mainly to people who want to educate, but have lack of time to study in the tradition way. Studies via Internet are also a great opportunity for people which are physically handicapped, professionally active, aiming to extend their education or for people continuing studies after the break. CODE directs also its offer to Polish people living abroad. There are numerous of students for whom studies via Internet is a great way to gain education in additional specialization, what would be much more difficult or even impossible in a traditional way due to the personal and professional limitations.

Studies via internet enable studying with the individual speed during the week, in the time that suits students the best with no need for visiting university often. Thanks to this the cost of the studies is decreased, which is especially important for people living far from university centers and from less economically developed regions.

Students which proceed their studies remotely are required to be self-disciplined, highly motivated and have well organization skills. This is the reason, why this way of studies suits adults the best.

2.4. Educational portal

CODE educational portal (see figure 1) is a technical solution realizing the offer of studies that were described in sub-chapter 2.2. The platform exposes to students such elements as: didactics materials, discussion forums, Internet notes and video clips thanks to such a tools as: chat, e-mail, instant messaging, voice communicators and on-line multimedia materials. Using educational portal students may share necessary information with their lecturers and other participants of their courses.

The platform is the solution customized to the needs of the university. With its evolution the quality and functionality is been increased what results in new publications and materials published by the university staff. The didactics materials are distributed mainly on CDs as multimedia books (with ISBN number). Didactic materials are also published on the web pages and presented as a text, graphics, multimedia, wave files and video clips. This way of material distribution enables systematic self-checking what motivates to systematic studies.

E-learning platform SPRINT evaluates systemically and concludes wide range of tools for remote studies. This includes following functions divided into two groups according to its users:

- Accessible for students:
  - chat, forum, e-mail to lecturer, notepad, interactive tests, audio and video files. The part of the platform accessible for students includes messages, advertisements, description of the didactic for the academic year, lectures schedule, notes, lectures information, virtual hostel;
- Accessible for lecturer and administrator:
  - fast announcement system (e-mail and SMS messages), possibility for users definition in the system, accessibility edition, reports and lecture information.

![Figure 1. http://www.okno.pw.edu.pl – main page](http://www.okno.pw.edu.pl)
The technical aspect of the Center is based on both – open source and customized solutions and applications. Three general parts of the entire project can be presented:

- Educational platforms,
- Student’s services provided by the main office,
- E-books and materials preparation.

The study system in CODE has been divided into three groups. Those groups are Engineer, M.Sc. studies and postgraduate studies. For each group a different platform has been implemented. Every matter connected with first degree students (Engineer) is processed in a customized authorial CMS system. This system contains information on upcoming events, payments, notes etc. It can be changed, removed, updated by first degree student’s supervisor. The other part of the system contains information on currently held courses. The information included in this area could be added, removed, updated by lecturers – just for his/her lecture. It is not only the content to be customized but also the look of the course website including colors, background, sections etc. Two remaining groups – M.Sc. and postgraduate studies are being operated by Moodle (see figure 2). For both – M.Sc. and postgraduate studies different edition of Moodle is running. The reason of using different platforms has a historical explanation. Customized system was in use since first days of e-learning project, when only Engineer studies were held. Since the beginning of M.Sc. and postgraduate studies the Center of Open and Distance Education have started using more universal platform – Moodle. Due to lots of information held in the old system the Engineer studies are still supported by old customized system.

![Figure 2. http://ebiznes.pw.edu.pl - Moodle platform](http://ebiznes.pw.edu.pl)

Every type of studies has its own supervisor at the main office. This person is responsible for placing necessary information in his/her own area of responsibilities. The communication between students and the studies supervisors is held mainly by e-mails, Voice Over IP (VOIP) applications like Skype, telephone. For studies supported by Moodle platform also forums and live chats play a big role in communication process. The part of the project that is not seen by the student is the internal circulation of documentation and information. For all types of studies a customized MS Access database is holding all necessary data including current and updated information on each student, his/her status, progress of study, payments, history of studying etc. In order to improve the system and to unify it, CODE is working on the implementation of a CRM class (Customer Relationship Management) system (Sugar CRM).

E-books and material preparation is a branch of the IT team of Center of Open and Distance Education. For e-books CODE uses self-made template. Such template is based on HTML files with the course content. Sometimes the pure HTML is not enough. That’s why technologies like Flash,
Java, JavaScript are in use. Recently video layers to e-books have been added. The recordings are converted into FLV files and are included in the e-book. Moreover, for interactive courses presentations that connect PowerPoint slides with voice or even video comment are being built. Preparation of the full interactive courses, tests, tutorials is also possible.

III. SUMMARY

3.1. CODE’s way to success: experiences and problems during project’s realization

There were three main difficulties for the project:
− University management limitations,
− Incompetence of academic teachers, lack of technological knowledge, lack of competences in virtual contact with students,
− Political barriers (government policy).

A task that Center dealt with was to involve researchers and academic teachers in a process of electronic courses’ creation. Founders of CODE had to prove the university management that e-learning could be an equivalent or complementary form of education to the traditional studies. Many people stated e-learning as a type of studies that cannot provide to students as good service as stationary form of education. In this context diplomas should be considered as equivalent.

The biggest organizational problems were:
− Information systems engineering,
− Organizing infrastructure background,
− Trainings for academic teachers (how to use new methods of teaching).

Until then, Polish Ministry of Education did not regard e-learning as an equivalent to traditional studies. Fortunately, this problem was solved and legal barrier does not exist anymore.

3.2. Future development of CODE

CODE established its main directions of development. These are:
− Continuous technological improvement;
  Improving applied information technologies, implementing new technologies and improving hardware and software.
− Utilization of internet courses for conventional studies;
  Internet courses are excellent forms of supporting conventional studies, allowing automation and improvement of communication process between lecturer and students.
− New forms of didactical and science materials;
  Adding open access materials and publications.
− Making courses more interactive (video conferences etc.);
  As e-learning process is too static, the CODE’s very important challenge is turning communication between lecturer and students into a more dynamic form.

Static website (that does not allow any information uploading without participation of administrator) is no longer sufficient to the students’ expectations. Students need interactive forms of communication and possibility to work in groups that are geographically dispersed. It is a system with functionalities of common (by all users of portal) data managing and information sharing, what is necessary. Furthermore, such system, which often offers innovating e-learning tools, should be support for traditional education. Value added of the system is that it turns didactical processes into a more attractive and effective forms. This is what is needed to make CODE’s offer more interesting for students. Such improvement is achieved by using above-described innovative solution to present materials for student in any electronic format.

It is also CODE that has recognized the need of implementation of the above-mentioned system (to publish, manage and organize website content). Project of the system, (which will replace
actual static website by dynamic platform with functionalities of data managing systems and e-
learning solutions) is planned to be implemented. Such platform, using Web 2.0 solutions, will be the
driver to build academic society similar to social networks in the Internet (people with similar interest
and objectives will have one virtual place to communicate).

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