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**PROVIDING CENTRAL and EAST - EUROPEAN ENGINEERING
STUDENTS
with INTERNATIONAL EXPERIENCE**

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Abstract

Historically, the academic life in Romania as well as in the other Central and East European countries had strong connections with Western Europe and some connections with the rest of the world.

These connections were almost entirely forbidden by the communist soviet type political power imposed to these countries, following the Second World War.

The 1989 anticommunist revolution in Central and East Europe opened the way for re-establishing contacts with the western World, offering Romanians and particularly to the students of the "POLITEHNICA" University in Bucharest, opportunities to get International Experience.

Due, mainly, to the activity of some promoters, without significant local financial aid, it has been possible to offer 3-12 months stages abroad, to 1% of the students of University "POLITEHNICA" in Bucharest and 2-week stages to other 1%, each year.

There are mentioned the barriers to these exchanges, because, mainly, of the heritage of the communist ruling in the country and some practical hints how to improve the providing students with a world perspective.

Two Quantum Mechanics models to explain some aspects of the situation are presented in the Annexes.

Introduction

Romania belongs to Central and East Europe, an area winning its freedom by the 1989 anticommunist revolution, action made possible by the development of technology and particularly of computers and of communications outside the communist camp, the failure of the totalitarian management and the resulted extreme poverty.

The two-generation communist, soviet type dictatorship in Romania was one of the stiffest and bloodiest and, consequently, the changes were to be much important afterwards to align the country with the civilised world.

Thus, by knowing the experience of the "POLITEHNICA" University in Bucharest (UPB), the leading engineering university in Romania, it might be useful to understand how was, where are we and what is to be done in East and Central Europe, in providing students with an international experience.

The examples are collected from the expertise of the author, who, as a volunteer, was engaged in providing international experience to his students and colleagues and not only to them.

The "POLITEHNICA" University in Bucharest

The University "POLITEHNICA" in Bucharest is a large university. In its 12 faculties and 41 research centres, hosted by 153 ha of build area, spread on 916 ha of land, there are enrolled 23 000 full time students, of which 21 000 are undergraduate students participating in integrated long curricula (5 years, 300 ECTS credit points), leading to a M. Eng. degree = "Inginer".

About 1500 students are studying in the foreign languages (EN, FR or DE) engineering curricula.

There are 270 students enrolled in (one year) advanced studies, 1000 students preparing Master in Science (1.5-2 years) degrees (50 in EN, FR or DE), 160 doctoral full time students (4 year) and 2600 doctoral part time (6-8 years) students.

A large part of the national winners of High school Olympiads in Romania, in Mathematics, Physics, Informatics, Chemistry, Economy are being enrolled in UPB (mainly in the Computers and Electronics curricula).

There are 1100 students enrolled in undergraduate evening courses (6 years, 300 credit points).

'POLITEHNICA" is a State University. There are no academic fees for ~95% of the UPB students. The 1991 CONSTITUTION of Romania, provides in Art. 32.(4), for free education of Romanians, in the state institutions, without any binding condition for that.

The current total staff of UPB is of 3300 employees, to decrease with ~15% next academic year, due to budgetary restrictions. The Academic Staff is actually of 1550 people: 30% Professors, 23 % Senior Lecturers, 27% Lecturers, 20 % Teaching Assistants.

History of UPB

The first mention of a technical higher school in Romania was on Jan. 23, 1729: the "SCHOOL OF MINES AND METALLURGY" in Oravita (the former Transylvania Principality), moved later on in Resita.

The first "TECHNICAL HIGHER SCHOOL" in Romanian language - the ancestor of the today "POLITEHNICA" University was founded, on March 24, 1818 by a princely edict in the former Wallachia Principality, in Bucharest. It was largely due to efforts of Gheorghe LAZAR and was located in the precincts of "St. Sava" Monastery.

In 1832, the education at "St Sava College" was structured in 4 cycles, the last cycle, "Special curricula" (including a Civil Engineering curriculum), being of 3 years.

In 1850 was founded the Faculty of Exact Sciences, with 4-year curricula, in Topography, Architecture and Roads and Bridges.

In 1862, there were established, in the newly "United Principalities Moldavia and Wallachia" the first Regulations of the Order of Engineers.

In 1867 the "School of Bridges, Roads and Mines" became independent, offering a 5-year curriculum, upon an admission examination and a Baccalaureate degree got in a Lyceum (after 12 years of primary and secondary education). These characteristics are being preserved up today.

In 1886, this School moved to a new campus (Calea Grivitei), even in use, having auditoriums, tutorial rooms, laboratories and workshops.

In 1890, this School become the "National School of Bridges and Roads" and here were established the headquarters of the new "State Commission for the Examination of

Graduates in Engineering Educated Abroad“, without the approval of which no engineer graduated abroad might be hired by the Romanian State Authorities.

In 1920, by a King Decree on Universities, the name was changed into the “Polytechnic School” in Bucharest (like "Ecole Polytechnique" in Paris, but the "Polytechnic School" was not depending of the Ministry of Defense). It included: 4 faculties (Civil Engineering, Electro-Mechanics, Mines and Metallurgy, Industrial Systems Management), the Institutes of Electrical Engineering and of Industrial Chemistry of the University of Bucharest, the Agriculture Academy and the Architecture Academy.

In 1924, it was founded the “Telephony and Telegraphy” Department and in 1928, the “Aeronautics” Department.

In 1938, the name was changed to “POLITEHNICA”, including all Engineering Higher Education Schools and Institutes in Bucharest (7 faculties).

Along his history, until the end of Second World War, "POLITEHNICA" had strong international connections, many students being temporarily enrolled at Polytechnics in France (Paris), Austria (Wien), Germany (Muenchen, Charlottenburg), UK and Italy or offered internships abroad, with prestige companies. Many graduates with "POLITEHNICA" were hired abroad, including on academic positions. Many top managers from the neighbour countries had graduated as engineers in Bucharest. Many professors of "POLITEHNICA" had degrees awarded abroad.

There was recorded an engineering doctoral degree, awarded in 1936, in Bucharest, to a Stanford (USA) graduate.

The Communist Period

The imposed Communist Ruling, under stiff Soviet influence, transformed, in 1948, "POLITEHNICA" into the “POLYTECHNIC INSTITUTE of BUCHAREST” - PIB (UPB receiving back its name, "POLITEHNICA", only in 1992). Eight departments were taken from PIB, becoming new independent “Institutes” in the country.

But, later on, there have been founded new faculties, among others: in 1948 - the Faculty of Transport Engineering, in 1950 the Faculty of Power Engineering, in 1953 - the Faculty of Electronics and Telecommunications, and the Engineering Physics Curriculum; in 1967 - the Faculty of Automatic Control (including Computer Sciences since 1969).

The policy of command large scale obsolete industrialisation correlated with the communist disguise of humanistic and social education resulted in a huge expansion of engineering education of "specialists", considered able, upon graduation, to exactly fulfil the tasks in an enterprise just after being sent there, without subsequent training. More than 6000 students/year being newly enrolled in PIB, only, in the late 1980's, the major part in Metallurgy, Chemistry and Mechanics curricula.

A new campus has been build for PIB (in Grozavesti, the main actual one), in the late 1960's - early 1970'.

The imposing to Romania of a generalised totalitarianism, under a Communist Party of soviet type, highly bureaucratic and pyramidally structured, resulted in no academic autonomy.

Centralised decisions were taken on cohorts and classes sizes and on detailed contents of the academic curricula, usually, with little opportunity of choice of the academic path for the student, after enrolling in a curriculum, as a freshman.

There have been used unique academic records blanks for all students enrolled in an approved curriculum.

The academic staff was structured on four levels (teaching assistants, lecturers, senior lecturers and professors), with very slow promotion. The positions of professor and senior lecturer had to be confirmed by the Secretariat of the Central Committee of the Communist Party and have on life.

The Communist Party bodies, upon one-candidate "elections" nominated the academic managers, at all levels, and their positions could be renewed. A part of academic managers had been trained in other soviet camp countries, many of them being hired as workers, before entering high education.

The students, at all levels, were trained with a national economy horizon, being compulsorily placed, after graduation, upon yearly national competitions for each type of curriculum, on jobs created by a State Planning Commission, at the state companies (the only ones exiting). These positions were binding them for a couple of years.

The lack of prospects in other carriers made the academic carrier a desired one by engineers. Usually, a three-year industrial stage was required before being possible that a graduate in engineering be accepted to enter academic staff.

The communications were strictly supervised (letters opened, phone listened frequently); no personal computers; no computer connections. Even for a private typing machine it was necessary a police permit, to be renewed yearly, upon approval and new sign prints. It was permitted to talk with a foreigner only in the presence of a third person and the authorities had to be informed in writing about the detailed content of such talk. A foreign banknote of 20 \$ in the house could meant prison.

Split personalities and double behaviour (public or private, relative to superior or inferior hierarchical levels, relative to Communist Party members or non-members, with respect to family relatives and friends or to strangers, inside or outside the country, double contracts - written and oral, public and secret, with contradictory provisions, on the same topics) were frequent.

Stiff hierarchic control and weak resources made discretionary behaviour and corruption spread.

The national compulsory plans of development (including higher education) were prepared on a 5-year basis, practically, without periodic re-evaluation.

The initiatives were permitted only when starting within the Communist Party and being implemented under its supervision.

The prohibition of any competition among industrial producers annealed Romania's technological progress.

The agriculture's progress was destroyed by collectivism. The proteins were disappearing from accessible on the market food.

The country, in spite of large natural resources, became very poor.

The traditional intense international academic connections (students and staff), before communism, were almost entirely forbidden outside the soviet camp (Iron Curtain), with rare exceptions - for some young researchers, prestige professors or for covered security agents or relatives of prominent party leaders.

Many old professors having and promoting an International Perspective to their students were, after 1945, dismissed, sent to prison without judgement and some killed there and never replaced.

The scales of values and positions, in many fields, were reversed.

The temporary working abroad, connected with Romanian exports to the Third World, was permitted, mostly, to low level technically educated people.

Nevertheless, with life risks, some very good and excellent graduates (M. Eng. and Ph. D.), including former winners of high school international competitions (Olympiads) have been successful in infringing the borders of Romania and of the

communist camp and in reaching western universities and companies. They have been appreciated there, some of them playing an important role in re-establishing international connections of Romania, after 1989.

In Annex 1 and Annex 2, there are introduced two models based on the Quantum Mechanics: the potential well and on the barrier of potential, to better explain how was structured the society and how was possible to cross the Iron Curtain.

Recent Evolution

After December 1989, Central and East European Anticommunist revolution, the situation has historically changed. The totalitarian ruling of the unique party was overthrown, Romania gradually re-oriented itself towards democracy and west. The EU and NATO have start to show their disposition to help Romania, and later on, their determination to stimulate Romania's integration in these organisations.

In spite of the totalitarian heritage in structures, in functions and in behavioural patterns, of almost no existing international academic private connections and of the lack of internal financial resources, there gradually have appeared and have been created opportunities to provide students with international experience.

These opportunities have offered UPB students access to get international experience, both virtually (using electronic communications) and actually (direct human contacts), at home and abroad. Romanian students are, usually, highly motivated to get International experience and to prove themselves competitive, easily mastering foreign languages.

Virtual International Experience

Since 1990, there have started the first connections by Internet. Today, all departments and the major part of hostels of UPB are connected with the UPB network. This year, UPB is being equipped with a fast network, but the major part of the terminals are rather slow, as yet. Internet is the main way of establishing virtual human contacts abroad. More, it permits getting access to many foreign electronic libraries (databases) and even to the assisted distance learning, using the expertise of foreign universities.

By now, in UPB, virtual enterprises are started to be approached with some small projects operating between colleagues, some of them abroad.

Now, the UPB students have direct access to new foreign books (hard and E-copies) in libraries sponsored by the Cultural Services of EU embassies in Bucharest. Previously, some western books could be consulted as Romanian and mainly, Russian translations.

International Experience Obtained at Home Institution.

The actual international experience is being got at home:

- by attending courses and modules offered by foreign visiting professors (FULBRIGHT, CIME, DAAD Programmes, for example);
- by participation into international conferences and seminars held in Romania, for example (see http://klimt.iwr.uni-heidelberg.de/mip/adaptive_filters/seminar.html) - a Joint Seminar on Adaptive Optics organised, just recently, March 17-21, 2003, in Bucharest, by the University of Heidelberg (DE) and UPB, with the participation of a

professor and 6 doctoral students from Heidelberg (sponsored by BOSC) and of 5 professors and 35 students, from Romania;

- by practical stages and internships with foreign and multinational companies acting in Romania (SIEMENS, PROCTER & GAMBLE, for example offer, each year, prizes for excellence in projects, dissertations and theses prepared within their companies);

- by participating into international competitions organised in Romania (IBM South East European Competitions in Programming; E-Idea, 2003 Business Plan; The Young Broker, for example) and the most important,

- by being enrolled into curricula entirely taught in international foreign languages.

Foreign Languages Curricula (EN, FR, DE) in UPB

The communist regime had banned the traditional in Romania high schools with teaching in foreign languages, not to permit that young generation be influenced by "bad capitalist" examples. Just after the situation changed, UPB got the Government approval to found engineering curricula, taught entirely in English (since 1990), in French and in German (since 1991).

Now, in UPB (see: <http://ing.pub.ro> and <http://www.pub.ro/English/Ects/>), within FILS (Romanian abbreviation of the "Faculty of Engineering taught in Foreign Languages") there are, every year, 325 new places financed by the State, covering 5 years curricula, offered in: Electrical Engineering and Computer Sciences, Mechanical Engineering, Chemical Engineering, Science of Materials, Economic Systems Management.

The Master of Sciences Programs of 1-2 years, in foreign languages, receive financing for 50 new places yearly. The doctoral programmes in foreign languages (3-6 y) have continuously been expanded.

There is a preparatory year for the foreign and Romanian students not mastering enough the chosen teaching language.

The curricula offered by FILS to its students are more general ones than for the rest of UPB students (the first two years being common for all FILS students in a stream) and more flexible and compatible with the curricula of European universities and Polytechnics.

With the assistance and help of EU Governments and companies, the FILS students are offered study and internship stages abroad, particularly in France (by a consortium of universities coordinated in Toulouse) and Germany (a Darmstadt consortium).

These students are educated to think internationally (a scent of "globally") and act locally. They are offered courses on foreign cultures and civilisations, on international business regulations and practices, travel, thus becoming aware of the differences between the regions of the World (more particularly, of Europe), since freshmen.

The FILS students regularly organise job fairs with the support of foreign companies, these ones offering placement for graduates and part-time jobs for students, better paid than for the students of the corresponding main Romanian stream.

The presence of ~ 5% foreign students in FILS offers an other opportunity to the FILS students to get accustomed with the world variety in values and patterns of behaviour, too.

Getting International Experience Abroad

- UPB students have been getting international experience abroad:
 - - by temporary (3 -12 months) studies evaluated by exams and
 - - by research stages (3-6 months) producing published papers at partner universities;
 - - by practical stages and internships abroad at multinational and foreign companies (through IAESTE, for the period Romania had paid the membership fee, or through partner universities),
 - - by participating into international projects, in workshops and in holiday schools (through BEST - Board of European Students in Technology, through partner universities), into scientific conferences and youth meetings, all financed from abroad, by European Union, UNO, different western countries gifts, international banks governmental loans.

 - The first actual exchanges started in the academic year 1990-1.
 - Some foreign professors, coming through international assistance programs, were active in UPB. Some UPB professors succeeded, by EU TEMPUS Programme support, to work for months in universities abroad.
 - The first stages abroad of a couple of the UPB students had been financed by the EU TEMPUS Programme, by "SOROS Foundation for an Open Society" and the European Physical Society and by foreign universities.
- These beginnings, unthinkable one year before, were welcome by all academy, they being seen as a victory upon the past, a proof of the new orientation of the country and a hope for a better future. The exchanges grew continuously due to:
- the abolition in 1990, of the exit visa to travel abroad, previously compulsory for Romanians;
 - the gradual orientation towards the West of the governing bodies;
 - EU, UNO, foreign governments, international banks increasing assistance and loans to the Romanian Government to help students to study temporarily abroad;
 - The study in schools of two western languages, at the choice of students;
 - The permission given to universities to create curricula taught in foreign languages (EN, FR, and DE at UPB) supported by partner universities and foreign governments, curricula which offer stages abroad to the enrolled students;
 - The signing by the Romanian Government of the European and UNESCO Conventions concerning recognition of periods of study, credit transfer, and quality assurance. UPB has gradually introduced the European Credit Transfer System, starting in 1997;
 - The promotion to higher positions of some teaching staff who have strong democratic views and including some professors that have studied in the EU and USA;
 - The desire of new foreign investors in Romania to hire Romanian engineers with international experience;
 - The granting of SCHENGEN-area free entry visa for three months for Romanians (2002);

- a PHARE governmental loan (starting with the present, 2002-3, academic year) to partially cover the living expenses of exchanged students not entirely covered by the EU SOCRATES Programme;
- the expansion of international contacts of UPB people;
- the very good results of UPB students abroad and the resultant growing prestige of UPB;
- the offer of foreign top universities to open shorter (workshops, seminars a.s.o.), or longer joint formation programs: for example a "Double Diplome" Programme of the "ECOLE POLYTECHNIQUE" in Paris (F) - University "POLITEHNICA" of Bucharest" (2-3 years stages), to start in October 2003;
- the beginning of a management of change by starting to appeal to job market studies, by redesigning some courses and by offering new curricula which make easier the recognition and equivalence of periods of study abroad,
- the debate in the UPB Senate on BOLOGNA Declaration and upon the proposal to, consequently, change the actual UPB schedule "5 y (Inginer) + 4 y (Ph. D.)" in a "4 y (B.Sc.) + 2 y (M. Eng.) + 3 y (Ph. D.) one";
- the proposal to create, in UPB, a Department for the Outstanding Students, to help these ones to get earlier high research performances, inclusive by providing them with an international perspective.

Between 1991- 8, during the TEMPUS project, UPB participated in ~ 80 JEPs. The ERASMUS / SOCRATES European Programs I and II (UPB having more than 100 SOCRATES Bilateral Agreements with EU partner universities) and other programs have been significantly helping student and teaching staff exchanges with Western Europe.

During the 2001-2 academic year, the UPB (at 23000 students and 1550 academic staff) had the following International Exchanges:

A. SOCRATES Programme: 1. Out: 136 students and 807 months , with 350 EUR/m as SOCRATES fellowship (158 students and 863 months in 2002-3, with 214 EUR/month from SOCRATES program and a supplement of 205 EUR/month, due to the new PHARE support), 42 % of students returning with credits; 21 professors (40 weeks). 2. In: 6 students, 7 professors.

B. Other programmes: 1. Out: 70 temporary students (200 months), enrolled home in the French and German Streams, 70 students transferred to prestige foreign universities, 1200 professors, for one week travels. 2. In: 74 students; 120 staff (1 - 2-week visits).

The "Scientific Bulletin of UPB" has 4 series, of 4 issues/year of ~ 120 pages each, the papers being published 94% in English, 5% in French, 1% in other languages.

Barriers.

But the evolution was much less flourishing than it was hoped in 1989.

Normal, western type connections have been difficult to develop, because some barriers have become important, mostly due to the structural, functional, psychological, behavioural and social inertia, to the totalitarian heritage.:

- extremely poor and poorer (until 2002) financial situation – lack of local money to support foreign exchanges. The students and their families, usually, have no possibility to pay accommodation during stages abroad and even some so them can not

afford to pay translation and official certification of the documents requested for completing the application file (think about academic fees!);

- active relationships with foreign prestige universities were sometimes difficult to build because, when concluding an agreement of co-operation, sometimes, there have been little intention to change something at home in UPB, to implement a compromise required by that agreement;

- there is rare appeal to the subsidiarity principle: in Romania, by tradition, usually, what is not being centrally regulated is considered as being forbidden or the reversed situation, that the academic autonomy may mean not to observe existing superior regulations;

- the belief that the mission of UPB is not to train “generalists” but to train “specialists”, in spite of the statistics showing that only a small part of the engineering graduates find jobs in their field of their specialisation;

- the power of inherited belief that the best students be trained and kept in the country to work for the "national economy", eventually for "POLITEHNICA", not by ensuring a fair compensation at home but by impeding them to study abroad, even temporarily;

- the totalitarian mentality of a part of the academic management, considering that the enrolled student has little right to choose himself his academic path after admission examination and that when studying abroad, the student be obliged to study the same topics, having the same number of credits, eventually using the same synopses, as established for his curriculum at home (but some deans accept 40% other courses than those scheduled at home);

- the difficulty of some deans of accepting that others, not under their control, select and evaluate their students. There have been cases when students have sent their application files to the partner universities abroad without the official academic transcripts, some deans refusing to issue the transcripts, before the deadline, by repeated postponement. Some students, asking the approval of their deans for their temporary studies abroad, have been required to sign declarations with their commitment to take, when back at home, all those home exams different from the abroad ones, in spite of the signing by the deans of the official formulation on the "Learning Agreement", explicitly providing for full equivalence of the period of study abroad;

- the equivalence and recognition of periods of study abroad is frequently done by the interaction returned student - each professor, for each exam and not returned student - academic board of the faculty, for the period of study;

- the returned students do, usually, have to take new examinations at home, in spite of getting the normal 60 credits/year abroad; some of them have been declared as being obliged to repeat the year of study, in spite of being abroad with the dean's approval who had signed the Learning Agreement and performing well there;

- the double standard of the some academic managers which, having their children studying or working abroad, pledge for their students to stay at home and sometimes make for the children of academic staff much less difficulties in getting recognised their temporary periods of studies abroad than for their mates without the support of the relatives in academy;

- the reluctance of academic administration to keep (and issue copies of) personalised academic records;

- the populist distribution of available funds from foreign sources by distributing them to more, candidates, for short stages of 3-4 months each (often without being got academic credits abroad as well as not working as a group in a large problem solving

project), instead to offer one academic year study stages to a smaller number, but excellent and very good students selected upon their competitiveness and creativity and returning with the normal 60 credits/year abroad.

- the late arrival at the students of the financial help, even 1-3 months after the beginning of their stages.

New Challenges

The new social environment generated new obstacles for the "POLITEHNICA":

- the dramatic decrease of the role and position of Physics and Mathematics in high school education and in promoting competitions;

- the decrease of demand of engineers;

- the diminishing of relative income and of the social prestige of scientific, academic and engineering staff;

- the reduction of the desire of youth for performance in sciences;

- some delays in obtaining study entry visas in Western countries, due, sometimes, to the higher than necessary level of requested financial support. To have granted study entry visas to their children, some parents are obliged to formally commit themselves to cover expenses much larger than their incomes.

At the beginning of getting stages abroad, during 1990', the major concern of the candidates to temporary studies was what would happen abroad, "could they fulfil the new tasks?".

Now, because of the treatment at home of some of the returned students, the main concern of outstanding students, before applying for a stage abroad, is "what would happen when back?".

The sometimes difficult processes of equivalence of the temporary studies done abroad and of the reintegration at home are inducing some excellent students to decide to leave the country to be able to study abroad, without unpleasant consequences, when returning home.

The compound difficulties abroad and at home make the international stages be very selective, opened, as yet to high potential students, only.

Criteria for Selecting Candidates for Study Abroad

The selection is done by promoters, based upon the individual results and the potential of growth of the candidates.

The main criteria used are:

- The answer to the question: "Was the student admitted in UPB without examination?" YES means that the candidate is a very competitive one, because only the winners in high school Olympiads at international and national levels are admitted without examination, upon their performances in competitions.

- The General Average Mark and the Rank at the admission examination (with subjects common for all "POLITEHNICA").

- High school performances: general average mark and the rank at Baccalaureate (a national standardised exam), what high school has attended the candidate and what were his performances there.

- Academic performance (general average mark of the last years > 8.50/10, 9 or 9.50/10, depending on the destination).

- Adaptability (positive time evolution of the general average mark, during studies).

- Competitiveness (the levels of the professional, sportive, artistic prizes gained).
- Creativity (papers, inventions, essays, projects, initiatives).
- Managerial and leadership abilities (natural leader; elected positions, implementation of the electoral program, public recognition of results; nominated manager, results)
- Communication skills (behaviour during the selection interview, quality of filling in the application forms, personal virtual relationships established abroad).
- I. T. skills (operation systems, languages, programmes known).
- Language abilities (Certificates: TOEFL, Cambridge, DALF, Sprachdiplom; clarity of the documents prepared to be included in the application file).
- Character, responsibility, sociability (recommendations, interview, team activities, hobbies).
- Devotion (Volunteer work, helping colleagues)
- Motivation (duration to prepare the Learning Agreement and other requested documents, pertinent information about the host university).
- Results at preparatory programs (when exists) to correspond to the host university requirements (Ecole Polytechnique in Paris, f. e.).
- Family support (discussion with family and the their signing of a commitment required by the UPB SOCRATES Office, to cover the eventual not implementation of tasks assumed abroad by the student).

The selection is based upon individual results and potential and not on his financial situation, but some family financial support may influence the exact destination abroad.

Promoters of Exchanges

The promoters of exchanges are volunteering professors, getting some help from paid administrative staff for the management of SOCRATES funds distributed via Romanian Government.

The promoters must have vision, prestige and devotion. Their work is essential:

- for launching inter-university programs, usually starting with their conferences abroad or with visits of foreign professors in UPB, upon their invitation;
- for concluding Bilateral or Multilateral Inter-university Agreements for exchange of students and staff and research projects,
- for advertising the opportunities for exchanges to the eventually interested students,
- for helping the students to prepare their applications (courses on preparing C. V., Motivation Letter, Learning Agreement; personalised advises - the students not being accustomed to choose their academic path),
- for selecting the students at home,
- for contacting and getting the acceptance of the student by the partner university,
- for making arrangements for the linguistic preparation of the students,
- for academic preparation of students,
- for assisting the student to find a cheap (the cheapest possible) accommodation,
- for supervising the study abroad by maintaining regular contacts with the student and his supervisor at the host university;
- for including the necessary path changes in to the Learning Agreement;
- for helping at home with evaluation, recognition and equivalence of the period of study abroad, eventually for negotiating with deans upon these matters;

- for checking the introduction of the results of the study into academic evidence,
- for finding short term rewards for the results got abroad,
- for creating an opinion at home, in UPB and the Ministry of Education in favour of creating conditions for providing students with global perspective;
- for attracting media to intervene, in a qualified manner (the global perspective in engineering education being rarely approached by media). Global perspective could now start do be discussed, due to Romania's negotiations for adhering to EU.

The promoters have to create opportunities and to identify and conveniently use the existing ones; to protect the exchanges of eventual obstacles; to take profit of the contradictions among the generators of obstacles; to master: the different interests at different levels, the unclear competencies, sometimes the lack of responsibility or the exaggerated approach of autonomy for promoting the exchanges.

Like that, it have been possible to yearly provide hundreds of UPB engineering students with International Experience by rising foreign funds; to create a large network of foreign academic partners, to develop unique international programs (like with the ECOLE POLYTECHNIQUE in Paris).

The short term statistics available show that students having been provided with an international experience have been launched to successful carriers. They have higher incomes than their mates, very good international human relationships and openings to future support abroad for their activities.

The successful carriers of former students having been provided with an international experience, having got an European towards a global prospective, will contribute to the change of the actual generation of decision-makers trained under the totalitarianism and local horizon, with a new one, at least partially having a global perspective.

The contribution to the change of the former students and professors having studied abroad seems essential in the middle and long runs.

Summary of Present Situation

Starting from zero, 12 years ago, now 1 % of enrolled students study abroad 3-12 months, other 1% spend 2-week stages, each year, without local financial support, mainly due to the work of the volunteer promoters and the support of EU and foreign universities.

The actual international exchange flows are not sustainable.

Global perspective of Engineers has to be significantly increased.

Current approaches do not ensure a global perspective for the majority of future engineers.

What To Do?

To change the mission - not to train "specialists" but to educate "generalists" by the first engineering cycle. To introduce in the mission: "providing a global perspective to our students"

To change the organisation. The newly proposed educational programme in UPB, "4+2+3 y" instead of actual "5+4 y", will permit further progress in international exchanges.

To study the job market and its trends.

To change curricula to comply with the world job market forecasted demand.

To improve the teaching technology.

To enter into joint international projects. The newly proposed Department for Outstanding Students might ensure to these ones a global perspective.

To broaden the international experience of the faculty.

To find means and ways to infringe faculty reluctance to the new standards.

To better master the complexity of recognition and equivalence problems.

To extend the base of promoters with young professors with a global vision.

To find ways to make direct connections between effort and results abroad and appreciation and promotion at home.

To imply media in the education changes.

I think that even some totalitarian mentality maintained, as yet, at almost all levels, by combining this with the change at the highest level due to the desire to enter NATO and EU, the result will lead to a positive change in all society. This up-down strategic change in orientation combined with the down-up tactics of implementing international exchanges, the positive influence of the former temporary students abroad, the change of generations at the academic managers level, will have a chain effect to change finally the actual mentality of some decision makers that the local and national perspectives count, and to lead to a larger international experience of Romanian students, able to provide them with global perspective and competitiveness.

. The sustainability of international exchange programs is far from UPB, as yet.

The families of the students are very poor.

The low incomes in Romania do not attract banks to offer loans to individuals for temporary studies abroad.

The international exchanges are to depend for a long time, almost entirely of foreign help at different levels.

With the present trend of continuously reducing the EU SOCRATES monthly support, there are to be found new financial sources: - new programmes in the traditional geographic area (ERASMUS WORLD for Master studies, EU FRAME 6, f.e., foreign national programs) and donors in new geographic areas to support the international stages of UPB students (e.g., USA, Canada, Japan, Australia).