# The European Materials Science Education Database and Czech Supply

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**Abstract:** The Federation of European Materials Societies (FEMS) has established links between European materials societies and promoted project Human Capital and Mobility. The main aim of the whole project was to collect and supply information on structures and conditions of materials science education in Europe. The Czech Society for New Materials and Technology (CSNMT) have collected the data from Czech Republic, Poland, Slovakia and Slovenia, others societies from Germany (DGM), United Kingdom (IOM), France (SF2M) and Hungary (OMBKE) from additional countries so at the moment 25 countries are in database. The whole database helps to establish links between national or European research programmes. It strengthens the social and economic ties throughout Europe.The comparatively low number of students of engineering sciences in Europe is without doubt a threat to the technological efficiency of industrialised countries. There are many possible reasons for this trend. An investigation has shown that young people are not motivated to enter this job market. Engineering and scientific subjects are not emphasised in schools and thus do not motivate and interest school children enough. Nowadays the student and anybody from any country of the World now using web pages from http://www.matnet.mcs.de/, after finding the base orientation can continue with enlarging his interes in particular points. An enormoues work were done by the members of CSNMT to collect the hundreds hand written forms together from many of Czech Universities associated with Materials Science education. The same troublesome endeavours have been made in Poland, Slovakia and Slovenia.

**Keywords:** materials science, education, database, ICEE2000

## 1. Introduction

The European Union published a Green Paper about innovation in December 1995, which is an analysis of what Europe has to do to maintain its competitive industrial / technological position, in particular with reference to the main economic powers such as Japan and the USA. Special emphasis was placed on innovation as a means of sustaining Europe's economic position. There are obvious disadvantages and backlogs compared to Japan and the USA. The reasons are not only that Europe is investing significantly less in its research and development (only 2% of gross national product GNP) than the USA (2.7%) and Japan (2.8%), but also the structural conditions. There is talk of a "European paradox". This refers to the fact that scientific achievements in Europe are excellent and may sometimes be rated even higher than those of their main competitors. However, Europe is obviously less successful when scientific competence has to be converted into new products or market share. The conclusion is that one of the main weaknesses in Europe is the inability to convert results of technical research work into innovative products to gain a competitive advantage. In this connection the fact that the total costs of research and development should be distributed according to market needs is pointed out. Mechanisms that form a link between research and innovation on the national level have to be improved Better co-operation between universities and industry should be aimed at, thus improving technology transfer, knowledge and competence. The conclusion drawn from these statements is the necessity of co-ordinating all material activities within Europe.

From that point of view it was the right and trend setting step to found FEMS ten years ago. (Federation of European Materials Societies). Highly industrialised countries will need young talent trained to a high academic level in science and engineering. During the last five years the number of students registering for scientific/technological subjects has become a cause for concern. Whoever takes into consideration that there will be as many active scientists by the next millennium as in all the previous 2500 years together, whoever realises that 20000 scientific essays are published every working day, and whoever is aware that every five years the available

knowledge in the world doubles may get an idea of how much will change in the near future, and will then react with concern to the decreasing number of first year students in our technical university departments. Engineering, mathematics and natural sciences are not as popular as before among students.

It is not only the universities but also our industries that are concerned with this trend. If this continues, there will be a shortage of well-trained engineers within a few years. Even considering that the overburdened pension and social security systems will lead to an increase in the age of retirement for engineers, companies are faced with the question today of what to do in about 10 years' time, when, because of age, there will be a lack of engineers. The comparatively low number of students of engineering sciences is without doubt a threat to the technological efficiency of industrialised countries. There are many possible reasons for this trend. An investigation has shown that young people are not motivated to enter this job market. Engineering and scientific subjects are not emphasised in schools and thus do not motivate and interest school children enough. Compared to their importance in the economy and society, technical and engineering fields have a poor image, and this attitude also spills over into materials oriented subjects. There must also be a better way for the requirements of the market place to be met in these fields. Students tend to react quickly but falsely. Thus everyone is asked to consider how to present the importance of technical studies, especially studies on materials science for the success and competitiveness in specific industrial locations. With regard to public relations work, but also with regard to the disappointing number of first-year students, also in material science, the investigation backed by the European Union and co-ordinated by the DGM ( Deutsche Geselschaft fur Materialkunde) into materials science teaching and research in 500 institutions in 25 European countries has become even more important. It offers students information about conditions of entry, study programmes, length of studies and research projects [1,2].

## 2. Human Capital and Mobility

The European Community is sponsoring an extensive programme on Human Capital and MobilityMaterials science is a truly interdisciplinary field, incorporating and interacting with most engineering and science disciplines. Traditionally, education in materials science has therefore been organised within the frame of the classical engineering and science disciplines. However, over the last 20 years, independent materials science departments have gradually grown in the universities of most European countries. This has induced a variety of different characteristic national "features" in both education and research. Today, as a result, there is a broad spectrum of subjects offered by the different universities and institutions. This wealth of opportunities is very often confusing to students and young researchers even on a domestic level. On a European scale, they have to try to consider an even greater variety of disciplines, curricula, degrees, etc. This is made all the more difficult by a lack of a Europe wide survey.

The way in which young researchers perceive personal involvement in international co-operation depends on opinions formed at an early stage of their educational development. Therefore "mobility" should been couraged before graduation [3]. The first prerequisite for mobility is information on opportunities. Information on relevant - opportunities must then include details of curricula and on their compatibility with he student's personal situation.

The aim of the FEMS-coordinated project is twofold: First of all, it will provide a database on the present structures and conditions of materials science education in Europe. Secondly, in order to implement the most efficient use of the information to keep the information continuously up-to-date, the project will also involve the establishment of a self-regulating network amongst the participants. A comprehensive survey based on a network organisation would obviously lead to a number of benefits:

- It enhances mobility, i.e. transfer of people and ideas between academic centres.
- It contributes to a rise in the standards of teaching across Europe.
- It provides information on resources (e.g. expertise, names and addresses, sources of funding, etc.) for the recruitment of personnel in industry and major research centres.
- It helps to identify priority areas for financial support of R&D by both governmental bodies and industry.

## 3. The Czech supply and database examples

The CSNMT (The Czech Society for New Materials and Technology) have started with some Questionnaire A and B prepared by FEMS (The Federation of European Materials Societies). A part of first one Questionnaire A is on Fig.1.

An enormoues work were done by the members of CSNMT to collect the hundreds hand written forms together from many of Czech Universities associated with Materials Science education. The same troublesome endeavours have been made in Poland, Slovakia and Slovenia. The next assignation to files and filing the File Maker was

necessary to send all data to the DGM (Deutsche Geselschaft fur Materiallkunde) for collecting the data fields from all the Europe.

**Establishing a European Materials Science Education Network**

**Data evaluation project sponsored by the EU in the frame of the Human Capital & Mobility Program,**
Contracts ERBCHRXCT 930218 + ERBCIPDCT 940006

**Questionnaire A** 5 □□□

**Head of the Faculty (or equivalent)**

Title ..... Phone .....
Given names ..... Fax .....
Surname ..... Electronic address .....
Name of University ..... (National name)
..... (English name)
Name of faculty (or equivalent) ..... (National name)
..... (English name)
Street .....
Zip Code ..... Town .....
Country code ..... Country .....

**Thank you very much for returning the completed Questionnaire before**

__ __ (day) __ __ (month) 1995 to:

Prof. Dr. Jiri Kliber
University of Mining and Metallurgy
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Fig. 1 Questionnaite A

After opening the database http://www.matnet.mcs.de/ you can choose first of all the particular country and after that and options like university structure, requirements for foreign students, geography and costs, institutes / institute profile/, undergraduate study, postgraduate study, costs, income and tasks, equipment, staff co-operative schemes, research areas and projects degree course schemes [4]– see Fig.2

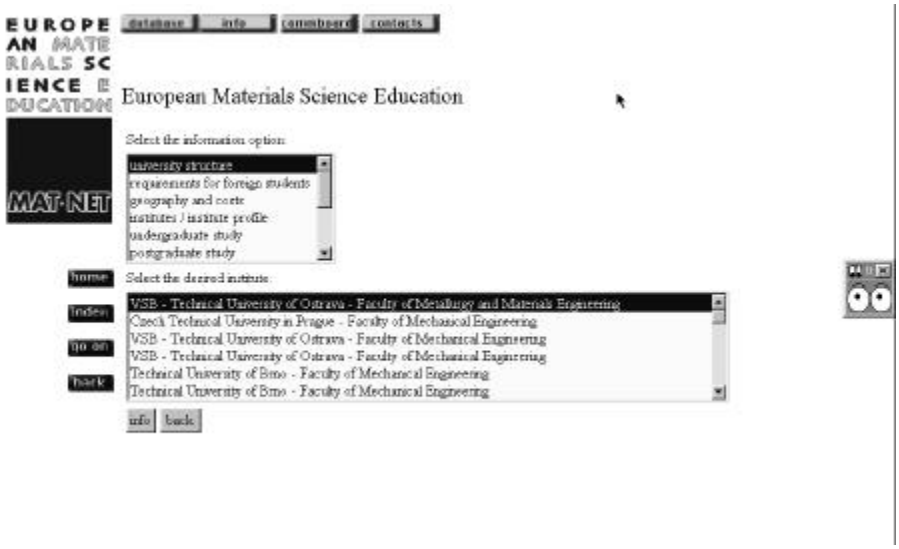

Fig. 2. One of the beginning web pages

You can find some more infornmation about demanded University, Faculty, Institute and the study program with additional deeper information. The student and anybody from any country of the World now, after finding the base orientation can continue, if the input block was orectic, enlarge his interes in particular points as seen on Figs. 3. to 5.

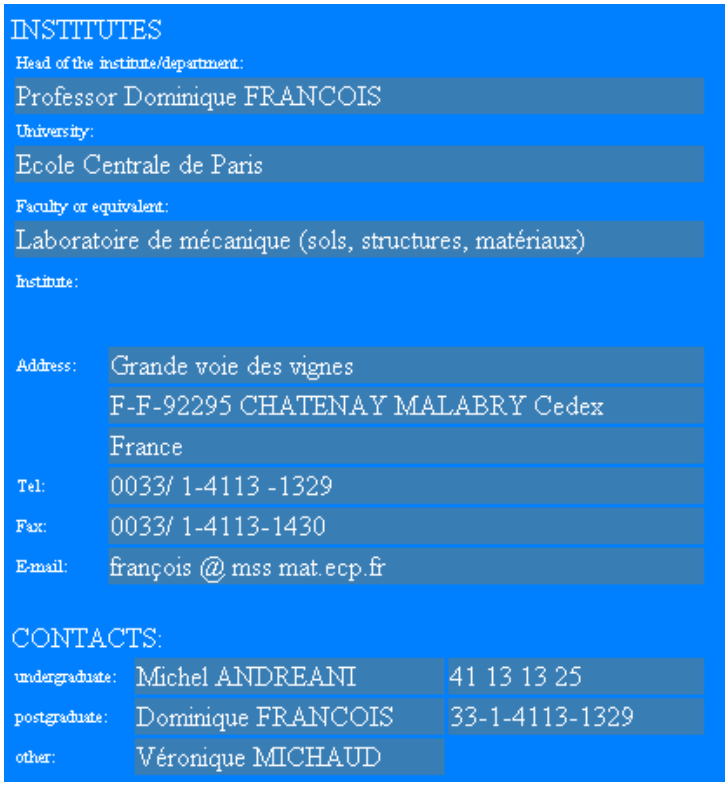


Fig. 3. Detailed inquiry from Ecole Centrale de Paris

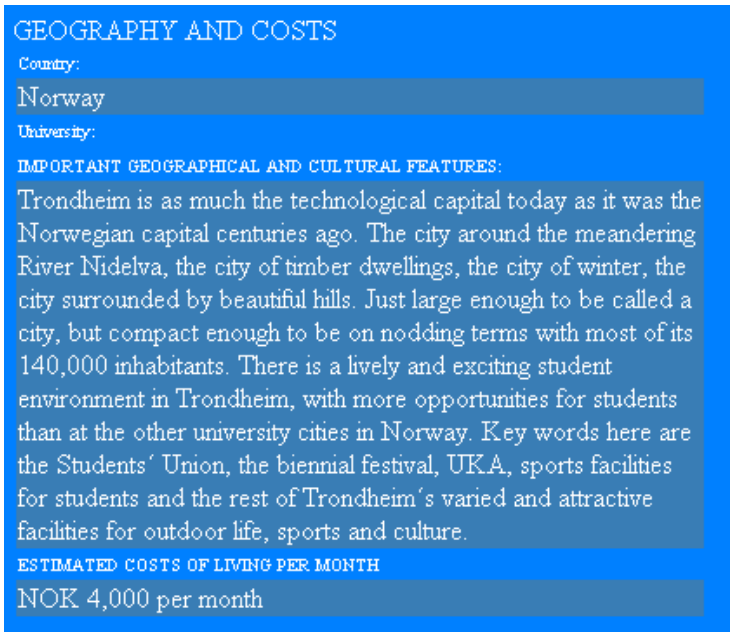


Fig. 4. Additional information about University in Norway

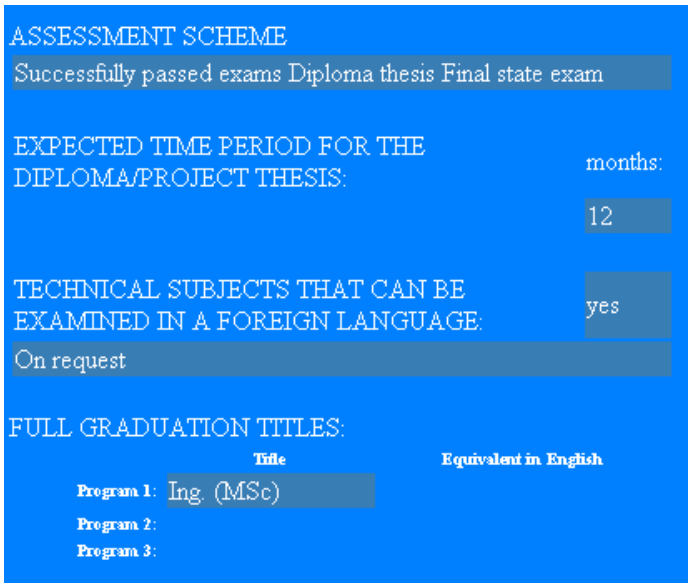


Fig. 5. Scheme of finishing master study conditions

## 5. Conclusion

The whole database helps to establish links between national or European research programmes. It strengthens the social and economic ties throughout Europe. The database should comprise all information regarding: Focal points of teaching and research, Curricula, Examinations and degrees, Admission requirements, Statistical figures (size, number of students and professors, duration of studies, etc.), Structure of the organisation. Some similar INFRA2 project is now executed supported by Czech Ministry of Education. Because all the questionnaires associated with

Czech Republic, Slovakia, Poland and Slovenia have been collected by the members of CSNMT, nowadays some effort is made to update the whole database [5,6].

## References


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