

EUR-ACE and ENAEE: a Proposal and a Tool for a European System for Accreditation of Engineering Education

Giuliano Augusti¹, Claudio Borri² and Elisa Guberti³

Abstract - The EUR-ACE Socrates-Tempus project (September 2004/March 2006) proposed a decentralized European system for accreditation of engineering programmes in the “Bologna process” area (EHEA) at the First and Second Cycle level (but including “Integrated Programmes”, i.e. programmes leading directly to a SC degree). In this system, “national” engineering accreditation agencies would continue to award their accreditation certificates and give them an added European value by the EUR-ACE quality label, recognized by all participating agencies.

As a basis for this system, the EUR-ACE project elaborated, through a wide consultation, and published appropriate “Framework Standards for the Accreditation of Engineering Programmes”, that should be respected by all participating agencies, and a proposal for the “Organization and Management of the EUR-ACE Accreditation System”. Also, an International non-profit association (ENAEE: European Network for Accreditation of Engineering Education) has been established to run and guarantee the quality of the system).

Two new EU-supported projects (“EUR-ACE IMPLEMENTATION” and “PRO-EAST: Promotion and Implementation of the EUR-ACE Standards”) have started in 2006 and are collaborating with ENAEE to start the EUR-ACE system, respectively in the European Union and in Russia. It is expected to grant the first EUR-ACE® labels within 2007.

Index Terms - accreditation, EUR-ACE, trans-national recognition, ENAEE.

1. ACCREDITATION AND TRANS-NATIONAL RECOGNITION OF ENGINEERING PROGRAMMES

Accreditation of an engineering educational programme has been defined [1] as “the primary result of a process used to ensure the suitability of that programme as the entry route to the engineering profession”. This definition, accepted in the present paper, on the one side underlines the concept of

“programme accreditation” vs. the “Institutional accreditation” preferred in some Academic circles, and on the other stresses the “aim” of “accreditation”: the difference with Quality Assurance, that should be regarded as a prerequisite of accreditation, thus appears more clearly than in other definitions; moreover, it is also evident that “accreditation” cannot be a process closed within academic circles, but need the participation of other stakeholders.

As well known, the European Union has established a legal framework for the mutual recognition of professional qualifications, that is the object of ad-hoc “European Directives”: in particular, the engineering profession has been covered from 1989 to 2005 by the “General Directive” 89/48/EEC, that in principle assured to professionals with a higher education background of at least three years, the possibility of keeping their professional qualification when moving from one European Community country to the other. The difficulties in the application of this Directive, and the evolution of the legislative and social context, have suggested the elaboration of the new Directive 2005/36/EC “on the Recognition of Professional Qualifications”, that after a few years of discussion was finally approved and published in September 2005 and is at present being implemented.

A similar process for recognition of education is impossible for several reasons: the autonomy of Educational Institutions, the fact that education is not included in the European Treatises, etc.

In parallel, the “Bologna process” is trying to implement a “system of easily readable and comparable degrees”, but little attention is being paid to the question of accreditation. An international accreditation system can only be achieved through bottom-up agreements between countries and Education Institutions concerned.

Throughout the world, several agreements for the international recognition of accredited engineering programmes are active (the Washington Accord, the Engineering Mobility Forum, etc. ...): all of them are spontaneous “bottom-up” agreements for mutual recognition of degrees and/or qualifications. Some such agreements exist sporadically also in Europe, and some international

¹ Prof. Giuliano Augusti - Full Professor of structural mechanics at the Facoltà di Ingegneria of the Università di Roma “La Sapienza” Coordinator of the EUR-ACE IMPLEMENTATION Project and President of ENAEE (giuliano.augusti@uniroma1.it).

² Prof. Claudio Borri - Vice Dean for International Relations and Full Professor of computational mechanics of structures - Facoltà di Ingegneria, Università di Firenze - President of SEFI 2005-07 and President of IFEEES 2006-08 - President of Thematic Networks E4 and TREE (cborri@dicea.unifi.it).

³ Dr. Elisa Guberti - Head of the International Relations Office - Facoltà di Ingegneria, Università di Firenze - Project Manager of Thematic Networks E4 and TREE (intreling@unifi.it).

agreements (e.g. the Washington Accord) involve European countries.

However, no shared accreditation or recognition system exists on the European scale. Quoting European Commission's statements [2], it can be said that in Europe 'most evaluation and accreditation is [still] carried out on a national or regional basis'.

Thus, notwithstanding the prestige of the National systems and of the Academic titles, in a global job market the lack of an accreditation system recognized on the continental scale puts the European engineer in a objectively weak position. The relevance of this problem has been felt for quite sometime, and motivated a series of efforts to overcome this situation and create a pan-European accreditation system, at least in engineering.

The recognition of this lack has been one, if not the main, motivation of the EUR-ACE project and its proposals, summarized in the following together with their historical background.

2. A LITTLE HISTORY: EWAEPs AND ESOEPE

The origins of the first structured activities around this aim (and at the same time contributing to "introduce a more uniform, transparent and flexible regime for the recognition of qualifications in the regulated professions") as far as engineering is concerned can be traced back to the three "European Workshops for Accreditation of Engineering Programmes" (EWAEPs), organized between 1998 and 2001 by Working Group 2 of the European Thematic Network H3E (Higher Engineering Education for Europe) with the basic purpose of bringing together higher engineering institutions providing engineering programmes and professional bodies active in Accreditation and Quality Assurance.

EWAEPs put in evidence the need to structure the efforts in the field: then, the "European Standing Observatory for the Engineering Profession and Education" (ESOEPE) was established in September 2000 by six bodies [Engineering Council UK, Commission des Titres d'Ingenieurs (FR), Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften und der Informatik ASII, (now ASIIN) (DE), Ordem dos Engenheiros (PT), Collegio (now "Conferenza") dei Presidi delle Facoltà di Ingegneria (IT), Thematic Network E4 "Enhancing European Engineering Education" (now TREE) (EU)] interested in accreditation of engineering educational programmes, and later enlarged by SEFI (Société Européenne pour la Formation des Ingénieurs), FEANI (Fédération Européenne d'Associations Nationales d'Ingénieurs) and other members.

According to the foundation agreement, the main purposes of ESOEPE were:

- facilitate the free exchange of information and provide an effective communication channel for those bodies and individuals throughout Europe concerned with educational and professional standards in Engineering. Such bodies may include government departments, non-government professional organisations, Universities and their

Associations, employers and their Associations;

- provide such information as already exists within each country on topics and issues connected with educational and professional engineering standards.

3. THE EUR-ACE PROJECT AND ITS FRAMEWORK STANDARDS

The EUR-ACE project for the Accreditation of Engineering Programmes (The EUR-ACE (Accreditation of European Engineering Programmes and Graduates) Project) was supported by the European Commission through the Socrates and Tempus programmes in the period Sept. 2004 – March 2006. Additional information is available on the EUR-ACE IMPLEMENTATION section of www.eanee.eu was prepared and proposed to the European Commission as a development of ESOEPE.

The project, concluded with a public meeting on 31 March 2006, proposed a decentralized European accreditation system of engineering education based on a set of common European Standards (EUR-ACE Framework Standards [3]) that were drafted, then widely discussed, tested in a number of countries, and finalized.

Indeed, a comparison of the EUR-ACE Standards and other recent Accreditation Standards throughout the world shows rather little difference in the contents: they are all outcome-based, and all lists of the programme outcomes are very similar to the EUR-ACE list:

- Knowledge and Understanding;
- Engineering Analysis;
- Engineering Design;
- Investigations;
- Engineering Practice;
- Transferable Skills.

The specific peculiarity of the EUR-ACE Framework Standards is the provision for accreditation at the "First Cycle" (FC) and "Second Cycle" (SC) level, consistent with the "Bologna process" approach. Thus, while other Standards specify only one set of outcomes to be met, for each outcome the EUR-ACE Standards differentiate between the requirements for FC and SC graduates.

For example as far as Engineering Analysis is concerned, graduates should be able to solve engineering problems consistent with their level of knowledge and understanding, and which may involve considerations from outside their field of specialisation. Analysis can include the identification of the problem, clarification of the specification, consideration of possible methods of solution, selection of the most appropriate method, and correct implementation. Graduates should be able to use a variety of methods, including mathematical analysis, computational modelling, or practical experiments, and should be able to recognise the importance of societal, health and safety, environmental and commercial constraints.

In particular First Cycle (FC) graduates should have: the ability to apply their knowledge and understanding to identify, formulate and solve engineering problems using established methods; the ability to apply their knowledge and understanding to analyse engineering products, processes

and methods and the ability to select and apply relevant analytic and modelling methods.

On the other hand Second Cycle (SC) graduates should have: the ability to solve problems that are unfamiliar, incompletely defined, and have competing specifications; the ability to formulate and solve problems in new and emerging areas of their specialisation; the ability to use their knowledge and understanding to conceptualise engineering models, systems and processes; the ability to apply innovative methods in problem solving. It is also to be noted that the EUR-ACE Standards, being outcome-based, allow also accreditation of “Integrated Programmes” (i.e. programmes leading directly to a SC degree) that still constitute a great part of Engineering Education in Europe.

4. “EUR-ACE”: A COMMON EUROPEAN QUALITY LABEL FOR ACCREDITED ENGINEERING PROGRAMMES

However, the most significant and novel contribution of the EUR-ACE proposals, essential for the correct application of the Framework Standards, is the operational system, in which “national” accreditations agencies will continue to award their accreditation certificates, to which a common European quality label (the EUR-ACE label) will be added.

To quote from the original documents: “EUR-ACE advocates a bottom-up approach which involves the active participation of present and future national accreditation agencies and which should embrace a multilateral mutual recognition agreement based on agreed Standards and procedures. No supra-national Accreditation Board should be formed: accreditation should always be awarded by a national (or regional) agency which may already be in existence or may be created in the future.”

In other words, a multi-lateral bottom-up agreement would add a common European label to the accreditation certificates of the National (or Regional) Agencies, either existing or to be created: this “decentralized” approach appears a novel approach in the world-wide panorama of systems for accreditation of engineering programmes.

In countries in which no national system for accreditation of engineering programmes is in place, the establishment of a new national (or regional) agency will be promoted: in the meantime the programme will be accredited and the EUR-ACE label will be awarded by an agency participating in the system.

In the rather novel way of international accreditation elaborated by the EUR-ACE project, the rich experiences accumulated in decades by national bodies like the French “Commission des Titres d’Ingénieur” and the British Chartered Engineering Institutes would not be wasted, but on the contrary exploited to create a consistent accreditation system of engineering education at the continental scale.

5. IMPLEMENTING EUR-ACE

To operate and develop the EUR-ACE system, ESOEPE has been transformed from an “observatory” into a formally established International no-profit Association (ENAE: European Network for Accreditation of Engineering Education), that was founded on 8th February 2006 and held its first assembly on 30th March 2006 (additional information

is available on www.enaee.eu).

ENAE has promoted several further European projects aimed at making the EUR-ACE proposals operational, awarding the first EUR-ACE labels and establishing ENAE as a permanent structure for support and supervision of the EUR-ACE system. In particular two projects will start the system, respectively in the European Union and in Russia:

“EUR-ACE IMPLEMENTATION” (Implementation of a European System for Accreditation of Engineering Education), a 20-partners project supported by the European Commission through the Socrates programme for the period September 2006 – July 2008. Additional information is available on the EUR-ACE IMPLEMENTATION section of www.enaee.eu)

- “PRO-EAST: Promotion and Implementation of EUR-ACE Standards”, a project within the Tempus–Takis programme.

Another Tempus project, namely “Lebanese Engineering Programs Accreditation Commission” (LEPAC), aims at applying the EUR-ACE Standards while establishing a structure for accreditation of engineering programmes in Lebanon.

More specifically the objectives of EUR-ACE IMPLEMENTATION have been formulated as follows:

- i. implement the proposals of EUR-ACE;
- ii. promote and supervise the award of the first EUR-ACE quality labels. The labels will be distinguished between “EUR-ACE Bachelor” (European Accredited Engineering Bachelor) and “EUR-ACE Master” (European Accredited Engineering Master), corresponding respectively to First-Cycle and Second-Cycle accredited degrees in Engineering;
- iii. facilitate the establishment of accreditation practices of engineering education in countries where at present no such system is operating;
- iv. set-up a viable and self-supporting system to carry on the practices in successive years.

The organization of the system and the award of the quality label will follow the indications of EUR-ACE Document A2 [4]; the award of the label will be subjected to the respect of the EUR-ACE Framework Standards, plus appropriate “Quality requirements” and a “Code of Good Practice” in line with the ENQA Standards, by the relevant Accrediting Body.

6. FIRST STEPS IN THE ESTABLISHMENT OF THE EUR-ACE SYSTEM

The preliminary work to start operating the system has begun. ENAE and the two projects have jointly nominated the “EUR-ACE Label Committee” including representatives of six accreditation agencies (EC^{UK}, Great Britain; EngineersIreland; OE, Portugal; RAEE, Russia; CTI, France; ASIIN, Germany.) that were already partners of the EUR-ACE project.

ENAE has recognized that these six agencies meet already the requirements of the “Framework Standards” and has consequently authorized them for two years to add the EUR-ACE label to their accreditation certificates: the six agencies will thus form the initial “core” of the EUR-ACE system in a significant sample of European countries, both

within and outside the European Union.

It is expected to grant the first EUR-ACE labels in the next few months.

In the meantime, the basis will also be set for appropriate procedures able to enlarge, in due time, the EUR-ACE system beyond the initial core of six agencies and countries. Three alternatives can be followed:

1. Include other Agencies in the system, as soon as they fulfil the Framework Standards and associated requirements: this can be soon the case of a couple of agencies that are already member of ENAEE (e.g. IDA, Denmark; MÜDEK, Turkey, ..).

2. In countries without any accreditation system, create a new Engineering Accreditation Agency. In the meantime, programmes may be accredited by an Agency already active in the system.

3. In countries with established “general” accreditation agencies, if they apply the EUR-ACE Standards when accrediting engineering programmes, they can be authorized to add the EUR-ACE label. Indeed the enlargement of the EUR-ACE system to general accreditation agencies is one of the main aims of the EUR-ACE IMPLEMENTATION project.

To allow realizations of these aims, three new documents For the current version of this document visit (the EUR-ACE IMPLEMENTATION section of www.eanee.eu) have been elaborated and approved:

- a) ENAEE Standards and Guidelines for Accreditation Agencies (SGA). These standards will be applied also to renew the authorization to the six “core” Agencies at the end of the two years.

- b) Application Form for Accreditation Agencies – Authorisation to award the EUR-ACE® Label.

- c) Procedures for Evaluating Applications from Agencies (an internal operative document).

The application of these documents with reference to alternative 3 above, will require particular care and perhaps some rewording. The whole EUR-ACE IMPLEMENTATION project and in particular its partner Nederlands-Vlaamse Accreditatieorganisatie (NVAO) is paying particular attention to this question.

Contacts are being maintained also with the European Consortium on Accreditation (ECA).

7. CONCLUSIONS

The EUR-ACE follow-up projects are finally setting the basis for establishing a European system for accreditation of engineering education. The “core” of the system is formed by six Agencies already operating in Great Britain, Ireland, Portugal, Germany, France and Russia. In the meantime, the spread of the system to other countries is also being pursued.

As a concluding remark it can be stated that the success of the EUR-ACE project, and the consequent launch of its system, has shown that there is not only a great interest towards accreditation procedures in the engineering field, but also a need for a pan-European accreditation scheme. The authors are confident that the project results will be implemented and a coordinated accreditation system will be established, soon covering most European countries.

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