ENAEE IEA

BEST PRACTICE IN ACCREDITATION OF ENGINEERING PROGRAMMES: AN EXEMPLAR

INTERNATIONAL ENGINEERING ALLIANCE
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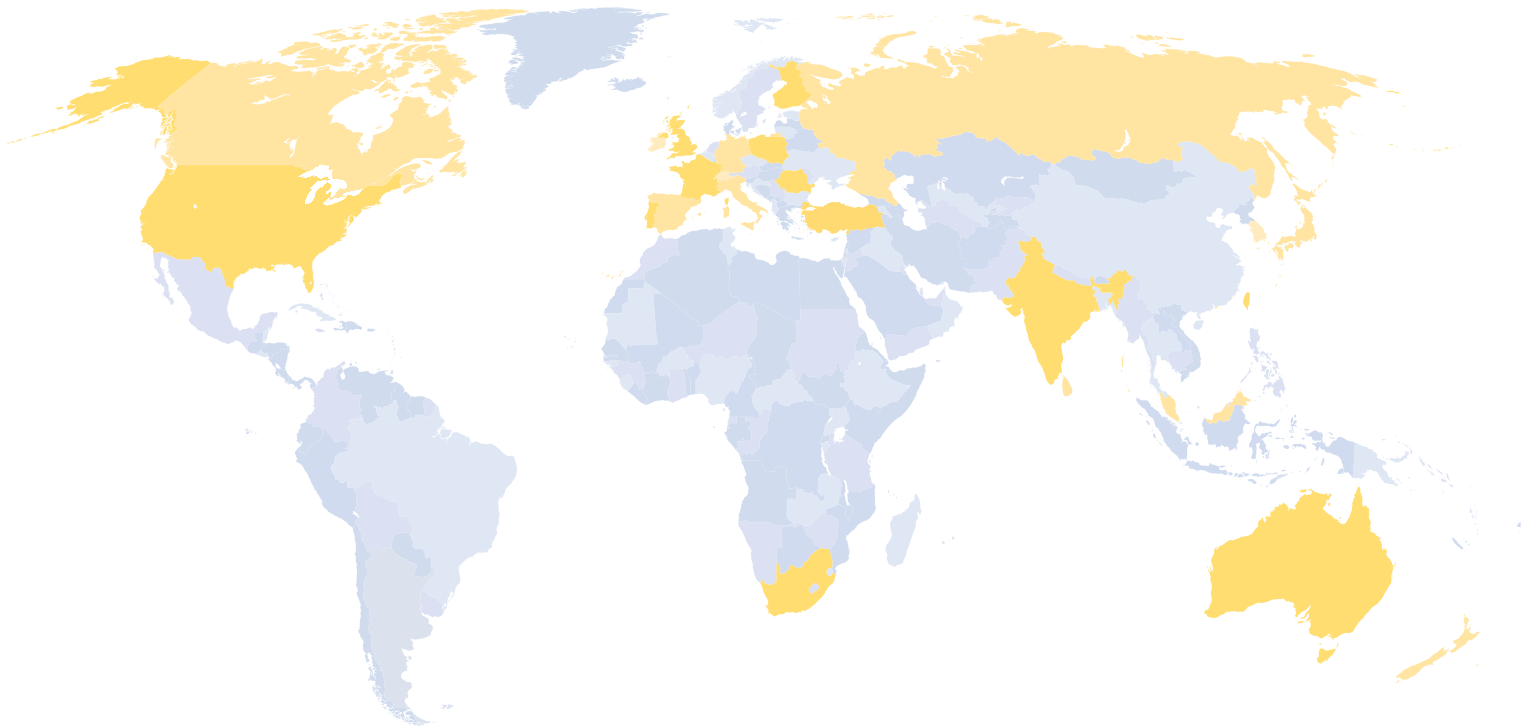ENGINEERING
ALLIANCE

EUROPEAN NETWORK FOR ENGINEERING
EDUCATION (ENAEE)

ENAEE

BEST PRACTICE IN ACCREDITATION OF ENGINEERING PROGRAMMES: AN EXEMPLAR

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1. BACKGROUND

This exemplar of best practice in accreditation of engineering programmes has been developed jointly by the European Network for Accreditation of Engineering Education (ENAEE) and the Washington, Sydney and Dublin Accords, the constituent educational agreements within the International Engineering Alliance (IEA).

ENAEE is a body whose members are committed to building confidence in systems of accreditation of engineering degree programmes within Europe and to promote the implementation of good accreditation practice for engineering education systems in Europe and worldwide. ENAEE operates the EUR-ACE® framework and accreditation system that provides a set of standards that identifies high quality engineering educational programmes in Europe and abroad (ENAEE 2015). ENAEE authorises accreditation agencies to award the EUR-ACE® label to accredited engineering degree programmes (ENAEE 2014). EUR-ACE® labels are awarded at the Bachelor Degree and Master Degree level, as defined in the Qualifications Framework of the Bologna Process[1]. The accreditation agencies authorized by ENAEE to award EUR-ACE® labels have signed the EUR-ACE® Accord, a mutual recognition agreement that commits the agencies to promoting the agreement in order to facilitate licencing for professional practice, academic mobility and transfer of students across jurisdictions. The EUR-ACE® Framework Standards and Guidelines (EAFSG) define the criteria for accreditation agencies to be authorized to award labels and standards for a programme to earn a label through accreditation.

The Washington, Sydney and Dublin Accords participants, termed signatories, are committed to benchmarking of engineering education standards for engineers, engineering technologists and engineering technicians respectively and to mutual recognition of the graduates of accredited educational programmes as providing the educational foundation for the following occupational roles:

- Washington Accord: engineering at the professional level;

- Sydney Accord: engineering technology practice within the engineering team;

- Dublin Accord: engineering technician practice within the engineering team;

The title of the award granted to accredited programmes is not specified in the Accords. The IEA Accords use two sets of reference points. First, the educational standard applied by each signatory agency is expected to be at least substantially equivalent to the Accord's Graduate Attribute exemplars (IEA 2013) for each Accord. Second, the agency is expected to operate an accreditation process characterized by quality indicators specified in the Accord Rules and Procedures[2] (IEA 2014), applicable under all Accords. Through the Accords, the IEA seeks to improve engineering education and competence globally (IEA 2014b).

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[1] Adopted by the Ministers of Education of the Bologna Process at their meeting in Bergen in May 2005;
[2] Section C.2.3.1-3: Criteria to be applied in admission of signatories; Section C.4.5: Indicators of satisfying the requirements laid out in C.2.3 for admission of Provisional Status bodies as Signatories.

ENAEE and the IEA Accords are committed to best practice in the accreditation of programmes and have given effect to this commitment by the joint development of this exemplar of Best Practice in Accreditation of Engineering Programmes

This exemplar captures a common understanding of best practice in engineering accreditation. It serves both ENAEE and IEA in their ongoing operations. It is also of interest to bodies forming new agencies or developing accreditation systems to the level required by either EUR-ACE® or the IEA Accords.

This exemplar of best practice contains elements that are both specific to accreditation of engineering programmes and are generally applicable in programme accreditation. This exemplar is not concerned with institutional review/audit for quality assurance. Best practice identified here is consistent with the applicable sections of the good practice guidelines published by INQAAHE (INQAAHE 2007) and the European Standards and Guidelines (ENQA 2009) as applicable to programme accreditation. Best practice in both the IEA Accord Rules and Procedures (IEA 2013) and the EUR-ACE® Framework Standards and Guidelines (ENAEE 2015) have been taken into account in compiling this exemplar.

This exemplar is organised as follows.
Section 2 refers to glossaries and gives additional definitions of key terms. **Section 3** presents background material on best practice in accreditation. **Section 4** presents best practice for the *constitution, scope and governance* of an accreditation agency. **Section 5** identifies the *criteria for accreditation* in a system operating according to best practice. **Section 6** enumerates elements of best practice in the *accreditation process* itself. **Section 7** identifies elements relating to the *agency's capacity* for current operation and long term sustainability of the accreditation agency and its process[3].

2. TERMINOLOGY

2.1 Critical definitions

In general, this exemplar follows the terminology defined in the IEA Graduate Attributes and Professional Competencies (IEA 2013), the Accord Rules and Procedures (IEA 2014) and the Joint ENAEE/IEA Glossary (IEA 2011) and the fuller IEA Glossary (IEA 2011). Terms of particular import in this best practice are as follows:

- **Accreditation** signifies both recognition given to a programme as meeting applicable criteria as a result of an evaluation process and the process itself.

- **Accredited** is used similarly to reflect the status of a programme evaluated as meeting relevant requirements.

- **Accreditation/accrediting agency** or simply **agency** used in this document means any authority, agency, association or institution performing the evaluation of programmes and granting recognition.

- **Accreditation board:** a board, council, committee or other body with authority to make accreditation decisions based on peer judgement.

- **Accreditation criteria** mean the full set of factors that are considered by an agency in evaluating the quality of a programme. Accreditation criteria include **standards**, that is,

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[3] A further section may be introduced in a future revision on accreditation of programmes offered transnationally. See also the IEA Accord Rules and Procedures Section C.8 Principles of good practice for accord signatories working internationally.

statements of assessable attributes to be displayed by graduates that indicate that the purpose of the programme has been achieved.

- **Accreditation process** embraces all phases: preparation for evaluation, the evaluation visit, reporting, decision making, publication of the decision and follow up, if required.

- **Engineering occupation [or role]** is used to signify recognised forms of engineering practice, for example professional or chartered or similarly titled engineers, engineering technologist or equivalently titled practitioners or engineering technicians.

- **Pathway:** A prescribed/defined arrangement of teaching, learning and assessment within a programme characterized by distinctive providers, sites or learning modes.

- **Programme:** A structured, integrated teaching and learning arrangement with a defined purpose, leading to the award of a qualification.

- The terms **programme outcomes** used in the EAFSG and **graduate attributes** used in the IEA context are taken to have the equivalent meaning with the following working definition:

  > **Programme outcomes/graduate attributes:** are assessable learning outcomes describing or exemplifying the knowledge, skills and attitudes[4] expected of a graduate from an accredited programme that provides the educational foundation for a particular purpose including practice in a particular engineering occupation.

- The terms **self-assessment report** used in the EUR-ACE® context and **self-study report** use in the IEA Accords have equivalent meaning, with the following working definition:

  > **Self-assessment report/Self-study report:** a quantitative and qualitative account prepared by an education provider in advance of the on-site evaluation of a programme addressing the extent to which the programme meets applicable accreditation standards, criteria and covering all methods of programme delivery and all possible pathways to award of the qualification.

2.2 Conventions for defining best practice

The following conventions are used in expressing elements of best practice:

- Elements of best practice are stated in the present tense, for example: **The evaluation process includes an on-site evaluation.**

- The words **should** and **may** are used to indicate where an element or aspect of best practice is considered advisable or permissible, for example: **The agency's geographic bounds may extend beyond its national boundary.**

- Illustrative material is prefaced by **for example** or equivalent constructs.

This exemplar does not cover methods or techniques for implementing best practice.

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[4] The form *knowledge, skill and attitudes* is used as a general definition of graduate competence; *understanding,* which is an Anderson-Krathwohl level of engagement with knowledge and *abilities* which duplicates elements already there are avoided. See also: A Rugarcia et al (2000) "…profiles [of engineers] may be conveniently sketched in terms of three components: (1) their *knowledge* – the facts they know and concepts they understand; (2) the *skills* they use in managing and applying their knowledge, … ; (3) the *attitudes* that dictate the goals toward which their skills and knowledge will be directed".

3. BEST PRACTICE: DEFINITION AND USAGE

A best practice[5] is a technique or methodology that, through experience and reflection, reliably leads to a desired result, superior to those achieved with other means. Acknowledged best practice therefore provides a benchmark for an accreditation system in evaluating programmes. A best practice can evolve to become better as improvements are discovered. Best practice does not therefore have an absolute unchanging definition. This document is therefore described as an exemplar of best current practice in the accreditation of engineering programmes.

This exemplar, consisting of the elements listed in sections 4, 5, 6 and 7, is intended for use in two principal ways. Bodies setting up as accreditation agencies, or operating or improving engineering education accreditation systems will be guided by these elements. Bodies facilitating recognition of accredited engineering programs, such as ENAEE and the IEA Accords, both develop and are guided by best practice in defining, operating and improving policy, processes and accreditation criteria. The exemplar does not impact directly on education providers but rather helps to shape the accreditation system that each provider experiences.

Best practice described in this exemplar assumes particular relationships between the programme providers and the accrediting agency. The provider designs and executes a programme to satisfy a stated purpose. Execution involves resourcing and conducting a teaching and learning process, including assessment of students. Programme design is informed by the standards and other accreditation criteria laid down by the accrediting agency. The agency is not involved in the design and delivery of the programme. Once a programme is in operation and producing graduates the accrediting agency evaluates the programme periodically against its standards using its defined processes.

The elements of best practice may be adapted into policies, processes and criteria by accreditation agencies and recognition bodies. The elements of best practice are those that have been found to ensure best functioning of accreditation systems.

The exemplar does not dictate policy to accreditation agencies as illustrated by the following examples.

- The IEA accords do not admit government controlled agencies as signatories. Non-governmental status is not an element of this best practice exemplar. Element 4.5 however requires that the agency enjoys independence, autonomy, responsibility and freedom from interference.
- Similarly element 4.7 requires the agency's geographic bounds of operation to be defined but does not prescribe particular bounds.
- While element 5.2 lists the components of accreditation criteria that have become accepted best practice, accreditation agencies have freedom to determine the detail and the format of their criteria. Groups of elements, for example 5.2.c, d and e may be packaged in a substantially equivalent form.

- A recognition body, in stating its criteria for recognising an agency's process would be guided by section 6. A recognition body's criteria for a best practice accreditation process may, as in the case of section 5, use a substantially equivalent formulation.

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[5] As distinct from *good practice*: that likely to deliver generally accepted, current, relevant, and practical results.

4. CONSTITUTION, SCOPE AND GOVERNANCE OF THE ACCREDITATION AGENCY

Best practice accreditation systems may be operated by a range of types of bodies. Key characteristics for the constitution, scope and governance of accrediting agencies that are consistent with attaining best practice are listed below.

4.1 The agency is legally incorporated in its jurisdiction or is a properly constituted board or committee of a legal entity and, in either case, has an appropriate ownership and governance structure.

4.2: The agency is recognised within its jurisdiction as the sole or leading authority for accrediting engineering programmes.

4.3: The agency operates consistently and transparently in a defined relationship with any national educational regulations, such as a qualifications framework, or quality assurance system.

4.4: The agency has a clear responsibility within its mission to accredit engineering education programmes whose primary purpose is to provide the educational base for independent practice in a defined engineering occupation.

4.5: The agency is independent and acts autonomously in respect of accreditation. It has full responsibility for its operations and accreditation decisions should be taken without third party influence.

4.6: The agency considers programmes for accreditation offered only by providers that have legal authority to operate and confer those degrees or other qualifications.

4.7: Geographic bounds of accreditation activity, if any, are defined, indicating any differences in standards, processes and levels of recognition of programmes if these are different in different territories.

4.8: The agency and the accreditation function has the support of and well established links with key stakeholders in the engineering academic and industry communities.

4.9: The agency makes accreditation decisions on a peer judgment basis.

4.10: The agency, staff and peer experts observe sound governance principles and act with professionalism.

4.11: Governance, evaluation and accreditation decisions should be made with balanced inputs from engineering peers from industry and education backgrounds drawn mainly from the jurisdiction where the engineering programmes operate.

4.12: Providers of education programmes, while key stakeholders in the accreditation agency, do not have a controlling power over standards, policies and accreditation decisions of the accreditation agency

4.13: Functions and powers are clearly allocated to its boards, committees or other structures responsible for overall governance, determining standards, accreditation criteria and policy, evaluation of programmes and accreditation decision making.

4.14: An agency may delegate functions relating to the accreditation of programmes to appointed agents. The agency retains responsibility for the quality of the accreditation process and standards applied and their consistency. The delegated agents are subject to this exemplar of best practice.

4.15: If the agency has mentoring procedures to help applicants for accreditation, these activities are clearly separated from the accreditation activities.

5. CRITERIA FOR ACCREDITATION

The agency has publicly available criteria for the evaluation and accreditation of programmes. Best practice relating to accreditation criteria includes:

5.1: The agency develops and reviews standards, criteria and policies by a process with engineering peer input and public comment, including that from relevant engineering stakeholders.

5.2: Criteria to be satisfied by programmes to be accredited include the following:

   a. The purpose of the programme includes providing the engineering educational base for a stated occupation.

   b. The agency's standards defining the outcomes to be demonstrated by graduates:
   - **I.** are consistent with the purpose of the programme; and
   - **II.** are consistent with an internationally benchmarked standard, for example the applicable IEA Graduate Attributes exemplar or the EUR-ACE® programme outcomes.

   c. Student entry requirements are defined by the programme provider consistent with the demands of the curriculum, the preparedness of students at intake and expected progression.

   d. The provider's programme design is coherent and consistent with the purpose of the programme, including requirement 5.2.a, the stated entry requirements and the programme outcomes to be met.

   e. Student progression requirements are consistent with the entry level, curriculum and programme outcomes to be achieved.

   f. Assessment of students is an appropriate combination of formative and summative assessment consistent with the planned student progression and target outcomes.

   g. A process exists to ensure that the assessment of individual students is of the required standard and is consistent, objective and fair.

   h. The teaching and learning environment is appropriate to the programme objectives, programme structure, preparedness of the students at intake, and the stated outcomes, for example, as evidenced by: a progressive learning experience, development of independent learning, effective programme co-ordination, and monitoring student progress.

     i. A suitable and adequately resourced environment to deliver the programme exists including:

        I. Adequate leadership for the program;

        II. Practitioners teaching in the programme have an appropriate combination of academic and professional qualifications and experience;

        III. Adequate physical and financial resources to support the programme; and

        IV. Adequate planning and execution capability.

     j. Ongoing reviews and continuous improvement of the programme and its delivery are undertaken by the provider with input from students, employers, graduates and other stakeholders.

5.3: The accreditation criteria are defined in a way that gives the programme provider freedom to design and execute programmes to meet an outcomes-oriented graduate attributes standard.

5.4: The accreditation process requires the programme provider to account for the resulting quality of the curriculum and its execution, for attainment of the programmes outcomes/graduate attributes expected from the students and for continuous improvement of the programme.

6. THE ACCREDITATION PROCESS:
THE *METHODS AND MEANS* OF DELIVERY

The process of accreditation of programmes, including preparation, evaluation, reporting and decision making, and follow up conforms to generally accepted principles including:

6.1: Evaluation of programmes and accreditation decision making are based on appropriate, consistent and fair procedures.

6.2: If the accreditation process is performed jointly with another evaluation or quality assurance process, there are clear distinctions between the two sets of criteria and decision making.

6.3: Programme evaluators, members of accreditation decision making bodies and administrators operate at all times in accordance with high standards of professionalism, ethics, impartiality and objectivity.

6.4: The agency's accreditation process is documented, is self-consistent and supports the evaluation of the programme against the fundamental criteria for accreditation.

6.5: The accreditation system should afford full information to all stakeholders (see 6.7 below) while striking an appropriate balance of transparency and confidentiality in the accreditation process for individual programmes (see 6.6 below).

6.6: Within the accreditation process of a programme:

     a. The accreditation agency, its evaluators, observers, decision makers and staff

observe confidentiality regarding information obtained in the course of the actual accreditation process; and

b. At the same time, the evaluators are open with the provider; in particular, potential adverse findings are raised with the provider and an opportunity given to provide additional information.

6.7: Outside of the evaluation of an individual programme, the accreditation system is completely transparent as evidenced by:

a. Official, written policies, standards, criteria and procedures are available to the providers and to the public; and

b. Those involved in the accreditation process have access to knowledge and competence in matters related to engineering accreditation, engineering education, the student experience and engineering practice.

6.8: The agency has a policy on observers, including confidentiality requirements, restriction of influence on the process and participation protocols.

6.9: A process for appealing adverse accreditation decisions is available involving only persons with no prior involvement in the decision being appealed and no conflict of interest.

6.10: A clear conflict of interest policy exists for all involved in the accreditation process including visiting teams, accreditation decision-makers and policy-makers.

6.11: Practices exist to ensure that there is no conflict of interest at any stages of the accreditation process, including selection of programme evaluators and during accreditation decision making.

6.12: Individual accreditation decisions are made for each programme identified in the provider's rules and on the degree certificate and academic transcript.

6.13 When appropriate, the evaluation process may consider groups of related programmes together.

6.14: In cases where the programme is offered via multiple pathways, the pathway followed by a student is disclosed on the qualification certificate or academic transcript.

6.15: Evaluations of programmes are conducted by peer evaluators, with disciplinary knowledge of the programme(s) being evaluated and a balance between engineering practitioners and academics.

6.16: Where the practice is to have a student member(s) of the visiting team, the following apply:

a. The student or students contribute to evaluation of programmes in areas where they are competent, including :

I. Meeting with a cross-section of students in the programmes being assessed and student leadership;

II. Participating in the evaluation of student services, assessment, teaching and learning facilities, library support, safety as instructed and practiced and the student body's understanding of the programme educational objectives.

       III. Participating in the evaluation of the learning conditions as perceived by the students: scheduling, pedagogical methods, workload, etc.

    b. To be eligible for inclusion in an evaluation team a student:

       I. Is registered in an undergraduate or masters engineering programme

       II. Has demonstrated leadership among students;

       III. Does not have a disciplinary decision on record; and

       IV. Has attended training as required by the accreditation agency.

6.17: The evaluation process includes a visit to the programme provider's premises.

6.18: The accreditation process includes periodic re-evaluation to maintain accreditation status and a follow-up process when the recommendations and decisions so dictate.

6.19: The accreditation process requires:

    a. Pre-visit completion of a self-study/self-assessment report by the provider of the programme seeking accreditation using a structure and format specified by the agency to assemble information that demonstrates how the programme meets the accreditation criteria; the onus for such demonstration falls on the programme provider.

    b. A curriculum description is part of the self-study report and gives comprehensive information on all the modules in the programme.

    c. Documentation to be provided to evaluators in time for adequate preparation for the visit.

    d. Clearly specified evidence that must be available on-site during the visit.

6.20: The visit schedule gives the evaluators time and opportunity to:

    a. Gather, check and evaluate all required information including evaluation of evidence of student attainment of the graduate attributes/programme outcomes;

    b. Interview the main stakeholders of the programme (management, teachers, students, staff, alumni, employers);

    c. Examine and evaluate the available facilities (including computers, laboratories, etc.); and

    d. Conduct private discussion, reflection and refinement of their evaluation as the visit proceeds.

6.21: Accreditation decision making:

    a. Is criterion-based evaluation, within framework of exercising peer-judgement;

    b. Makes a judgement of the sustainability of the programme;

    c. Has a clearly defined set of allowed accreditation processes and decisions, including proceeding to regular evaluations at predetermined intervals and

interim evaluations under defined conditions;

d. Has a rational approach to dealing with non-compliant programmes that encourages and verifies improvement of quality;

e. Is receptive to innovation in engineering technologies and teaching methods and does not inhibit the introduction of new subjects and ways of teaching; and

f. Has a method of dealing with new and extensively revised programmes involving material change during the period in which the programme is accredited and with programmes being terminated.

6.22: The agency follows defined reporting protocols. In particular:

a. Visit reports provide sufficient detail for its Accreditation Board (or equivalent) to make informed decisions whether or not to accredit particular programmes, or to impose conditions.

b. Reports use standardised ways of recording recommendations and decisions. Defined keywords such as defect, weakness, concern, comply, commend are used.

c. While evaluation templates or questionnaires may be used, the team's findings are clearly recorded and recommendations and decisions based on evidence and accreditation criteria are developed in report form.

d. The agency provides a written report to the institution that clearly distinguishes between actions required for the provider to reach or maintain accreditation and actions recommended for academic programme improvement.

6.23: The process provides for right of reply on factual matters by relevant official of the provider, for example dean or head of programme, before the accreditation recommendation or decision is made.

6.24: The agency publishes or makes available to the public a list or searchable database of accredited programmes that clearly identifies each programme for which an accreditation decision has been made and the period of validity of the accreditation. The agency's policy may require publication of the rationale for their decisions or other information, subject to any limitations arising from confidentiality and other relevant considerations.

6.25: In actual operation of the accreditation system, evaluators, decision makers and staff ensure that:

a. Accreditation visits are conducted in accordance with its own published accreditation policies and procedures;

b. They apply standards and criteria in a consistent and fair manner from institution to institution, programme to programme and year to year;

c. The accreditation system and the way that it is operated are robust; unusual circumstances are handled in a sensitive way and difficult decisions are made in a way likely to be beneficial to the engineering community in the longer term; and

d. Substantial changes to the accreditation system's standards, criteria, policies or procedures are managed in a way realistic to all stakeholders.

7. THE AGENCY'S *CAPACITY TO CONDUCT ACCREDITATION* ACTIVITIES

Accreditation of engineering programmes requires resources to initially implement and to sustain an accreditation system. Delivery of education programmes must be sustained over a long period while the cyclical accreditation process must also be sustained indefinitely. Both the providers and the agency require continual improvement. Best practice therefore requires that the agency has the **capacity to initially develop (if applicable), operate and further develop accreditation activities** on an ongoing basis. Essential components of this capacity are:

7.1: The agency has sufficient and sustainable funding prospects to support an effective and sustainable accreditation system.

7.2: The agency has sufficient, appropriately skilled staff to manage and operate the accrediting process effectively.

7.3: Adequate numbers of qualified engineering peers with both academic and industry backgrounds are available for appointment to the accreditation board and its substructures, if present.

7.4: A corps of experienced evaluators is available in all the disciplines in which programmes are put forward for accreditation and to be team chairs and visit chairs.

7.6: An effective process is applied for the recruitment, selection, training and appraisal of programme evaluators. Appropriate eligibility criteria are applied in the selection of evaluators.

7.7: An effective training process for evaluators is in place and is supported by written training materials.

7.8: The accreditation agency benchmarks its criteria and processes and conducts periodic self-review to improve its standards, criteria, policies and procedures. Methods may include the use of international evaluators and observation of other agency's processes.

7.9: The agency's procedures ensure that its standards and methods of working are reviewed at regular intervals, are subject to external scrutiny and are updated as required.

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