ACCREDITATION: GLOBAL (BEST) PRACTICES

14:00hrs to 15:30hrs on 19th March 2016, WOSA 2016.

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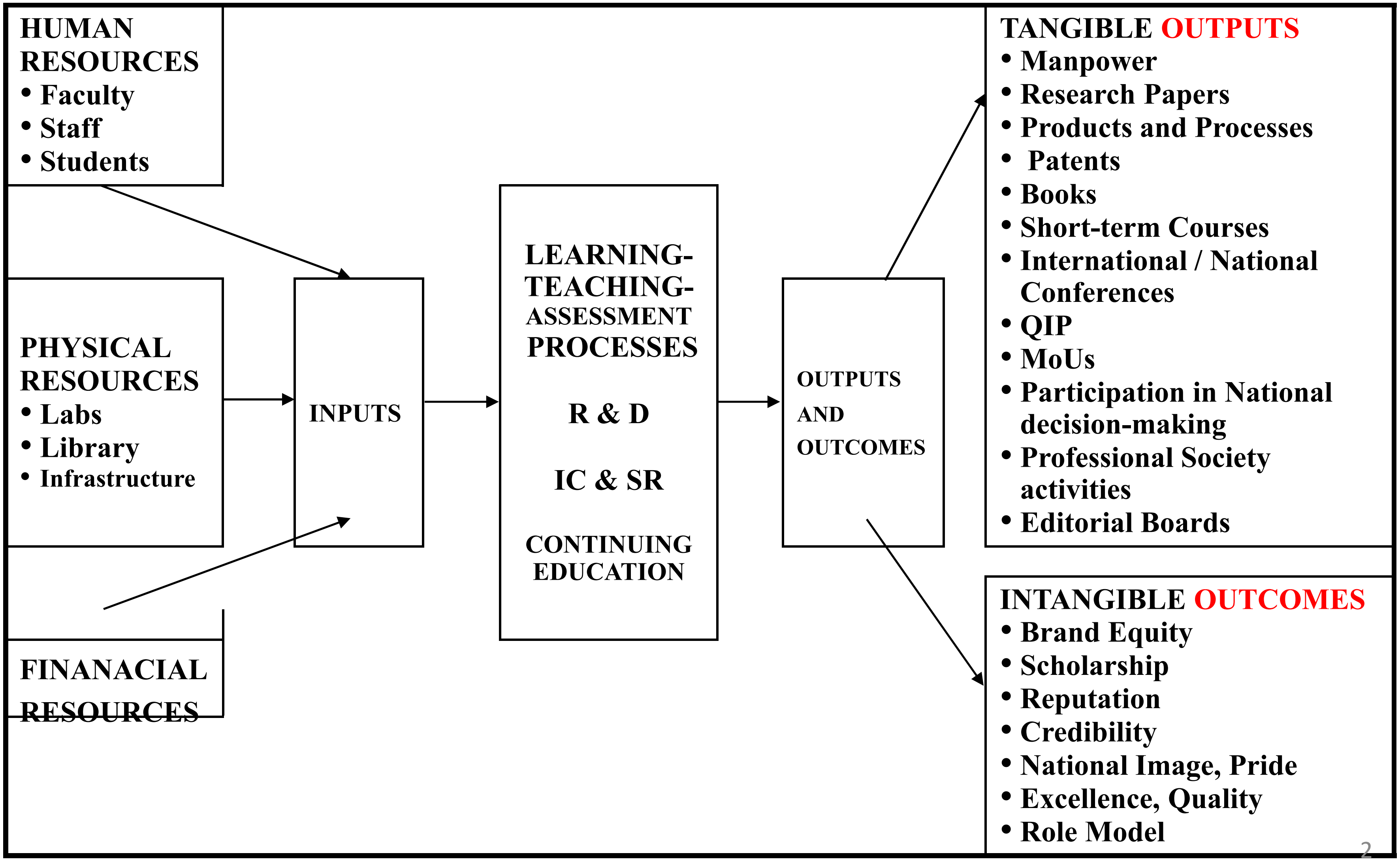
THE ANATOMY OF A RESEARCH UNIVERSITY



USA-ABET

CRITERION 3 ABET 2000 a-k competencies

a. ability to **apply knowledge of math, science & engineering**
b. ability to **design & conduct experiments, analyze data**
c. ability to **design a system component or process**
d. ability to function on **multi-disciplinary teams**
e. ability to **identify, solve & formulate engineering problems**
f. understanding of **professional & ethical responsibilities**
g. ability **to communicate** effectively
h. understand the **impact of engineering solutions in a global & societal context**
i. **life-long learning**
j. knowledge of **contemporary issues**
k. ability to use techniques, skills & engineering tools necessary for **engineering practice**

Key Words : Competencies, Abilities

Source: www.abet.org

- **Outcome assessment is a method for determining**
  - **whether students have learned,**
  - **have retained, and**
  - **can apply what they have been taught.**

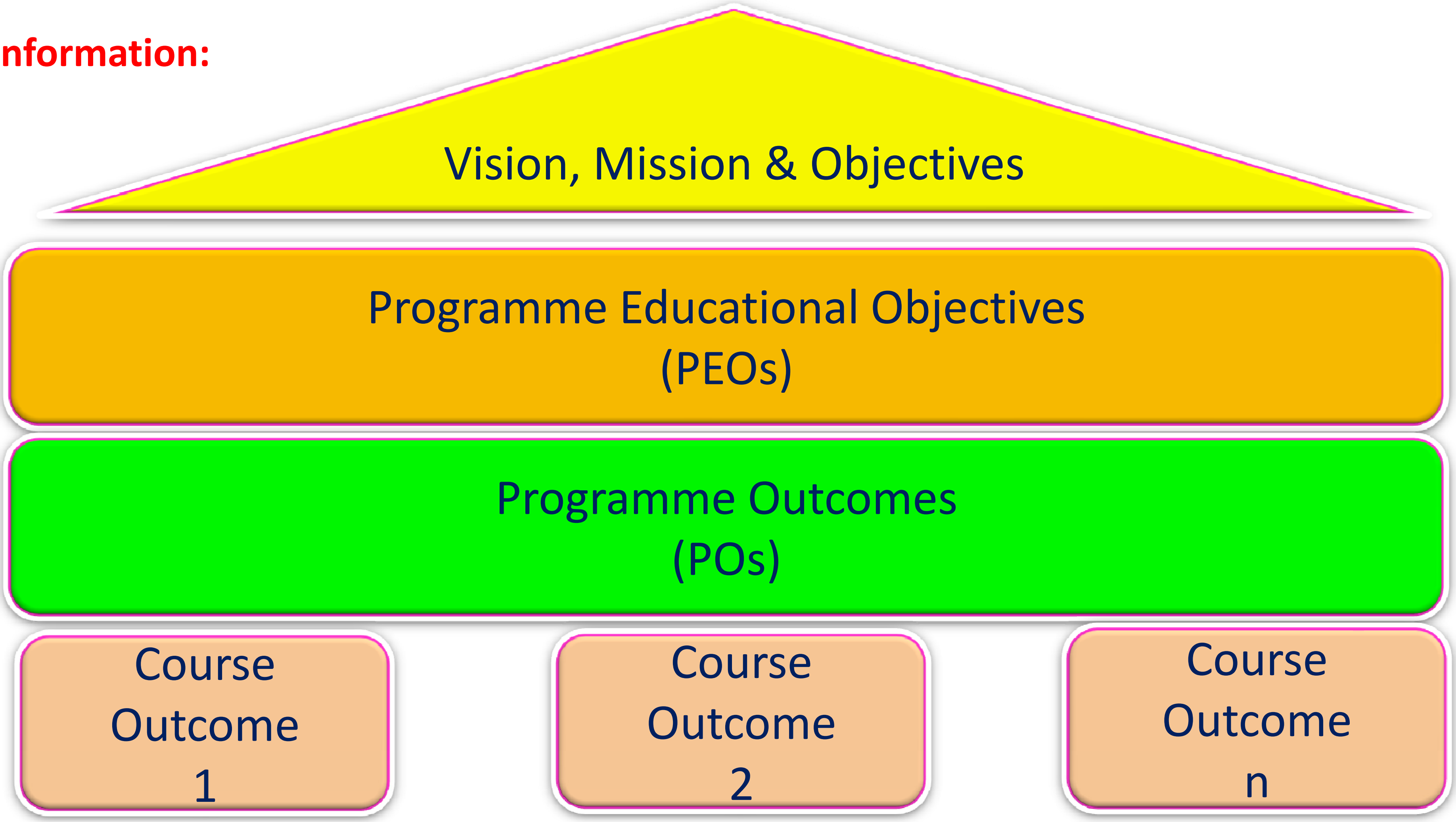
- **Assessment plans have three components:**
  - **a statement of educational goals,**
  - **multiple measures of achievement of the goals,**
  - **and use of the resulting information to improve the educational process.**

- **The results of outcomes assessment are part of a feedback loop in which faculty members are provided information that they can use to improve their teaching and student learning**

Part - B - I. Vision, Mission and Programme Educational Objectives

1.2.4. State the process for establishing the PEOs:

Information:



ABET -- REVISIONS IN PROGRESS

REVISIONS OF ABET CRITERIA 3 AND 5 - PROPOSAL

In an effort to keep the criteria relevant, fresh and compelling.

Criterion 3 Student Outcomes

Criterion 5 Curriculum

Criterion 3 : to ensure that the outcomes are richer and measurable, but above all realistic.

The EAC was receiving requests from constituent groups for additional outcomes to be included in Criterion 3

Criterion 3 Task Force: Members of the task force represented domestic undergraduate and graduate engineering programs, industry, and professional societies.

SHORTCOMINGS REVEALED BY REVIEWS AND FEEDBACK

Shortcomings were reported in all 11 of the (a)-(k) components of Criterion 3, mostly at the weakness or concern level. The data collected revealed that programs had the most difficulty in determining the extent of outcome attainment with components :

3(d) (ability to function on multidisciplinary teams),

3(f) (understanding of professional and ethical responsibility),

3(h) (a broad education to understand engineering solutions in global, economic, environmental, and societal context),

3(i) (recognition of the need for and ability to engage in life-long learning), and

3(j) (knowledge of contemporary issues).

The Criterion 3 task force concluded that some of the (a)-(k) components were interdependent, broad and vague in scope, or impossible to measure.

As a consequence, program evaluators were inconsistent in their interpretation of how well programs were complying with Criterion 3.

Some constituent groups independently informed the EAC that important outcomes were missing from the (a)-(k) list and they proposed additional outcomes. Communications with constituent groups took the form of email, letters, presentations, and position papers.

Suggested additions to the list of outcomes brought the total to 75.

The Task Force grouped the suggestions into six topic areas that would drive a possible major change to Criterion 3.

This possible change would also serve to align ABET criteria more closely with Washington Accord graduate attributes including project management and finance.

The Criteria Committee examined and catalogued all inputs received. Further discussions in 2014-15 resulted in addition of a seventh topic area, so that the following topic areas would be addressed:

THE SEVEN TOPIC AREAS

1. Engineering problem solving,
2. Engineering design,
3. Measurement, testing, and quality assurance,
4. Communication skills,
5. Professional responsibility,
6. Professional growth, and
7. Teamwork and project management

Specific and clearly defined outcomes must be described to the students so that the students will be able to set their own expectations and means to achieve the desired outcomes.

As such, the role of the lecturers is to guide and provide directions for the students to navigate their own learning.

The defined outcomes must be specific, measureable, achievable, realistic and time-based. (SMART)

CRITERION 5. CURRICULUM

The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The curriculum must support attainment of the student outcomes and must include:

(a) one academic year of a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the program.

(b) one and one-half academic years of engineering topics, consisting of engineering sciences and engineering design appropriate to the program and utilizing modern engineering tools.

(c) a broad education component that includes humanities and social sciences, complements the technical content of the curriculum, and is consistent with the program educational objectives.

Students must be prepared to enter the professional practice of engineering through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple constraints.

The Criteria Committee will be collecting and analyzing all input received before June 15, 2016.

Based on feedback received and realizing the importance to engage as many perspectives as possible, the EAC has agreed to extend the deadline to June 30, 2016 for public comment.

EUROPE

EUR-ACE (EURopean ACredited Engineer) project (2004/06) - Giuliano Augusti

Within Continental Europe, formal accreditation (habilitation) started in France. At present, some 700 engineering programs are accredited in French schools.

In the UK a similar role has been played since the 19th century by the Professional Institutions of the different engineering disciplines . In 1981 the Engineering Council UK (EC-UK) was established to coordinate and maintain the standards of the accreditation process.

In Germany, up to a few years ago all higher education programs had to conform to strict (state or Federal) rules, which made accreditation superfluous.

Bachelors and Masters programs were introduced in the late 1990s and are gradually replacing the old programs.

Formal accreditation has been prescribed from the beginning for the Bachelors and Masters programs, and was later extended to all programs.

The European Network for Accreditation of Engineering Education (ENAEE) has been established to run the system and six Agencies have been accredited and have started awarding the EUR-ACE label in six countries:

France,

Germany,

Ireland,

Portugal,

Russia,

UK.

Contacts are also in progress with accrediting Agencies outside the European Higher Education Area (EHEA).

MOTIVATION FOR A SYSTEM OF EUROPEAN ACCREDITATION OF ENGINEERING EDUCATION

The variety of educational situations and of degrees awarded in Europe makes trans-national recognition of academic and professional qualifications rather difficult.

The Bologna process is working towards the creation of a transparent system of easily readable and comparable degrees in the European Higher Education Area (EHEA), but as far as professional accreditation and recognition are concerned, no generally accepted system or agreement exists on a continental scale.

However, in engineering several international agreements for mutual recognition of degrees and/or qualifications are active, for example, the Washington Accord.

In accordance with the approach of the Bologna process, the EUR-ACE Standards distinguish between First and Second Cycle degrees, and identify 21 outputs for accredited First Cycle degrees and 23 for Second Cycle Degrees, grouped under six headings:

1. Knowledge and understanding
2. Engineering analysis
3. Engineering design
4. Investigations
5. Engineering practice
6. Transferable skills

ENAEE determined that six Accreditation Agencies in six different countries ,namely,

Engineering Council-UK,

Engineers Ireland;

Order of Engineers, Portugal;

RAEE, Russia;

CTI, France;

ASIIN, Germany

already fulfilled the requirements set by the Framework Standards and, in November 2006, accredited them to award the EUR-ACE label.

Although the six countries constituting the initial core of the EUR-ACE system are a significant sample of the European Higher Education Area (EHEA), their number is only about one-seventh (1/7) of the total 46 EHEA countries.

Therefore, ENAEE is now committed not only to strengthen the EUR-ACE system in these six countries, but also to spread it into other EHEA countries

THE GLOBAL CONTEXT OF EUR-ACE

Apart from the European context, EUR-ACE must confront the global scene, primarily in relation to the Washington Accord.

The EUR-ACE system mutual recognition stems from a common quality label awarded by the participating agencies on the basis of shared standards and procedures (the EUR-ACE Framework Standards) while the Washington Accord relies on comparable accreditation procedures, independently applied by the participating agencies

In most Washington Accord countries one degree is the academic basis for entry into the engineering profession, therefore, the Accord recognizes only the bachelor’s degree.

However, this scheme is at present being questioned and there are pressures for the Washington Accord to move toward a two-tier system analogous to the Bologna/EUR-ACE scheme.

A comparison between the EUR-ACE and the Washington Accord requirements will be a crucial element in making the EUR-ACE label fully recognized globally, if for no other reason than that two members of the EUR-ACE core are also signatories of the Washington Accord.

AUSTRALIA

AUSTRALIAN ENGINEERING ACCREDITATION PRACTICES

In Australia, professional accreditation of entry to practice engineering programs is the responsibility of Engineers Australia, and is normally carried out on a five-yearly cycle.

The accreditation process does not prescribe detailed program objectives or content, but requires engineering education providers to have in place their own mechanisms for validating outcomes and continually improving quality.

NBA – TIER I AND TIER II INSTITUTIONS

TIER I AND TIER II INSTITUTIONS

- Applies only in the context of NBA membership in Washington Accord

- Tier I institutions are Universities (of all types) and Autonomous Colleges; Tier II institutions are the Affiliated Colleges.

- Rationale: Tier I institutions have the freedom to make and sustain changes in their Academic systems and processes.

WASHINGTON ACCORD

THE WASHINGTON ACCORD

***Goal*: Working Together to Advance Benchmarking and Mobility in the Engineering Profession**

BRIEF BACKGROUND ON THE WASHINGTON ACCORD

- **Originally signed in 1989 by 6 engineering education accrediting bodies from:**
  - **Australia, Canada, Ireland, New Zealand, United Kingdom & United States – All English-speaking Countries.**
- **Non-governmental agreement**
- **Emphasizes peer-review**

WASHINGTON ACCORD

… recognizes the "substantial equivalency" of accreditation systems to assess that the ***graduates of accredited programs are prepared to practice engineering at the entry level to the profession****.*

- **Therefore, the focus is on 4-year (minimum) Undergraduate programs in engineering.**

WASHINGTON ACCORD
LATEST POSITION – POST JUNE 13 2014

New Permanent Signatories:

1. The Institution of Engineers Sri Lanka
2. National Board of Accreditation, India

In the case of the National Board of Accreditation (NBA), recognition of programmes by other signatories applies only to programmes accredited by NBA that are offered by education providers accepted by NBA as Tier 1 institutions

WASHINGTON ACCORD
CURRENT SIGNATORIES

1. Australia - Represented by Engineers Australia (*1989*)
2. Canada - Represented by Engineers Canada (*1989*)
3. Chinese Taipei - Represented by Institute of Engineering Education Taiwan (*2007*)
4. Hong Kong China - Represented by The Hong Kong Institution of Engineers (*1995*)
5. India - Represented by National Board of Accreditation (*2014*)
   (Applies only to programmes accredited by NBA offered by education providers accepted by NBA as Tier 1 institutions.)
6. Ireland - Represented by Engineers Ireland (*1989*)
7. Japan - Represented by Japan Accreditation Board for Engineering Education (*2005*)
8. Korea - Represented by Accreditation Board for Engineering Education of Korea (*2007*)

9. **Malaysia** - Represented by Board of Engineers Malaysia (*2009*)
10. **New Zealand** - Represented by Institution of Professional Engineers NZ (*1989*)
11. **Russia** - Represented by Association for Engineering Education of Russia (*2012*)
12. **Singapore** - Represented by Institution of Engineers Singapore (*2006*)
13. **South Africa** - Represented by Engineering Council of South Africa (*1999*)
14. **Sri Lanka** - Represented by Institution of Engineers Sri Lanka (*2014*)
15. **Turkey** - Represented by MUDEK (*2011*)
16. **United Kingdom** - Represented by Engineering Council UK (*1989*)
17. **United States** - Represented by Accreditation Board for Engineering and Technology (*1989*)

ORGANIZATIONS HOLDING PROVISIONAL STATUS

1. **Bangladesh** - Represented by Board of Accreditation for Engineering and Technical Education
2. **China** - Represented by China Association for Science and Technology
3. **Pakistan** - Represented by Pakistan Engineering Council
4. **Peru** - Represented by ICACIT
5. **Philippines** - Represented by Philippine Technological Council

- The WA standard is part of the IEA Graduate Attributes and Professional Competencies, a co-ordinated set of exemplar standards for engineering education and entry to independent professional practice for professional engineers and similarly titled or equivalent practitioners.

- Other IEA agreements provide for engineering technologists and engineering technicians.

The Relationships between :

International Engineering Alliance

Washington Accord

ABET

NBA

International Engineering Alliance

- Washington Accord*
  - Engineering
- Sydney Accord*
  - Engineering Technology
- Dublin Accord**
  - Engineering Technician
- APEC Engineer Agreement
  - Asia Pacific Economic Cooperation
- Engineers Mobility Forum
  - Professional Engineers Register
- Engineering Technologist Forum

*** ABET membership; ** provisional membership**

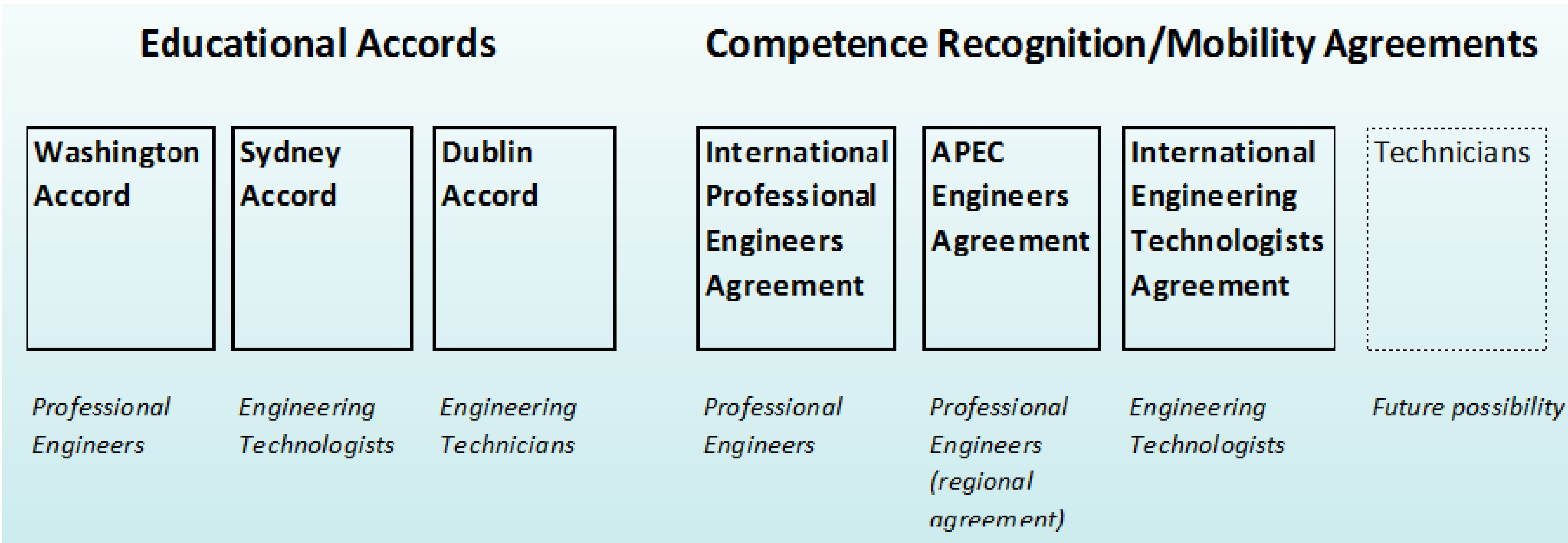


Figure 1. Structure of educational accords and professional competence agreements in the International Engineering Alliance. The three Accords and three Agreements form the core of all IEA activities.

WASHINGTON ACCORD GRADUATE ATTRIBUTES

1. Use of engineering and underpinning knowledge
2. Problem identification, formulation and analysis
3. Problem solution synthesis and design
4. Investigation and research methods
5. Use of engineering methods, tools and techniques
6. Ability to communicate effectively

7. **Assessing societal, health, safety, legal and cultural issues and engineering responsibilities**
8. **Evaluating the sustainability and impact of professional engineering work**
9. **Applying ethical principles and committing to professional ethics**
10. **Function effectively as an individual, in a team and in multi-disciplinary settings**
11. **Understanding principles of engineering management and economic decision-making**
12. **Ability to engage in independent and life-long learning**

CAREER OPTIONS AFTER UNDERGRADUATE DEGREE

Higher Education:

Engineering

Management /Other : *Internal Brain Drain*

In India

Abroad : *External Brain Drain*

Employment:

Industry

Teaching

Govt. / Public Sector

Consultancy

Entrepreneur

RELEVANCE OF OBE TO WASHINGTON ACCORD

In engineering education, the outcome based approach has been mandated as compulsory for accreditation of an engineering program for signatories of the Washington Accord.

The main problem with implementation of outcome based education is the broad definition of outcome based education itself. While it emphasizes the achievement of outcomes, this also refers to the achievement of learning outcomes (LO) for a particular course

OUTCOMES-BASED TEACHING & LEARNING (OBTL)

According to *Prof. Tony T.N. Hung* of HKBU, the 'Essence' of OBTL is captured by three statements:

1. **"In education, what matters ultimately is not what is *taught,* but what is *learned*;**
2. **Therefore, teachers would do well to set their course/program objectives (as far as possible) in terms of *learning outcomes*.**
3. ***What* we teach and *how* we teach, and how we *assess* our students, ought to be properly *aligned* with our *intended learning outcomes*".**

SOME (PROVOCATIVE) QUESTIONS

- **Is it necessary to seek WA membership? What are the benefits? Are we enjoying these benefits without WA membership – overseas employment and higher education opportunities (through GRE, GMAT..) ?**

- **Same questions for ABET?**

- **Since ABET is one of the signatories of WA , if India gets WA membership, is ABET still relevant for us?**

- **What is the relevance of NAAC accreditation for engineering institutions? cf NBA accreditation has recently been made mandatory for receiving grants.**

RATIONALE

- **International Collaborations – Due Diligence:**
  - **National Accreditation**
  - **International Accreditation**
  - **Rankings**
  - **Reputation**

GEDC , CHICAGO , OCT 2013
SUGGESTED TOPICS FOR
THE ACCREDITATION SESSION

- **Accreditation as a Driving Force for Reforms / Changes in Engineering Education Systems**

- **Roles of Deans, Department Chairs and Faculty Members**

- **Contemporary and Futuristic Initiatives of ABET and EUR-ACE**

- **Accreditation of Online / Digital Engineering Programs or Accreditation in a Global Technology-Driven Environment**

- **Accreditation in Emerging Economies with Very Large Engineering Education Systems (as in China and India)**

- **Impact of Washington Accord on Mobility of Engineering Manpower**

- **Hu Hanrahan : WA looks for *substantial equivalence* of national Accreditation Systems and Processes . Within this broad framework, what are the major differences in the National Accreditation systems of the different Signatories?**

- **And what are the Best Practices which can be transferred among the signatories?**

ACCREDITATION SESSION SUMMARY:

Theme:

Promoting Global Mobility of Engineering Graduates, by imparting Graduate Attributes prescribed by Washington Accord, requiring substantial equivalence of National Accreditation Systems

Michael Milligan: Current And Future Challenges: Accreditation Of Engineering Education

- **Some notable challenges facing accreditation of engineering education programs include:**
  - **changing profiles and diversity of students and their expectations,**
  - **globalization of workforce,**
  - **emergence of online education and the internet as tools for learning, and**
  - **density of academic programs.**

- **Michael Milligan will discuss the ABET responses to these changes and challenges.**

Hu Hanrahan : Impact of Washington Accord on Mobility of Engineers through Standards

- **The collective objective of The International Engineering Alliance (IEA) is:**

Working together to advance benchmarking and mobility in the engineering profession.

- **The implication of this objective is to promote mobility of engineers through achievement of substantially equivalent standards by the signatories, as verified by an accreditation and review process**

Maria Mercedes Larrondo Petrie
LACCEI

Maria Petrie will discuss the approaches being pursued by the Latin American and Caribbean Consortium of Engineering Institutions (LACCEI) to assist the existing accrediting bodies to align their accreditation process with those of a signatory of the Washington Accord.

A MEANS OF MANAGING ENGINEERING OUTCOMES, SHARING GOOD PRACTICE AND FACILITATING MOBILITY

GEDC 2013

Barry Clarke

Professor of Civil Engineering, University of Leeds, UK
President of the Institution of Civil Engineers
Chair of the UK Engineering Accreditation Board
Past President Engineering Professors Council

HYPOTHESIS

- Accreditation maintains standards of engineering education, allows good practice to be shared and facilitates mobility of engineers.

- Therefore, accreditation is a universal means of publically demonstrating the academic attributes of engineering graduates.

ENGINEERING BODIES

ICE (UK)	1818
EI (Ireland)	1835
IMechE (UK)	1847
ASCE (USA)	1852
IET (UK)	1871
ASME (USA)	1880
AIEE (USA)	1884
EIC (Canada)	1887
IPENZ (New Zealand)	1912
EA (Australia)	1919
IEA (India)	1920

PROFESSIONAL ENGINEERING BODIES

- Some engineering bodies are single discipline
- Some represent all engineering

- Some are learned societies
- Some are qualifying bodies
- Some are learned societies and qualifying bodies

- Some register alone
- Some accredit alone
- Some accredit and register
- Some do neither

BERLIN INTERNATIONAL HE CONFERENCE 2-4 MAY 2016
"Quality Management in Higher Education: the unsolved mystery of its untapped potential – how to jointly tackle the five remaining grand challenges?"

Five "grand challenges" have been identified and will structure the program.

Challenge 1 : "untapped potential of Quality Assurance and Accreditation for the University of the Future".

Challenge 2: its potential as new magic wand for political and economic integration processes on an international level

Challenge 3 : how we can do better to stimulate public interest in QA of higher education

Challenge 4 : how we can make quality assurance matter for the employment sector

Challenge 5 :the (again untapped) potential of QA/Accreditation for the recognition of academic degrees and for organizing academic and professional mobility