UTEM WORKHOP

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ENGINEERING & ENGINEERING TECHNOLOGY
ACCREDITATION DEPARTMENT, BEM

24-25 APR 2019

EAC-ETAC

AREAS TO COVER

1. Source of power for BEM
2. Why IEA
3. About ETAC
4. Purpose of Accreditation
5. Focus of ETAC Accreditation
6. Mechanics of Accreditation

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REGISTRATION OF ENGINEERS ACT (REV 2015)

Key changes related to Engineering Technology:

- Liberalisation of engineers' registration and practice
- Include technologists and technicians as part of the engineering service professionals
- Recognition of engineering technologists as professional engineers
- Recognition of engineering technicians as assistant to Professional Engineers' services

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ONE FUNCTION OF THE BOARD

4(1)(ef)

to appoint a body consisting of members from the Board, Professional Engineers and other persons as may be determined by the Board to advise the Government and the public on matters relating to engineering education, including the certification of such programmes;

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MQA ACT ALLOWS

3(1) : *The provision of this Act shall be in addition to, and not in derogation of, the provisions of any other written law relating to accreditation of programmes or qualifications."*

51(1) : *A Joint Technical Committee consisting of representatives of the relevant professional body, an officer of the Agency and such other persons as may be deem necessary by the relevant professional body shall be established by the relevant professional body for the purpose of –*

(a) considering an application for accreditation under subsection 50(1)…

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IMPLEMENTATION

- Engineering Technologist – 2017 *(ENGINEERING TECHNOLOGY PROGRAMME ACCREDITATION MANUAL 2015)*
- Technician – 2018 (ENGINEERING *TECHNICIAN EDUCATION PROGRAMME ACCREDITATION MANUAL 2016)*

- **MQA perpetual accreditation ends 6 years after initial year given**

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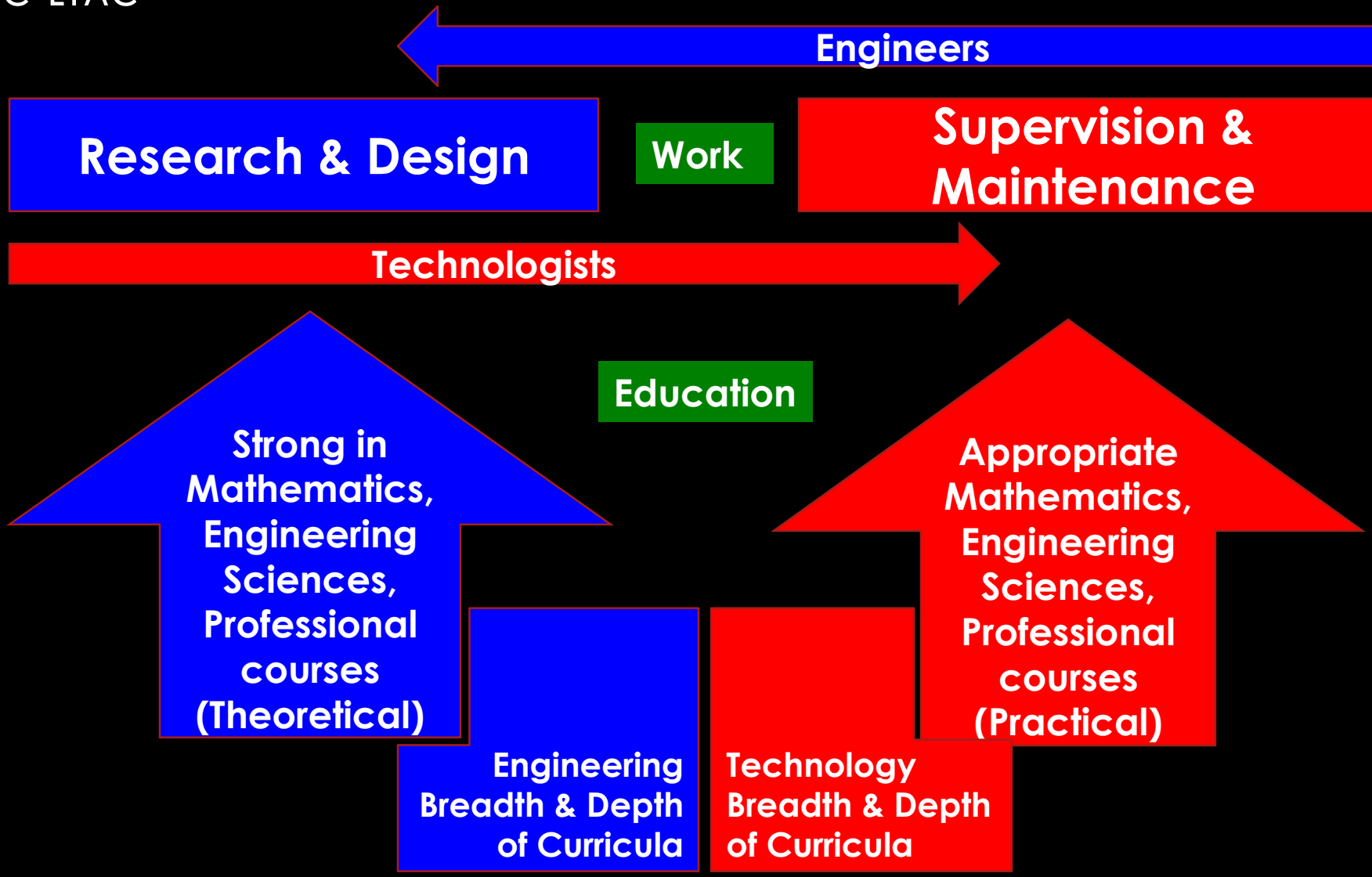
ENGINEERING & ENGINEEERING TECHNOLOGY DOMAIN



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OUR CHALLENGE

We need to prepare our engineering technology and technician graduates:

- ✓ To be aware of their roles to take care of **public safety** in their line of work
- ✓ To be able to take up the **global** challenge
- ✓ To be **mobile** across nations

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THE GLOBAL STANDARDS

INTERNATIONAL ENGINEERING ALLIANCE

http://www.**ieagreements**.org/

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THE IEA'S VISION

Improve the global quality, productivity and mobility of engineers by being an accepted **independent authority on best practice in standards, assessment and monitoring** of engineering education and professional competence

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THE IEA'S CORE ACTIVITIES

- **Consistent improvement** of standards and mobility
- **Defining standards** of education and professional competence
- **Assessment** of education accreditation and evaluation of competence
- **Participation in activities** that are driven from the engineering profession

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DEVELOPMENT OF INTERNATIONAL ENGINEERING ALLIANCE

WA signed by 6 organisations	Development of formal peer review processes	New Accords and Agreements	Development of graduate attribute exemplars
28 Sep 1989	1990s onwards	1997-2002	2001 onwards

IEA Established in 2007

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EDUCATIONAL ACCORDS

WA
- Washington Accord

SA
- Sydney Accord

DA
- Dublin Accord

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WA

- Signed in 1989, the Washington Accord, is a multi-lateral agreement between bodies responsible for accreditation or recognition of tertiary-level engineering qualifications within their jurisdictions who have chosen to work collectively to **assist the mobility of professional engineers.**
- The Washington Accord is specifically focused on academic programmes which deal with the practice of **engineering at the professional level**.

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WA SIGNATORIES

- Australia - Canada - China - Chinese Taipei - Hong Kong China -India - Ireland - Japan - Korea - **Malaysia** - New Zealand - Russia - Singapore - South Africa - Sri Lanka - Turkey - United States - United Kingdom - Pakistan - Peru
- **Provisional Status** – Chile, Costa Rica, Mexico, Bangladesh, Philippines

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SA

- The Sydney Accord is specifically focused on academic programmes dealing with **engineering technology**.
- The Accord acknowledges that accreditation of these academic programmes is a key foundation for the practice of engineering technology in each of the countries or territories covered by the Accord.
- It recognises the importance of the roles engineering technologists as part of a wider engineering team.

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SA SIGNATORIES

- Australia - Canada - Chinese Taipei - Hong Kong China - Ireland - Korea - New Zealand - South Africa - United Kingdom - United States - Malaysia
- Provisional Status – Peru

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DA

- The Dublin Accord is specifically focused on the mutual recognition of academic programmes/qualifications that underpin the educational base for Engineering Technicians.
- The Accord acknowledges that the educational base is a key foundation for practice as an engineering technician, in each of the countries or territories covered by the Accord.
- It recognises the importance of the roles engineering technicians play as part of a wider engineering team.

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DA SIGNATORIES

- Australia - Canada - Ireland - New Zealand - Korea - South Africa - United Kingdom - United States - **Malaysia**

EDUCATION ACCORDS

WASHINGTON ACCORD	4 YEARS
SYDNEY ACCORD	3 YEARS
DUBLIN ACCORD	2 YEARS
FEANI / EUR-ACE / ENAEE (EUROPE)	3 + 2 YEARS
NABEEA (ASIA)	
UPADI (CENTRAL & SOUTH AMERICA)	

PRACTICE AGREEMENTS

IPEA
International Professional Engineers Agreement
(ENGINEERS MOBILITY FORUM)

APEC ENGINEER

IETA
International Engineering Technologist Agreement
(ENGINEERING TECHNOLOGISTS MOBILITY FORUM)

AIET
Agreement For International Engineering Technicians
(ENGINEERING TECHNICIANS MOBILITY FORUM)

INTERNATIONAL ENGINEERING ALLIANCE (IEA)

(INTERNATIONAL ENGINEERING MEETING, IEM)

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IPEA MEMBERS

- Australia - Canada - Ireland - New Zealand - Hong Kong China - South Africa - United Kingdom - United States -Japan - Malaysia - Korea - Singapore - Sri Lanka - India -Chinese Taipei
- Provisional Status – Bangladesh, Pakistan, RussiaPeru

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APEC ENGINEER MEMBER ECONOMIES

- Australia - Canada - Hong Kong China - Japan -Korea - Malaysia -New Zealand - United States -Indonesia - Philippines - Thailand - Chinese Taipei -Singapore - Russia -

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IETA MEMBER

- Canada - Hong Kong China - Ireland - New Zealand - South Africa - United Kingdom

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AIET MEMBER

- Australia – Canada - Ireland - New Zealand - South Africa - United Kingdom

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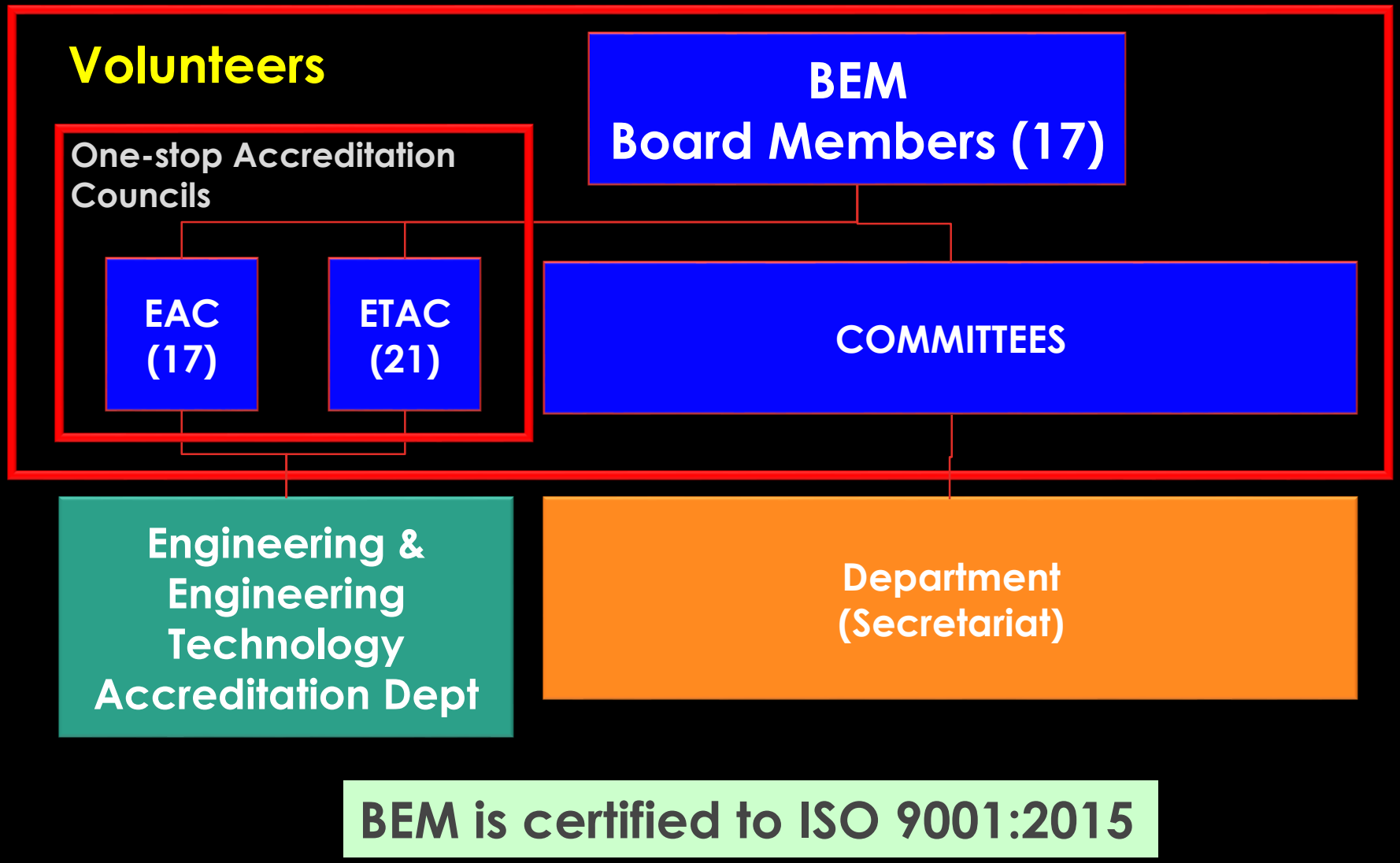
BEM ORGANOGRAM



BEM is certified to ISO 9001:2015

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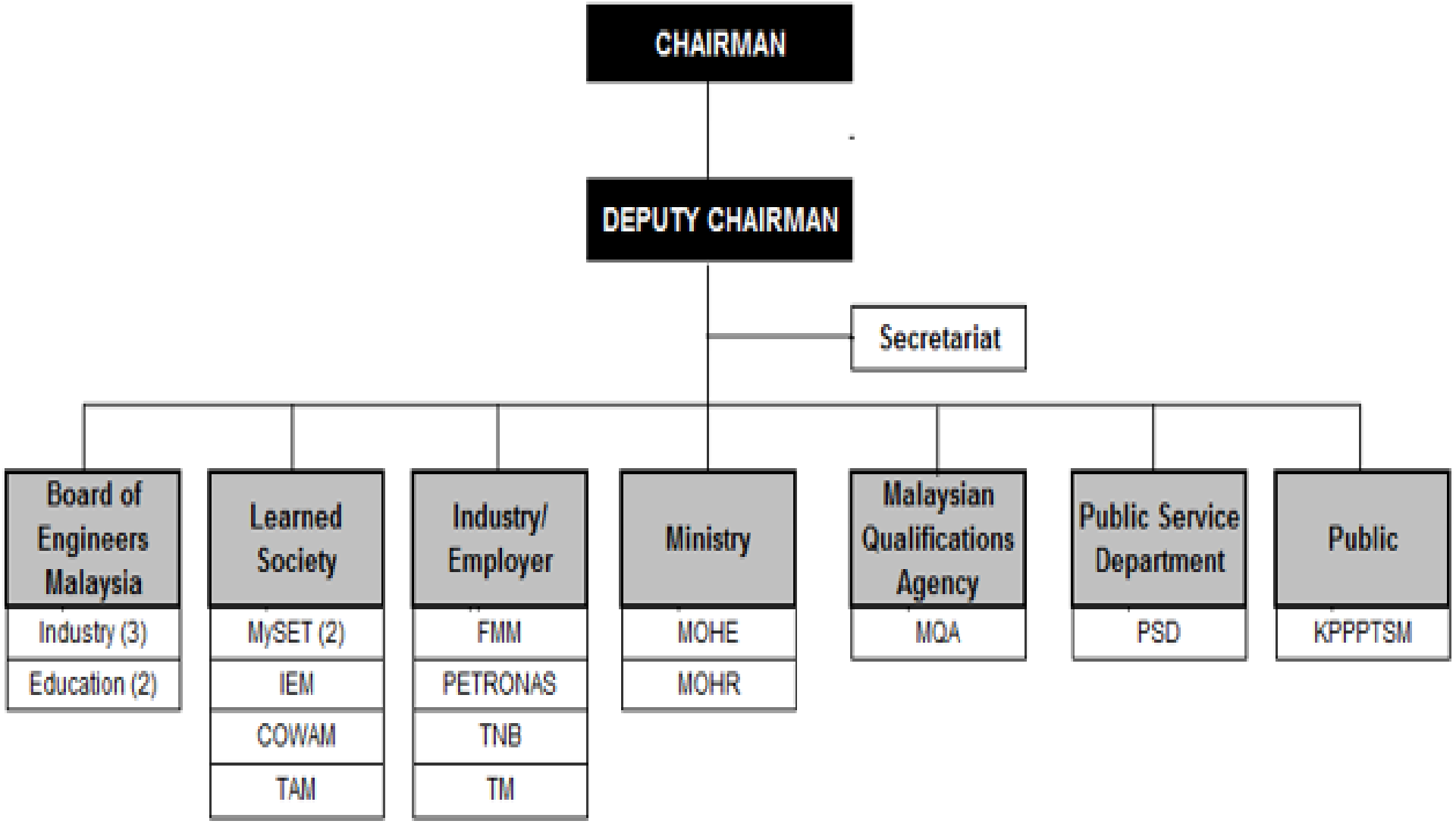
ENGINEERING TECHNOLOGY ACCREDITATION COUNCIL – 21 MEMBERS



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ETAC VISION & MISSION

Vision:

- To be a **leading accreditation body** by providing outstanding and quality curriculum for engineering technology education.

Mission:

- To **accredit** engineering technology bachelor degree, engineering diploma and engineering technology diploma programmes
- To **provide students** with an excellent academic foundation and technical education through structured education programmes
- To **provide recognition** for all engineering technologist and engineering technician from skilled based education programmes both locally and internationally

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THE ETAC STRATEGIC PLAN

Eminence

Driving towards achieving recognition in engineering technology education

Technology

Aim for the highest levels of excellence in engineering technology education

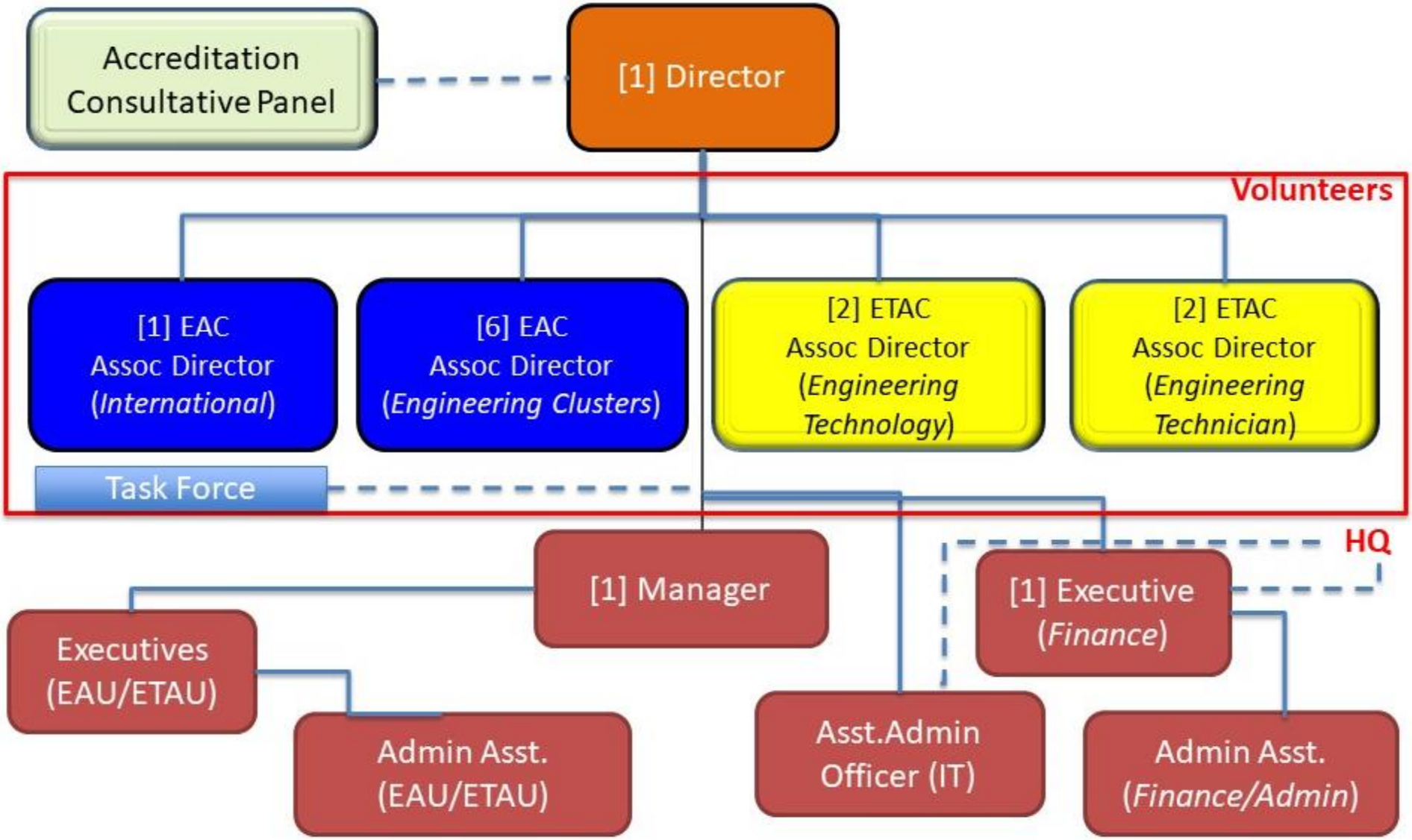
Accelerate

Recognising efforts that accelerate the engineering technology education programme

Core Values

Uplift and fostering high standards of professionalism, standard and integrity

EETAD


Accreditation Consultative Panel
[1] Director
Volunteers
[1] EAC Assoc Director (International)
[6] EAC Assoc Director (Engineering Clusters)
[2] ETAC Assoc Director (Engineering Technology)
[2] ETAC Assoc Director (Engineering Technician)
Task Force
HQ
[1] Manager
[1] Executive (Finance)
Executives (EAU/ETAU)
Admin Asst. (EAU/ETAU)
Asst.Admin Officer (IT)
Admin Asst. (Finance/Admin)

THE EETAD RESPONSIBILITIES

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- **Manage the process** of applications for approval and accreditation of engineering and engineering technology (E&ET) programmes
- **Liaison with stakeholders** (IHL, MOHE, MQA, JPA, IEM etc.)
- **Collaborate** with universities, corporations, private institutions and government agencies on the development of E&ET education in Malaysia.
- **Promote the Malaysian accreditation system** whilst retaining collaboration with international professional bodies especially the signatories of Washington, Sydney and Dublin Accords.
- **Establish and maintain** a list of local and foreign accredited E&ET programmes.
- **Support mutual recognition** initiatives in E&ET education.
- **Respond** to any inquiries and complaints concerning accreditation.
- **Facilitate the EAC and ETAC meetings** and other related meetings on accreditation and recognition where necessary.

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ACCREDITATION OBJECTIVE

1. To ensure that graduates of the accredited engineering education programmes satisfy the minimum academic and practical requirements for registration as ET/Tech(IoW) with BEM.
2. To satisfy MQA's requirements under the Malaysian Qualification Framework
3. To ensure that Continual Quality Improvement (CQI) is being practiced by IHLs, and may also serve as a tool for benchmarking.
4. Allow international mobility of graduates.

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IMPORTANCE TO THE PROFESSION

- Ensures that graduates have **met the educational requirements** to enter the profession
- Enhances the **mobility of graduate** professionals
- Provides **professional development** for faculty and industry practitioners
- Provides opportunity for the profession to **guide the educational process** to reflect current and future needs

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THE FOCUS

- **Outcome-based Education (OBE)** Programme
- Engineering education **content and level (breath & depth)** are maintained
- Programme Continual Quality Improvement **(CQI)**
- Systematic **(QMS)**

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THE APPROACH

- To concentrate more on assessments of outcomes:
  - The IHL Self-Assessment Report (SAR) must focus more on whether have they **achieved the 12 Programme Outcomes** and how do they assess them.
  - The Evaluation Panel (EP) will **concentrate on reviewing the evidences for outcome achievements** through more extensive documents reviews, longer interviews with staff, students and stakeholders.

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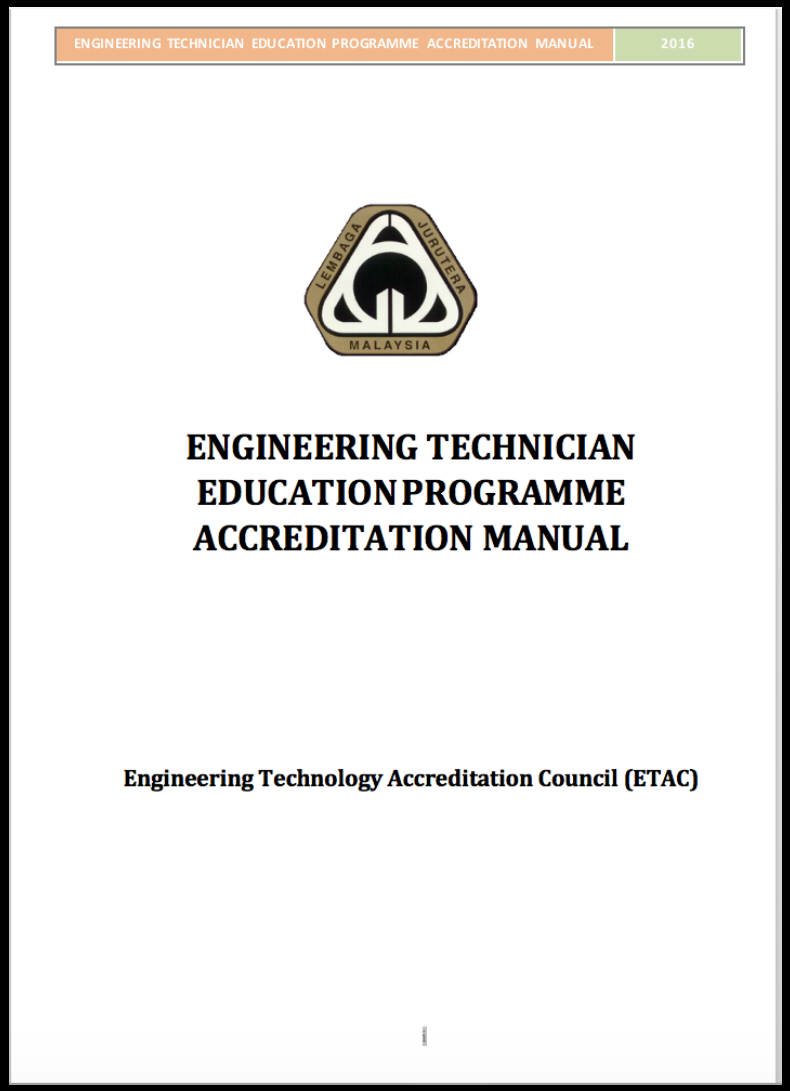
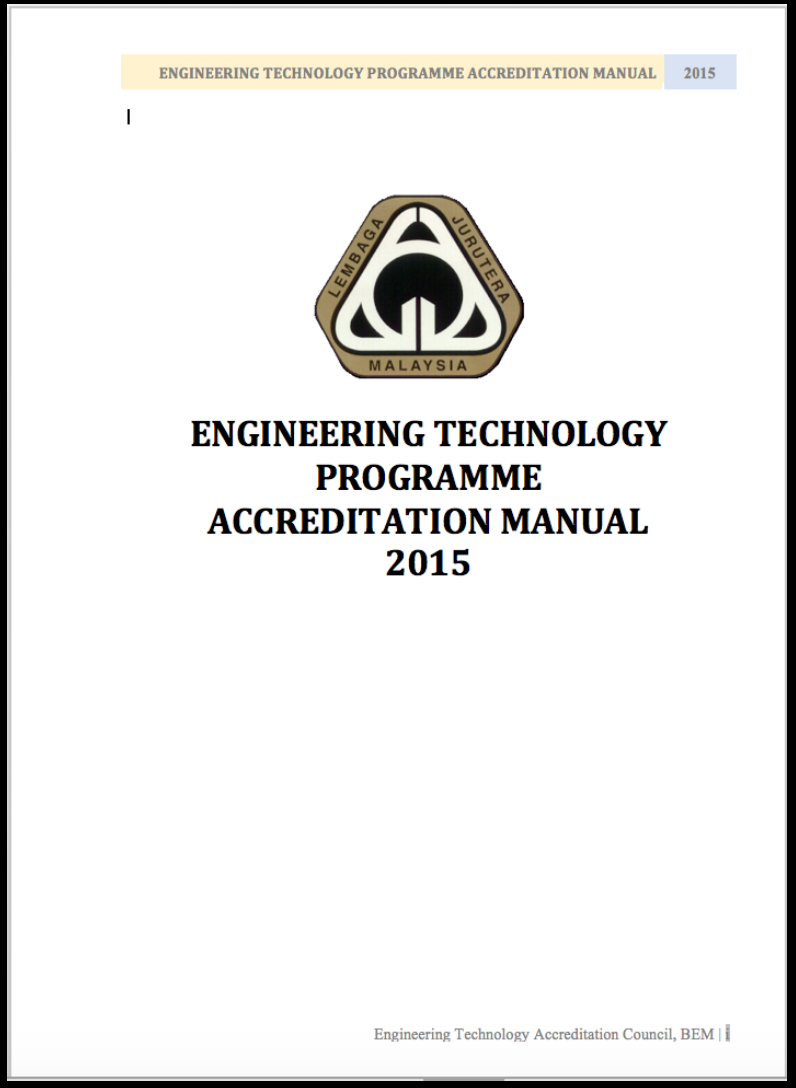
ETAC ACCREDITATION STANDARDS





www.etac.org.my/download/

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OBE - DEFINITION

"Outcome-based education means starting with a clear picture of what is important for students to be able to do, then organising the ***curriculum***, ***instruction*** and ***assessment*** to make sure that this learning ultimately happens"

(Spady, 1994)

CONSTRUCTIVE ALIGNMENT

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OBE FOCUSES ON STUDENT LEARNING

- Using **learning outcome** statements to make explicit what the student is expected to be able to know, understand or do;
- Providing **learning activities** which will help the student to reach these outcomes;
- **Assessing** the extent to which the student meets these outcomes through the use of assessment criteria.

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THE OBE APPROACH IN CURRICULUM DESIGN

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OBE

Outcome Based Education

Directed & Coherent Curriculum

Graduate Relevant to Industry

Programme Objective (after 3-5 Years)

Measurable

Programme Outcome (at Exit)

Performance Indicator

Course/Unit/Learning Outcome (Abilities & Intentional)

Assessment

Accountable

Knowledge | Skill | Attitude

Evaluation

Student Centered

Appropriate Delivery (Case, PBL …)

Continual Quality Improvement (CQI)

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CHARACTERISTICS OF OBE CURRICULA

- Have programme objectives **(PEO)**, programme outcomes (**PO**), course outcomes (**CO/CLO**) and performance indicators/criteria or Rubrics.
- Stated objectives and outcomes **can**, and **should** be assessed.
  - Course outcomes must satisfy the stated programme outcomes. **Constructive alignment** must be seen.
  - Learning outcomes are **intentional** and assessed using suitable performance indicators and assessment tools.

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CHARACTERISTICS OF OBE CURRICULA

- Centered around the needs of the students and the stakeholders (i.e. market requirements)
- Programme outcomes address **Knowledge (Cognitive)**, **Skills (Psychomotor)** and **Attitudes (Affective)** to be attained by students.
  - Teaching/Learning method may have to be integrated to include different delivery methods to complement the traditional lecturing method.
- **CQI must be visible**.

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GENERAL CLASSIFICATION

- Strength – "Wow" factor
- Weakness – Deficiency or non-compliance
- Concern
- Opportunity for Improvement

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STRENGTH

Strengths can be defined as anything with a '**wow factor**' of '**very outstanding nature**' far beyond just satisfying the minimum requirements.

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WHAT MAY CONSTITUTE STRENGTH?

- **Exceeds** the minimum standard set by Manuals.
- Involved **stakeholders**, both internal and external, **extensively**
- Programme **challenges students** to achieve greater heights than just satisfying the minimum standard
  - **Blend** of **delivery methods**
  - Attain competency in the **open-ended** project based and problem oriented courses
- **Majority** of the staff has **Industrial** experience/ qualification and the number available indicates a **low staff-student ratio** (that enables greater contact with students)

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WEAKNESS

Transgression of any Accreditation Criteria to the point of **TOTAL COLLAPSE**.

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WHAT MAY CONSTITUTE WEAKNESS?

- ANY of the eight (8) Qualifying Requirements **NOT** fulfilled.
- Below the 'minimum' expectation of criteria.
- Programme has no breadth and depth of an engineering education.
- OBE is not implemented.
- **Repeated** Major Concerns may lead to Weaknesses.

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CONCERN

Any shortfall, shortcoming or transgression, but **not amounting to** 'total collapse', of any of the accreditation criteria.

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WHAT MAY CONSTITUTE CONCERN?

- Usually a "concern" is that the programme has **not failed** the criteria set under the ETAC Manuals, but if left unchecked may lead to **failure at a later date.**
- Where there are **lapses** in observing the criteria of the EAC Manual, it would appropriately be classified under "concern".

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CONCERN CATEGORY

1. **MAJOR**
   - Serious lapses or non-compliances of the Manual.
   - Usually relates to Criteria 2, 3 & 7
2. **MINOR**
   - Underachievement of the Manual requirements
   - Mostly relates to Criteria 1, 4, 5 & 6

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OPPORTUNITY FOR IMPROVEMENT

- The "**Good to have**" items.
- Items an institution could consider **despite already having the necessary strength** or having already satisfied the minimum requirements of the ETAC Manual.
- Institutions would **not be penalised** for not taking the necessary action to address the issue.

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ACCREDITATION DECISION

- **Accredited**
  - **6 years/6 years with interim/3 years**
- **Decline** accreditation. In such a case, a further application will normally not be considered within the next one year.
- **Defer** accreditation. IHL will need to comply in a given time frame before another visit is done
- The accreditation shall be accorded to a **specific programme, location and mode**.

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SIX YEARS (6) ACCREDITATION

- Programme that has **satisfied the minimum** requirement of the ETAC Manuals.
- There is **no shortcoming** found except for the continual quality improvement issues.
- **Implementation of OBE approach is effective where academic staffs are aware and fully implementing it at the course level, together with CQI.**
- **Overall evaluation and CQI of the programme are visible.**

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SIX YEARS (6) ACCREDITATION AND INTERIM REPORT TO BE SUBMITTED BY 3RD YEAR

- Programme that has **satisfied** the minimum requirement of the Manual **except for a few "CONCERN" found.**
- These concerns are **isolated and minor** in nature.
- Implementation of **OBE approach is significant** (widespread) with **varied** awareness among academic staffs and varied implementation at the course level, including CQI.
- Overall **evaluation and CQI** of the programme and courses are **visible.**

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THREE YEARS (3) ACCREDITATION

- Programme that has satisfied the minimum requirement of the Manual **except** for the list of "CONCERN" found.
- These concerns are mostly related and **some are major** in nature.
- Implementation of **OBE** approach is already in place with varied awareness among academic staffs and **varied implementation at the course level.**
- **Overall CQI** at programme and courses are **not visible**.

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DECLINE ACCREDITATION OR ZERO (0) YEAR

- Anytime "**WEAKNESS**" is invoked, it refers to non compliance with the minimum standard specified by the Manual, and as such accreditation cannot be accorded
- Programme **not meeting** the qualifying requirements
- Curriculum **does not provide** the breadth and depth of engineering
- OBE approach is **not implemented** at all.

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DECLINE ACCREDITATION OR ZERO (0) YEAR

- Evaluators must be fully **convinced** that the programme/institution is **not in control** of the situation and the **outcomes are not evident**, before recommending decline accreditation.
- There is a need to pursue on the problem issue with further investigation and obtain further evidence before making the decision.

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DEFERRED ACCREDITATION

- **To allow the institution to do the necessary corrective action due to non-compliance**.
- The institution may also **withdraw** the application for accreditation as a face saving option when accreditation decision is deferred. The record of evaluation would then **be expunged**.
- The institution may **reapply** for accreditation when deemed ready.
- **Further evaluation** would be **required** to ascertain compliance.

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ACCREDITATION DECISION RUBRICS

NEW PROGRAMME + NEW CYCLE

	6 years	6 years + interim report within 3 years		3 years			Deferred or Declined
Major concerns	x	x	1	x	1	2 – 3 Major	≥ 4 major concerns or any weak-ness.
Minor concerns	x	≤ 3	1-2	≥ 4	≥ 3		

As a guide for Panel to recommend – final decision is still with Council

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ACCREDITATION DECISION RUBRICS
CONTINUING ACCREDITATION

Balance of years	Balance of years –1	Balance of years –2
ALL concerns CLOSED	≤ 2 concerns not CLOSED	> 2 concerns not CLOSED

As a guide for Panel to recommend – final decision is still with Council

UNDERSTANDING THE MANUALS

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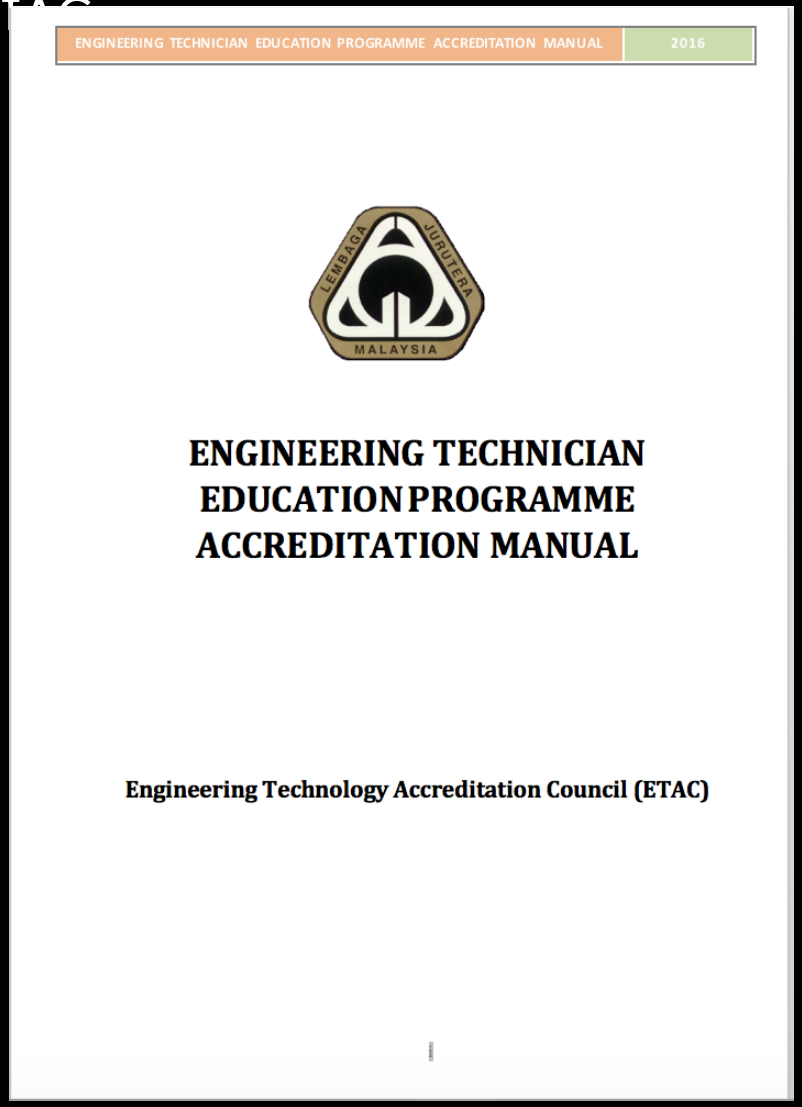

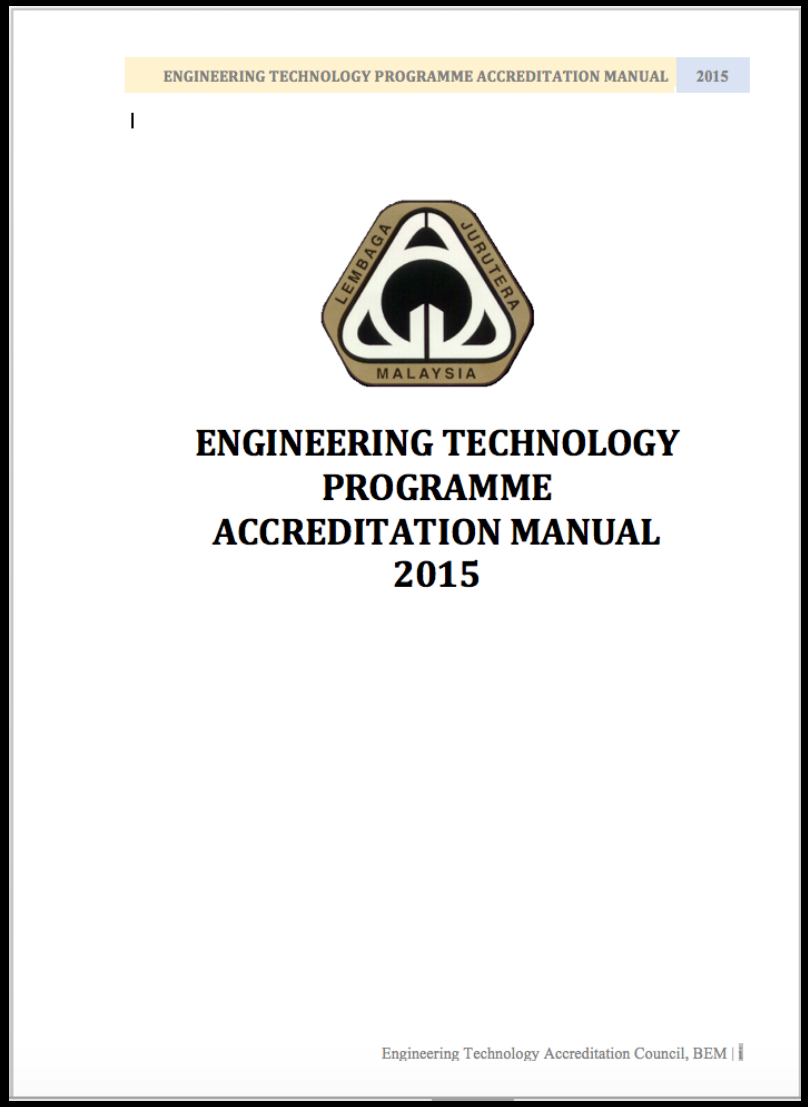

www.etac.org.my/download/

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GUIDING PRINCIPLES (SECTION 8)

1. Qualifying Requirements
2. Accreditation Criteria

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QUALIFYING REQUIREMENTS - ET

1. Minimum 140 SLT credit units of which about 40-50% time should be allocated for practice-oriented components.
2. Final year project (8-12 SLT credit units)
3. Industrial training (minimum of 24 weeks)
4. Full-time Teaching staff (minimum of 8)
5. Staff: student ratio 1: 15 or better
6. External examiner's report (minimum of two reports over five years)
7. Programme Educational Objectives
8. Programme Outcomes

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QUALIFYING REQUIREMENTS - DIPLOMA

1. Minimum 90 SLT credit units. A minimum of 60 SLT credit units shall be engineering or engineering technology courses, of which at least 50% should be allocated for practice-oriented components in the technical and specialists areas.
2. Final year project (4-6 SLT credit units)
3. Industrial training (minimum of 16 weeks)
4. Full-time Teaching staff (minimum of 8)
5. Staff: student ratio 1: 20 or better
6. External examiner report (and availability of the process that requires a minimum of one report over two years)
7. Programme Educational Objectives
8. Programme Outcomes

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ACCREDITATION CRITERIA

Criterion 1- Programme Educational Objectives (PEOs)
Criterion 2- Programme Outcomes (POs)
Criterion 3- Academic Curriculum
Criterion 4- Students
Criterion 5- Academic and Support Staff
Criterion 6- Facilities
Criterion 7- Quality Management Systems

PROGRAMME OUTCOMES

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Engineering Technology

1. **Knowledge:** apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to defined and applied engineering procedures, processes, systems or methodologies;
2. **Problem analysis:** Identify, formulate, research literature and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation.;

Engineering Technician

1. **Knowledge**: Apply knowledge of applied mathematics, applied science, engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices;
2. **Problem analysis**: Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (DK1 to DK4);

PROGRAMME OUTCOMES

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Engineering Technology

3. **Design/ development of solutions:** Design solutions for broadly-defined engineering technology problems and contribute to the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.;
4. **Investigation:** Conduct investigations of broadly-defined problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions.

Engineering Technician

3. **Design/development of solutions**: Design solutions for well-defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (DK5);
4. **Investigation**: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements;

PROGRAMME OUTCOMES

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Engineering Technology

5. **Modern Tool Usage:** Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering activities, with an understanding of the limitations.;
6. **The Engineer and Society:** Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technology practice.
7. **Environment and Sustainability:** Understand the impact of engineering technology solutions in societal and environmental context and demonstrate knowledge of and need for sustainable development.;

Engineering Technician

5. **Modern Tool Usage**: Apply appropriate techniques, resources, and modern engineering and IT tools to well-defined engineering problems, with an awareness of the limitations (DK6);
6. **The Engineer and Society**: Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well-defined engineering problems (DK7);
7. **Environment and Sustainability**: Understand and evaluate the sustainability and impact of engineering technician work in the solution of well-defined engineering problems in societal and environmental contexts (DK7);

PROGRAMME OUTCOMES

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Engineering Technology

8. **Ethics:** Understand and commit to professional ethics and responsibilities and norms of engineering technology practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse technical teams.
10. **Communications:** Communicate effectively on broadly-defined engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

Engineering Technician

8. **Ethics**: Understand and commit to professional ethics and responsibilities and norms of technician practice;
9. **Individual and Team Work**: Function effectively as an individual, and as a member in diverse technical teams;
10. **Communications**: Communicate effectively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions;

PROGRAMME OUTCOMES

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Engineering Technology

11. **Project Management and Finance:** Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments;
12. **Life Long Learning:** Recognize the need for, and have the ability to engage in independent and life-long learning in specialist technologies.

Engineering Technician

11. **Project Management and Finance**: Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a technical team and to manage projects in multidisciplinary environments;
12. **Life Long Learning**: Recognise the need for, and have the ability to engage in independent updating in the context of specialised technical knowledge;

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DEPTH OF KNOWLEDGE REQUIRED

(WA) Complex Problems	(SA) Broadly Defined Problems	(DA) Well defined Problems
In-depth knowledge that allows a fundamentals-based first principles analytical approach	Knowledge of principles and applied procedures or methodologies	Solved using limited theoretical knowledge, but normally requires extensive practical knowledge

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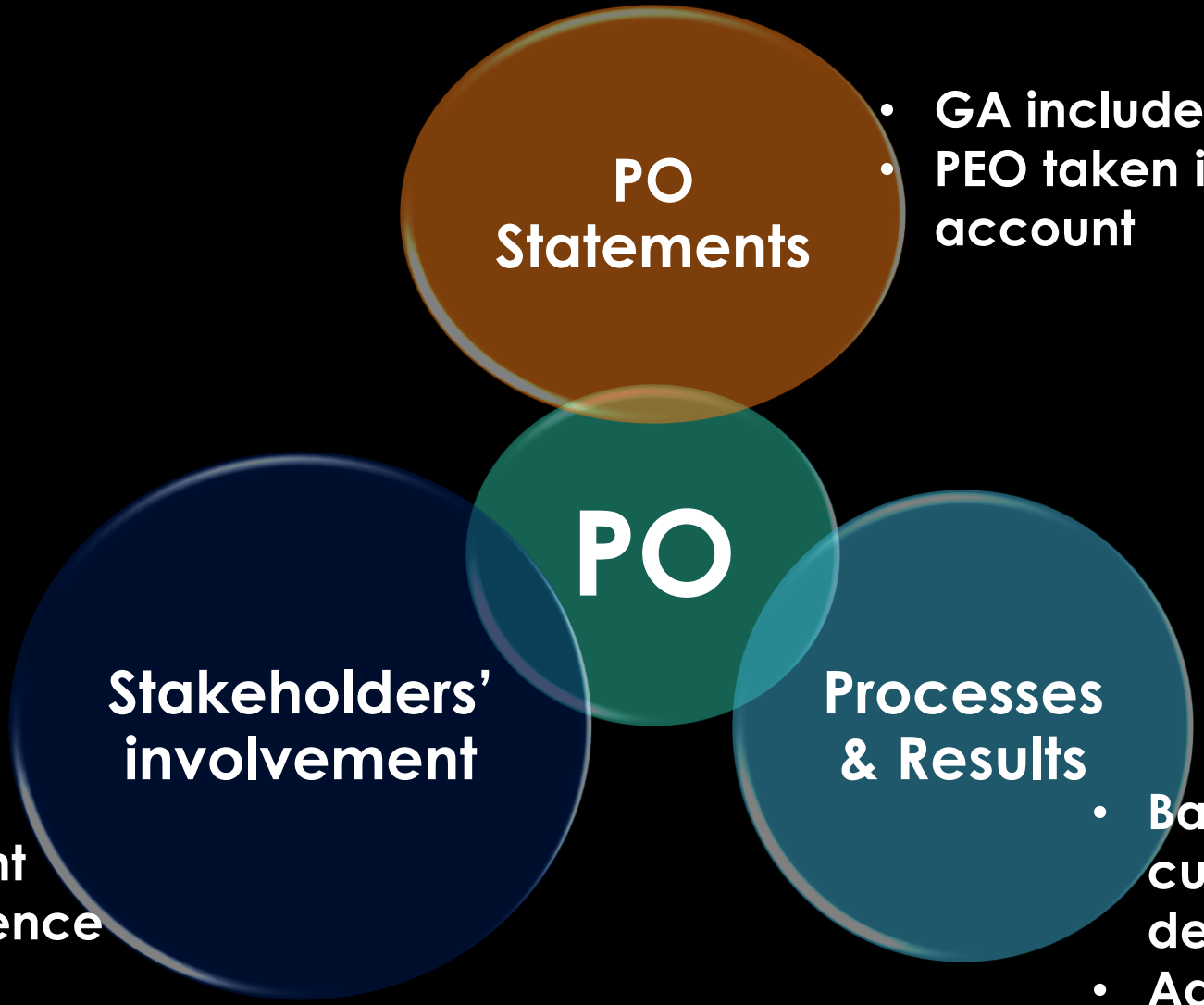
PO EXPECTATION



- GA included
- PEO taken into account

- Extent
- Evidence

- Basis for curriculum design
- Adequately assessed

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PROCESSES AND RESULTS

- Assessment model adopted
  1. **Where** is each PO assessed?
  2. **How** is each PO assessed?
  3. **What** is the satisfactory attainment?

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PROCESSES AND RESULTS

Where is each PO assessed?

- There should be mapping to the curriculum
  - Beyond CO – other learning outcomes in study period
- Framework of assessment – what, when, why and how – The Rubrics

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PROCESSES AND RESULTS

How is each PO assessed?

- Explain the assessment mechanisms – could be quantitative and/or qualitative
  - Formative, summative / enabling, culminating
  - Cohorts, year
  - Extra curricular

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PROCESSES AND RESULTS

What is the satisfactory attainment?

- Explain your meaning of attainment and the standard set by the institution
  - What you consider as attained?
  - Examples of attainment by cohorts, students

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PROCESSES AND RESULTS

- The CQI process instituted
  - Onion model for CQI loop
  - Describe the process and significance of CQI in the programme planning