Opportunities and Challenges of Engineering Technology Education for Developing Countries

by
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10th August 2015
Presentation Outlines

- Background
- Malaysia as Developing Country & National Agenda
- MBOT & Engineering Technology
- Initiatives at MTUN
- Challenges
- Wayforward
Learning Objectives

At the end of presentation, participants will be able to:

• Understand the Engineering Technology Education issues in Malaysia.
• Value the benefits of Engineering Technology to the country.
• Appreciate initiatives in Engineering Technology.
• Experience the challenges faced during the whole process.
• Visualize the Future Direction.
FOREIGN DIRECT INVESTMENT – set up manufacturing plants.

RESEARCH AND DESIGN COMPANIES – very few.
MALAYSIAN ENGINEERING EDUCATION SCENARIO

1970 and 80s: Theory-oriented; Design and Research-based

1990s: Transition

2000 onward: Practice-oriented

Paper to Cabinet on setting up technical University colleges

Technical universities established
MALAYSIA : TOWARDS BECOMING A DEVELOPED COUNTRY

VISION 2020
NEW ECONOMIC MODEL
Malaysia’s has introduced 4 pillars to achieve Vision 2020

1. Malaysia
   - People First, Performance Now
   - April 2009

2. Government Transformation Programme (GTP)
   - 6 NKRAs
   - January 2010

3. Economic Transformation Programme (ETP)
   - SRIs & NKEAs
   - Q4 2010

4. 10th Malaysia Plan
   - Macroeconomic growth targets & expenditure allocation
   - June 2010
The Goals

High Income

Targets US$15,000-20,000 per capita by 2020

Inclusiveness

Enables all communities to fully benefit from the wealth of the Country

Sustainability

Meets present needs without compromising future generations

The New Economy Model

Characteristics in 2020

- Market led
- Well-governed
- Regionally integrated
- Entrepreneurial
- Innovative
VISION 2020

1 Malaysia
People First, Performance Now
Preservation and enhancement of unity in diversity

Reducing Crime
Fighting Corruption
Improving Student Outcomes
Raising Standards of Low Income Households
Improving Rural Basic Infrastructure
Improving Urban Public Transport

6 NKRA's
Effective delivery of government services

High Income
Inclusive-ness
Sustainability

New Economic Model
A high income, inclusive and sustainable nation

10th and 11th Malaysia Plan Roll-Out
Implementation of government’s development program

Source: Academia-Industry Consultative Council 8th Dec 2011
ETP focuses on:
- 12 National Key Economy Areas (NKEAs)
- 131 entry point projects
- 3.3 millions new jobs by 2020
- 60% are middle & high income jobs

ETP 1 year progress:
- 66% or RM10 billion worth of projects have started
- 53% of 131 entry point projects have taken off
- Private investments increased 23.4% to RM512.2 billion from RM 41.5 billion

Source: Academia-Industry Consultative Council 8th Dec 2011
Across the NKEAs, nearly 1 million jobs requiring vocational certificates or diplomas will be created over the next 10 years.

### No. of jobs required by NKEAs by 2020
Cumulative, ‘000

<table>
<thead>
<tr>
<th>Industry</th>
<th>Vocational</th>
<th>Diploma</th>
<th>Examples of top jobs</th>
<th>Ability to attract?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Services</td>
<td>20</td>
<td>138</td>
<td>• Insurance agents</td>
<td>Sufficient supply</td>
</tr>
<tr>
<td></td>
<td>345</td>
<td></td>
<td>• Hotelling staff</td>
<td>today and in 2020</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Convention hall exhibition service staff</td>
<td></td>
</tr>
<tr>
<td>Tourism</td>
<td>0</td>
<td>37</td>
<td>• Clerical staff</td>
<td>Insufficient supply</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>50</td>
<td>• Aerospace technicians</td>
<td>today and in 2020</td>
</tr>
<tr>
<td>Business Services</td>
<td>3</td>
<td>117</td>
<td>• Production worker</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35</td>
<td></td>
<td>• E&amp;E technician</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Hospitality workers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Nurses</td>
<td></td>
</tr>
<tr>
<td>Healthcare</td>
<td>35</td>
<td>22</td>
<td>• Store keeper</td>
<td>Insufficient supply</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sales supervisor</td>
<td>today and in 2020</td>
</tr>
<tr>
<td>Wholesale and retail</td>
<td>20</td>
<td>14</td>
<td>• Technicians</td>
<td>Sufficient supply</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Feedlotting supervisors</td>
<td>today and in 2020</td>
</tr>
<tr>
<td>Agriculture</td>
<td>6</td>
<td>8</td>
<td>• Farm supervisors</td>
<td></td>
</tr>
<tr>
<td>Palm Oil</td>
<td>30</td>
<td>23</td>
<td>• Chemical engineers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Solar maintenance technician</td>
<td></td>
</tr>
<tr>
<td>Oil Gas &amp;Energy</td>
<td>24</td>
<td>8</td>
<td>• Mechanical engineering supervisor</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE: Labour estimates from NKEA labs, dated July 8th 2010
We cannot continue at the current pace unless we transform...

1. NKEAs (drivers)
   National Key Economic Areas

2. SRIs (enablers)
   Strategic Reform Initiatives
**TEVT is critical in the 10th Malaysia Plan**

<table>
<thead>
<tr>
<th>Target</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>40%² skilled workforce¹ by 2020</td>
<td></td>
</tr>
<tr>
<td>1,031,000 more managers &amp; professionals</td>
<td></td>
</tr>
<tr>
<td>1,434,000 more skilled workers</td>
<td></td>
</tr>
<tr>
<td>482,000 more semi-skilled workers</td>
<td></td>
</tr>
</tbody>
</table>

### Policy guidelines from the 10th Malaysian Plan

#### Improving the Perception of TVET and Attracting More Trainees
- ...a national media campaign will be developed and rolled-out...
- 69 out of 88 technical schools will be converted into vocational schools ... six new vocational schools will be established by 2015 ...

#### Upgrading and Harmonising TVET Curriculum Quality in Line with Industry Requirements
- ...standardize TVET curriculum...
- Recognizing and equating various levels of Malaysian Skills Certificate with certifications issued by TVET providers
- ...a Board of Technologists Malaysia will be established
- Malaysia-Japan International Institute of Technology will be established as an independent institute

#### Developing Highly Effective Instructors
- Highly experienced industry personnel...to become instructors ...
- part-time working arrangements will be expanded
- ...Centre for Instructor and Advanced Skills Training (CIAST) will be expanded..
- A new centre for instructor skills training will be developed to add a further training capacity of 800 instructors each year

#### Streamlining Delivery of TVET
- The current funding approach of TVET will be reviewed...provide financial assistance to students to study at Malaysian Skills Certificate Level 3
- The performance rating of TVET institutions will be utilized when making decisions for buying places...in private TVET institutions
- A total of RM 150 million will be set aside to train 20,000 school dropouts during the Plan period

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1. Skilled workforce defined as those with at least SKM 3 certificate, diploma, or degree certification semi-skilled defined as those with at least SKM 1 or 2 certification, while unskilled workers have only SPM certification. A 40% target is projected by Ministry of Human Resource, and a 50% target committed to in the 10th Malaysian Plan
2. Target based on MOHR estimates, different from 10th Malaysia Plan published targets of 50%

SOURCE: 10th Malaysia Plan
On the supply side, there is also a significant pool of students for expansion of TVET

<table>
<thead>
<tr>
<th>Segment</th>
<th>Size Today Thousands</th>
<th>Segment description</th>
<th>Projected capture rate in 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic education dropouts</td>
<td>30(^1)</td>
<td>Basic education dropouts, i.e. students leaving school prior to taking SPM</td>
<td>50%</td>
</tr>
<tr>
<td>SPM leavers directly entering workforce</td>
<td>100</td>
<td>Unskilled workers entering workforce without further qualifications, out of which 40k have no SPM credits</td>
<td>30%</td>
</tr>
<tr>
<td>Foreign students</td>
<td>0.2</td>
<td>Foreign students coming to Malaysia for Skills Training</td>
<td>16,000</td>
</tr>
<tr>
<td>Lifelong learning for unskilled and semi-skilled workforce</td>
<td>8,400</td>
<td>Malaysian Skills training curriculum exported abroad</td>
<td>20%</td>
</tr>
<tr>
<td>Higher level SKM 3 and 4</td>
<td>40</td>
<td>SKM 1 and 2 holders who do not currently go on to pursue SKM 3 and 4</td>
<td>50%</td>
</tr>
</tbody>
</table>

\(^1\) Number of students leaving the national education system could be higher, up to 80k

SOURCE: MOHR
MALAYSIA vs. DEVELOPED COUNTRIES IN TERM OF SKILL WORKERS

Ref:
Presentation Malaysian Society of Engineering Technologist (MSET) by Prof. Dr. Mazliham Mohd Su’ud, UniKL.
FACTS AND FIGURES

In Malaysia, 10% joined vocational and technical after high school whereas in German, Finland and Austria 50 – 80%.

In Australia, ~ AUD 2 billion annually to provide skilled workers;
FACTS AND FIGURES

40,000 skilled workers needed by 2015 in oil and gas;

RM 3.7 billion budget 2013 technical and vocational;
FACTS AND FIGURES

40% or 1.3 millions skilled worker needed by 2020 for Malaysia to be high income nation.

~ 700,000 diploma holders from polytechnic and other institutions
FACTS AND FIGURES

33% skilled workers in industrial sector by 2015

SCORE (Sarawak) : by 2030 requires 435,000 manpower; 52.2% skilled and semi-skilled; 70,000 engineering-related
3.3 millions NEW JOBS

- Unskilled: 22% of 800,000 jobs
- Vocational/certificate: 24% of 800,000 jobs
- Diploma: 22% of 800,000 jobs
- Degree: 22% of 800,000 jobs
- Masters: 7% of 800,000 jobs
- PhD: 3% of 800,000 jobs
# EMPLOYMENT BY SKILLS CATEGORY

## GROUP 2010-2020

Source: Economic Planning Unit and Department of Statistics Malaysia

<table>
<thead>
<tr>
<th>Industry</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>Average annual growth in %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>000’ person</td>
<td>%</td>
<td>000’ person</td>
<td>%</td>
</tr>
<tr>
<td>skilled</td>
<td>3,306.2</td>
<td>27.6</td>
<td>3,858.8</td>
<td>28.0</td>
</tr>
<tr>
<td>Semi skilled</td>
<td>7,291.9</td>
<td>61.0</td>
<td>8,530.7</td>
<td>61.0</td>
</tr>
<tr>
<td>Low skilled</td>
<td>1,360.4</td>
<td>11.4</td>
<td>1,391.9</td>
<td>10.1</td>
</tr>
<tr>
<td>Total</td>
<td>11,958.5</td>
<td>100</td>
<td>13,761.4</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Economic Planning Unit and Department of Statistics Malaysia
Exhibit 5-12

Jobs by skills category\(^1\), 2015 – 2020

<table>
<thead>
<tr>
<th>Category</th>
<th>2015(^2)</th>
<th>2020(^2)</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skilled</td>
<td>13,781</td>
<td>5,352</td>
<td>-8,429</td>
</tr>
<tr>
<td>Semi-skilled</td>
<td>1,493</td>
<td>8,927</td>
<td>7,434</td>
</tr>
<tr>
<td>Low-skilled</td>
<td>3,859</td>
<td>1,013</td>
<td>-2,846</td>
</tr>
</tbody>
</table>

\(^1\) The three major occupational groups are skilled workers, semi-skilled and low-skilled. Skilled workers comprise managers, professionals and technicians and associate professionals. Semi-skilled workers comprise clerical support workers, service and sales workers, skilled agricultural, forestry and fishery workers, craft and related trade workers, and plant and machine operators and assemblers. Low skilled workers comprise elementary occupations.

\(^2\) 2015 figures are an estimation while 2020 are forecasted.

Source: Economic Planning Unit and Department of Statistics Malaysia
11TH MALAYSIAN PLAN
Anchoring Growth on People

- Enhancing inclusiveness towards an equitable society
- Improving wellbeing for all
- Accelerating human capital development for an advanced nation

- Pursuing green growth for sustainability and resilience
- Strengthening infrastructure to support economic expansion
- Re-engineering economic growth for greater prosperity
Box 5-4

Malaysia Education Blueprint 2015-2025 (Higher Education)

In 2015, the Government launched the Malaysia Education Blueprint 2015-2025 (Higher Education) or MEB (HE), outlining a comprehensive transformation programme for the higher education system. As with the MEB, the Government aims to improve system outcomes on the dimensions of access, quality, equity, unity, and efficiency. From a student outcome perspective, the vision is to develop holistic, entrepreneurial, and balanced graduates with the relevant knowledge and skills (ilmu), and ethics and morality (akhlak) to meet the needs of Malaysia’s growing economy and to be competitive internationally.

To achieve these system and student aspirations, the MEB (HE) outlines 10 shifts that will spur continued excellence. The first four shifts focus on talent outcomes for key stakeholders in the higher education system. The other six shifts focus on enablers, covering critical components of higher education such as funding, innovation, governance, online learning, global prominence, and delivery.

The implementation of the MEB (HE) will result in major shifts in the way the higher education system operates, as shown below:

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job seekers</td>
<td>Job creators and balanced citizens with entrepreneurial mindsets</td>
</tr>
<tr>
<td>Focus on university education</td>
<td>Academic and TVET pathways equally valued and cultivated</td>
</tr>
<tr>
<td>Focus on inputs</td>
<td>Focus on outcomes</td>
</tr>
<tr>
<td>Highly centralised</td>
<td>A model of earned autonomy for institutions</td>
</tr>
<tr>
<td>Reliance on government resources</td>
<td>All stakeholders have shared responsibility for higher education resources</td>
</tr>
<tr>
<td>Mass production delivery model</td>
<td>Technology-enabled innovations to deliver and tailor education for all students</td>
</tr>
<tr>
<td>Separation of private and public institutions</td>
<td>Harmonised Higher Learning Institutions</td>
</tr>
</tbody>
</table>

Source: Ministry of Education
ENGINEERING VS ENGINEERING TECHNOLOGY

Engineering and Engineering Technology
Spectrum of Technical Job Functions

- Test and Evaluation
- Product Design
- Manufacturing
- Production
- Operation, service and maintenance
- Distribution and Sales
- Research
- Complex Analysis
- Complex Design
- Engineering
- Engineering Technology
- More theoretical
- More application
JOB SCOPE OF AN ENGINEER?
JOB SCOPE OF AN ENGINEERING TECHNOLOGIST?
Science
Knowledge of general truths and laws

Engineering
Acquiring and applying scientific knowledge to build/design/create something

Technology
The sum of all the engineered tools/devices/processes available
In order to distinguish between engineering and engineering technology, a technological spectrum is used to illustrate the differences. Generally, in an organization, engineers would most likely work in the design and development fields while technologists, technicians and craftsmen would be more inclined to work in manufacturing and production line. The engineers role are more towards the left of the spectrum while the technologists are more towards the right of the spectrum although the main activities of both engineers and technologist are in the center of the spectrum.

Source: Cheshier, 1998
EDUCATION SPECTRUM

ABET Accredited ETAC

ENGINEERING TECHNOLOGY EDUCATION


ENGINEERING EDUCATION

ABET Accredited EAC
Accreditation Board for Engineering and Technology [ABET] describes the difference between engineering and engineering technology as "Engineering and technology are separate, but intimately related professions"
• Engineering undergraduate programs include more mathematics work and higher level mathematics than technology programs.
• Engineering undergraduate programs often focus on theory, while technology programs usually focus on application.
• Once they enter the workforce, engineering graduates typically spend their time planning, while engineering technology graduates spend their time making plans work.
ENG VS ENG TECH [ABET] .... cont.

- At ABET, engineering and engineering technology programs are evaluated and accredited by two separate accreditation commissions using two separate sets of accreditation criteria.
- Graduates from engineering programs are called engineers, while graduates of technology programs are often called technologists.
- Graduates from engineering technology programs are often hired as engineers.
Graduate Attributes and Professional Competencies

Version 3: 21 June 2013

This document is available through the IEA website: http://www.ieaagreements.org.
<table>
<thead>
<tr>
<th>... for Washington Accord Graduate</th>
<th>... for Sydney Accord Graduate</th>
<th>... for Dublin Accord Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization as specified in WK1-WK4 respectively to the solution of complex engineering problems.</td>
<td>Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization as specified in SK1-SK4 respectively to defined and applied engineering procedures, processes, systems or methodologies.</td>
<td>Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization as specified in DK1-DK4 respectively to wide practical procedures and practices.</td>
</tr>
</tbody>
</table>
## 4.1 Range of Problem Solving

References to the Knowledge Profile are shown thus: (WK3, WK4 ...)

In the context of both Graduate Attributes and Professional Competencies:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Complex Engineering Problems have characteristic WP1 and some or all of WP2 to WP7:</th>
<th>Broadly-defined Engineering Problems have characteristic SP1 and some or all of SP2 to SP7:</th>
<th>Well-defined Engineering Problems have characteristic DP1 and some or all of DP2 to DP7:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of Knowledge Required</td>
<td>WP1: Cannot be resolved without in-depth engineering knowledge at the level of one or more of WK3, WK4, WK5, WK6 or WK8 which allows a fundamentals-based, first principles analytical approach</td>
<td>SP1: Cannot be resolved without engineering knowledge at the level of one or more of SK4, SK5, and SK6 supported by SK3 with a strong emphasis on the application of developed technology</td>
<td>DP1: Cannot be resolved without extensive practical knowledge as reflected in DK5 and DK6 supported by theoretical knowledge defined in DK3 and DK4</td>
</tr>
<tr>
<td>Range of conflicting requirements</td>
<td>WP2: Involve wide-ranging or conflicting technical, engineering and other issues</td>
<td>SP2: Involve a variety of factors which may impose conflicting constraints</td>
<td>DP2: Involve several issues, but with few of these exerting conflicting constraints</td>
</tr>
<tr>
<td>Depth of analysis required</td>
<td>WP3: Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models</td>
<td>SP3: Can be solved by application of well-proven analysis techniques</td>
<td>DP3: Can be solved in standardised ways</td>
</tr>
<tr>
<td>Familiarity of issues</td>
<td>WP4: Involve infrequently encountered issues</td>
<td>SP4: Belong to families of familiar problems which are solved in well-accepted ways</td>
<td>DP4: Are frequently encountered and thus familiar to most practitioners in the practice area</td>
</tr>
<tr>
<td>Extent of applicable codes</td>
<td>WP5: Are outside problems encompassed by standards and codes of practice for professional engineering</td>
<td>SP5: May be partially outside those encompassed by standards or codes of practice</td>
<td>DP5: Are encompassed by standards and/or documented codes of practice</td>
</tr>
<tr>
<td>Extent of stakeholder involvement and conflicting requirements</td>
<td>WP6: Involve diverse groups of stakeholders with widely varying needs</td>
<td>SP6: Involve several groups of stakeholders with differing and occasionally conflicting needs</td>
<td>DP6: Involve a limited range of stakeholders with differing needs</td>
</tr>
<tr>
<td>Interdependence</td>
<td>WP 7: Are high level problems including many component parts or sub-problems</td>
<td>SP7: Are parts of, or systems within complex engineering problems</td>
<td>DP7: Are discrete components of engineering systems</td>
</tr>
</tbody>
</table>

In addition, in the context of the Professional Competencies

<table>
<thead>
<tr>
<th>Consequences</th>
<th>EP1: Have significant consequences in a range of contexts</th>
<th>TP1: Have consequences which are important locally, but may extend more widely</th>
<th>NP1: Have consequences which are locally important and not far-reaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Judgement</td>
<td>EP2: Require judgement in decision making</td>
<td>TP2: Require judgement in decision making</td>
<td></td>
</tr>
</tbody>
</table>
## 4.2 Range of Engineering Activities

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Complex Activities</th>
<th>Broadly-defined Activities</th>
<th>Well-defined Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preamble</td>
<td><strong>Complex activities</strong> means <em>(engineering)</em> activities or projects that have some or all of the following characteristics:</td>
<td><strong>Broadly defined activities</strong> means <em>(engineering)</em> activities or projects that have some or all of the following characteristics:</td>
<td><strong>Well-defined activities</strong> means <em>(engineering)</em> activities or projects that have some or all of the following characteristics:</td>
</tr>
<tr>
<td>Range of resources</td>
<td>EA1: Involve the use of diverse resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)</td>
<td>TA1: Involve a variety of resources (and for this purposes resources includes people, money, equipment, materials, information and technologies)</td>
<td>NA1: Involve a limited range of resources (and for this purpose resources includes people, money, equipment, materials, information and technologies)</td>
</tr>
<tr>
<td>Level of interactions</td>
<td>EA2: Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues,</td>
<td>TA2: Require resolution of occasional interactions between technical, engineering and other issues, of which few are conflicting</td>
<td>NA2: Require resolution of interactions between limited technical and engineering issues with little or no impact of wider issues</td>
</tr>
<tr>
<td>Innovation</td>
<td>EA3: Involve creative use of engineering principles and research-based knowledge in novel ways.</td>
<td>TA3: Involve the use of new materials, techniques or processes in non-standard ways</td>
<td>NA3: Involve the use of existing materials techniques, or processes in modified or new ways</td>
</tr>
<tr>
<td>Consequences to society and the environment</td>
<td>EA4: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation</td>
<td>TA4: Have reasonably predictable consequences that are most important locally, but may extend more widely</td>
<td>NA4: Have consequences that are locally important and not far-reaching</td>
</tr>
<tr>
<td>Familiarity</td>
<td>EA5: Can extend beyond previous experiences by applying principles-based approaches</td>
<td>TA5: Require a knowledge of normal operating procedures and processes</td>
<td>NA5: Require a knowledge of practical procedures and practices for widely-applied operations and processes</td>
</tr>
</tbody>
</table>
### Knowledge profile

<table>
<thead>
<tr>
<th>A Washington Accord programme provides:</th>
<th>A Sydney Accord programme provides:</th>
<th>A Dublin Accord programme provides:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WK1</strong>: A systematic, theory-based understanding of the natural sciences applicable to the discipline</td>
<td><strong>SK1</strong>: A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline</td>
<td><strong>DK1</strong>: A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline</td>
</tr>
<tr>
<td><strong>WK2</strong>: Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline</td>
<td><strong>SK2</strong>: Conceptually-based mathematics, numerical analysis, statistics and aspects of computer and information science to support analysis and use of models applicable to the sub-discipline</td>
<td><strong>DK2</strong>: Procedural mathematics, numerical analysis, statistics applicable in a sub-discipline</td>
</tr>
<tr>
<td><strong>WK3</strong>: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline</td>
<td><strong>SK3</strong>: A systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline</td>
<td><strong>DK3</strong>: A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline</td>
</tr>
<tr>
<td><strong>WK4</strong>: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.</td>
<td><strong>SK4</strong>: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline</td>
<td><strong>DK4</strong>: Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline</td>
</tr>
<tr>
<td><strong>WK5</strong>: Knowledge that supports engineering design in a practice area</td>
<td><strong>SK5</strong>: Knowledge that supports engineering design using the technologies of a practice area</td>
<td><strong>DK5</strong>: Knowledge that supports engineering design based on the techniques and procedures of a practice area</td>
</tr>
<tr>
<td><strong>WK6</strong>: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline</td>
<td><strong>SK6</strong>: Knowledge of engineering technologies applicable in the sub-discipline</td>
<td><strong>DK6</strong>: Codified practical engineering knowledge in recognised practice area.</td>
</tr>
<tr>
<td><strong>WK7</strong>: Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability</td>
<td><strong>SK7</strong>: Comprehension of the role of technology in society and identified issues in applying engineering technology: ethics and impacts: economic, social, environmental and sustainability</td>
<td><strong>DK7</strong>: Knowledge of issues and approaches in engineering technician practice: ethics, financial, cultural, environmental and sustainability impacts</td>
</tr>
<tr>
<td><strong>WK8</strong>: Engagement with selected knowledge in the research literature of the discipline</td>
<td><strong>SK8</strong>: Engagement with the technological literature of the discipline</td>
<td></td>
</tr>
</tbody>
</table>

A programme that builds this type of knowledge and develops the attributes listed below is typically achieved in 4 to 5 years of study, depending on the level of students at entry.
### 5.2 Graduate Attribute Profiles

References to the Knowledge Profile are shown thus: (WK1 to WK4)

<table>
<thead>
<tr>
<th>Differentiating Characteristic</th>
<th>... for Washington Accord Graduate</th>
<th>... for Sydney Accord Graduate</th>
<th>... for Dublin Accord Graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engineering Knowledge:</strong></td>
<td>WA1: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to the solution of complex engineering problems.</td>
<td>SA1: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in SK1 to SK4 respectively to defined and applied engineering procedures, processes, systems or methodologies.</td>
<td>DA1: Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in DK1 to DK4 respectively to wide practical procedures and practices.</td>
</tr>
<tr>
<td><strong>Problem Analysis</strong></td>
<td>WA2: Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (WK1 to WK4)</td>
<td>SA2: Identify, formulate, research literature and analyse broadly-defined engineering problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialisation. (SK1 to SK4)</td>
<td>DA2: Identify and analyse well-defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity. (DK1 to DK4)</td>
</tr>
<tr>
<td><strong>Complexity of analysis</strong></td>
<td>WA3: Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (WK5)</td>
<td>SA3: 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. (SK5)</td>
<td>DA3: 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)</td>
</tr>
<tr>
<td><strong>Design/development of solutions:</strong></td>
<td>WA4: Conduct investigations of complex problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.</td>
<td>SA4: Conduct investigations of broadly-defined problems; locate, search and select relevant data from codes, data bases and literature (SK8), design and conduct experiments to provide valid conclusions.</td>
<td>DA4: Conduct investigations of well-defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements.</td>
</tr>
<tr>
<td><strong>Investigation:</strong></td>
<td>WA5: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations. (WK6)</td>
<td>SA5: Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to broadly-defined engineering problems, with an understanding of the limitations. (SK6)</td>
<td>DA5: Apply appropriate techniques, resources, and modern engineering and IT tools to well-defined engineering problems, with an awareness of the limitations. (DK6)</td>
</tr>
<tr>
<td><strong>Modern Tool Usage:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Each Graduate Attribute Profile is tailored to the specific context and requirements of each accord (Washington, Sydney, Dublin), focusing on different aspects of engineering education and professional practice.*
| The Engineer and Society: Level of knowledge and responsibility | WA6: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. (WK7) | SA6: Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technology practice and solutions to broadly defined engineering problems. (SK7) | DA6: 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) |
| Environment and Sustainability: Type of solutions. | WA7: Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (WK7) | SA7: Understand and evaluate the sustainability and impact of engineering technology work in the solution of broadly defined engineering problems in societal and environmental contexts. (SK7) | DA7: 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) |
| Ethics: Understanding and level of practice | WA8: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (WK7) | SA8: Understand and commit to professional ethics and responsibilities and norms of engineering technology practice. (SK7) | DA8: Understand and commit to professional ethics and responsibilities and norms of technician practice. (DK7) |
| Individual and Team work: Role in and diversity of team | WA9: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings. | SA9: Function effectively as an individual, and as a member or leader in diverse teams. | DA9: Function effectively as an individual, and as a member in diverse technical teams. |
| Communication: Level of communication according to type of activities performed | WA10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | SA10: 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. | DA10: 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. |
| Project Management and Finance: Level of management required for differing types of activity | WA11: Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. | SA11: Demonstrate knowledge and understanding of engineering management principles and apply these to one’s own work, as a member or leader in a team and to manage projects in multidisciplinary environments. | DA11: 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. |
| Lifelong learning: Preparation for and depth of continuing learning. | WA12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. | SA12: Recognize the need for, and have the ability to engage in independent and life-long learning in specialist technologies. | DA12: Recognize the need for, and have the ability to engage in independent updating in the context of specialized technical knowledge. |
6 Professional Competency Profiles

To meet the minimum standard of competence a person must demonstrate that he/she is able to practice competently in his/her practice area to the standard expected of a reasonable Professional Engineer/Engineering Technologist/Engineering Technician.

The extent to which the person is able to perform each of the following elements in his/her practice area must be taken into account in assessing whether or not he/she meets the overall standard.

<table>
<thead>
<tr>
<th>Differentiating Characteristic</th>
<th>Professional Engineer</th>
<th>Engineering Technologist</th>
<th>Engineering Technician</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehend and apply universal knowledge: Breadth and depth of education and type of knowledge</td>
<td>EC1: Comprehend and apply advanced knowledge of the widely-applied principles underpinning good practice</td>
<td>TC1: Comprehend and apply the knowledge embodied in widely accepted and applied procedures, processes, systems or methodologies</td>
<td>NC1: Comprehend and apply knowledge embodied in standardised practices</td>
</tr>
<tr>
<td>Comprehend and apply local knowledge: Type of local knowledge</td>
<td>EC2: Comprehend and apply advanced knowledge of the widely-applied principles underpinning good practice specific to the jurisdiction in which he/she practices.</td>
<td>TC2: Comprehend and apply the knowledge embodied in procedures, processes, systems or methodologies that is specific to the jurisdiction in which he/she practices.</td>
<td>NC2: Comprehend and apply knowledge embodied in standardised practices specific to the jurisdiction in which he/she practices.</td>
</tr>
<tr>
<td>Problem analysis: Complexity of analysis</td>
<td>EC3: Define, investigate and analyse complex problems</td>
<td>TC3: Identify, clarify, and analyse broadly-defined problems</td>
<td>NC3: Identify, state and analyse well-defined problems</td>
</tr>
<tr>
<td>Design and development of solutions: Nature of the problem and uniqueness of the solution</td>
<td>EC4: Design or develop solutions to complex problems</td>
<td>TC4: Design or develop solutions to broadly-defined problems</td>
<td>NC4: Design or develop solutions to well-defined problems</td>
</tr>
<tr>
<td>Evaluation: Type of activity</td>
<td>EC5: Evaluate the outcomes and impacts of complex activities</td>
<td>TC4: Evaluate the outcomes and impacts of broadly defined activities</td>
<td>NC5: Evaluate the outcomes and impacts of well-defined activities</td>
</tr>
<tr>
<td>Protection of society: Types of activity and responsibility to public</td>
<td>EC6: Recognise the reasonably foreseeable social, cultural and environmental effects of complex activities generally, and have regard to the need for sustainability; recognise that the protection of society is the highest priority</td>
<td>TC6: Recognise the reasonably foreseeable social, cultural and environmental effects of broadly-defined activities generally, and have regard to the need for sustainability; take responsibility in all these activities to avoid putting the public at risk.</td>
<td>NC6: Recognise the reasonably foreseeable social, cultural and environmental effects of well-defined activities generally, and have regard to the need for sustainability; use engineering technical expertise to prevent dangers to the public.</td>
</tr>
<tr>
<td>Legal and regulatory: No differentiation in this characteristic</td>
<td>EC7: Meet all legal and regulatory requirements and protect public health and safety in the course of his or her activities</td>
<td>TC7: Meet all legal and regulatory requirements and protect public health and safety in the course of his or her activities</td>
<td>NC7: Meet all legal and regulatory requirements and protect public health and safety in the course of his or her activities</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Ethics: No differentiation in this characteristic</td>
<td>EC8: Conduct his or her activities ethically</td>
<td>TC8: Conduct his or her activities ethically</td>
<td>NC8: Conduct his or her activities ethically</td>
</tr>
<tr>
<td>Manage engineering activities: Types of activity</td>
<td>EC9: Manage part or all of one or more complex activities</td>
<td>TC9: Manage part or all of one or more broadly-defined activities</td>
<td>NC9: Manage part or all of one or more well-defined activities</td>
</tr>
<tr>
<td>Communication: No differentiation in this characteristic</td>
<td>EC10: Communicate clearly with others in the course of his or her activities</td>
<td>TC10: Communicate clearly with others in the course of his or her activities</td>
<td>NC10: Communicate clearly with others in the course of his or her activities</td>
</tr>
<tr>
<td>Lifelong learning: Preparation for and depth of continuing learning</td>
<td>EC11: Undertake CPD activities sufficient to maintain and extend his or her competence</td>
<td>TC11: Undertake CPD activities sufficient to maintain and extend his or her competence</td>
<td>NC11: Undertake CPD activities sufficient to maintain and extend his or her competence</td>
</tr>
<tr>
<td>Judgement: Level of developed knowledge, and ability and judgement in relation to type of activity</td>
<td>EC12: Be responsible for making decisions on part or all of complex activities</td>
<td>TC12: Choose appropriate technologies to deal with broadly defined problems. Exercise sound judgement in the course of his or her broadly-defined activities</td>
<td>NC12: Choose and apply appropriate technical expertise. Exercise sound judgement in the course of his or her well-defined activities</td>
</tr>
<tr>
<td>Responsibility for decisions: Type of activity for which responsibility is taken</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
Pathways for Engineering Technology Academic Qualification (Abang Abdullah 2009)
Register as Professional Engineering Technologist (PEngT)

Register as Graduate Engineering Technologist

Register as Professional Engineering (PEng)

Register as Graduate Engineer

Engineering Technology Accreditation Council (ETAC)

Engineering Accreditation Council (EAC)

BEngTech

BEng
MBOT will enhance the career path of TEVT graduates

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>NA</td>
<td>NA</td>
<td>Doctorate</td>
<td>Principal Technologist / Executive</td>
</tr>
<tr>
<td>7</td>
<td>NA</td>
<td>NA</td>
<td>Masters</td>
<td>Senior Technologist / Executive</td>
</tr>
<tr>
<td>6</td>
<td>NA</td>
<td>NA</td>
<td>Bachelors</td>
<td>Technologist / Executive</td>
</tr>
<tr>
<td>5</td>
<td>Advanced Diploma</td>
<td>Advanced Diploma</td>
<td>Advanced Diploma</td>
<td>Senior Technician</td>
</tr>
<tr>
<td>4</td>
<td>Diploma</td>
<td>Diploma</td>
<td>Diploma</td>
<td>Technician</td>
</tr>
<tr>
<td>3</td>
<td>Skills Certificate 3</td>
<td>Vocational &amp; Technical Certificate</td>
<td></td>
<td>Junior Technician</td>
</tr>
<tr>
<td>2</td>
<td>Skills Certificate 2</td>
<td></td>
<td></td>
<td>Senior Operator</td>
</tr>
<tr>
<td>1</td>
<td>Skills Certificate 1</td>
<td></td>
<td></td>
<td>Operator</td>
</tr>
</tbody>
</table>
New Issue in Engineering Technology

• About 80% of working field in engineering needs engineering technologist
• Out of 100,000 engineers, 80,000 doing engineering technologist work
• Government aims to produce 60,000 Technologists by 2020
• MTUN is responsible to produce Technologists
The Establishment of Malaysia Board of Technologists (MBOT)
CURRENT STATUS ON TECHNOLOGIST AND TECHNICIANS 2014 BILL

PASSED IN PARLIAMENT ➔ 2 APRIL 2015

PASSED IN SENATE ➔ 23 APRIL 2015

GAZETTED ➔ 6 JUNE 2015;
EFFECTIVE ➔ 1 AUG 2015
Policy decisions on the establishment of MBOT

10th Malaysia Plan

Accelerate the recognition of TEVT certifications through the establishment of MBOT

Cabinet Committee on HCD (JKMPMI) No.3/2010 (20 August 2010)

Recommend the establishment of MBOT to recognise and certify technologist as a profession to increase the pool of skilled workforce required to attain a high income economy

Cabinet Decision (29 September 2010)

Endorse the decision of Cabinet Committee on HCD to establish MBOT

Cabinet Committee on HCD (JKMPMI) No.1/2011 (8 March 2011)

Expedite the establishment of MBOT to recognise TEVT graduates
Key Functions of MBOT

1. Accredit technology and Technical Programme in IHL / TEVT Institution
2. Regulate the conduct and ethics of technologists and technicians
3. Promote education and training (professional programme)
4. Assess and approve / reject applications for registration
5. Establish accreditation councils (eg. ETAC and SAC)
To elevate the standing and recognition of Technologists and Technicians

- Technologists and technicians are currently not recognised and certified as professionals by any professional body
- Technologists and technicians will be accorded international recognition through membership of MBOT in various international accords
- Institutions will be motivated to offer technology and TEVT programmes

To increase the pool of skilled workforce required to attain a high income economy

- Only 28% of the total workforce is employed in the higher skilled jobs category reflecting a huge pool of unskilled workforce
- Potential pool of 100,000 students (22% of total students enter the workforce after SPM) who are technically inclined
- Of the total 3.3 million jobs to be created under ETP by 2020, 700,000 jobs require skilled workforce with diploma in TEVT

To improve public perception of TEVT and attract more students

- On average, 10% of students enroll in TEVT institutions annually (low compared to 44% in OECD countries) reflecting the unattractiveness of TEVT
- 38 diploma / advanced diploma engineering and technology courses offered by 30 polytechnics will be accredited
- 30% of the 5,639 skills programmes that are technical-based will be accredited
- More students will be motivated to enroll in TEVT

To protect public safety and health through...

- Quality assurance (qualification, accreditation, training)
- License professional technologists / certified technicians to offer professional technology and technical services
- Regulate code of conduct and ethics of technologists and technicians
Technologists are not recognised as a profession in Malaysia by any professional bodies in Malaysia (estimated 384,300 technologists will be produced by 2020).

300,000 technicians produced by polytechnics in Malaysia are not accredited by any professional bodies in Malaysia.

911 training centres offer 5,639 skills training programmes but they are not recognised.

Limited career path for graduates in skills because the programmes are not recognised.

Engineering Technology Programmes offered by Higher Education Institutions are not accredited by any professional bodies in Malaysia.

MBOT will solve these long overdue problems...
MBOT WILL PRODUCE THESE OUTPUTS...

<table>
<thead>
<tr>
<th>TEVT</th>
<th>Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More than <strong>300,000</strong> technicians will be registered</td>
<td>• <strong>5,639</strong> accredited programmes (certificate / diploma / advanced diploma) will be recognised</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engineering Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>44</strong> new engineering technology programmes and <strong>124</strong> existing ones will be accredited</td>
</tr>
<tr>
<td>• <strong>384,300</strong> new technologists will be registered by 2020</td>
</tr>
</tbody>
</table>
2. In this Act, unless the context otherwise requires —

- “technologist” means a person who involves in the application and adaptation of technology that requires principles, methods and techniques appropriate to the field of technology with the exception of those who are already registered under any other Acts as in appendix; (BEM, BOA, BQSM,..)

- “Professional Technologist” means a person registered under subsection 19(4);

- “Graduate Technologist” means a person registered under subsection 19(2);
17. No person shall, unless he is a Professional Technologist –

(a) approve and certify the manner or conduct of technology services to be carried out;

be entitled to describe himself or hold himself out under any name, style or title –

bearing the words “Professional Technologist” or the equivalent in any other language;

bearing any other word whatsoever in any language which may reasonably be construed to imply that he is a Professional Technologist;

using the abbreviated title “Ts.” for Professional Technologist before his name with the approval of the Board; or

using the abbreviation “P.Tech” for Professional Technologist and his specialisation after his name with the approval of the Board;
19. (1) A person who holds a degree in technology or a technical-related programme which is recognised by the Board may apply to be registered as a **Graduate Technologist** upon payment of the prescribed fee.

(2) Upon application made under subsection (1), and based on the criteria as may be determined by the Board, the Board may approve the application to be registered as a **Graduate Technologist**.

(3) A **Graduate Technologist** registered under subsection (2) who has –

obtained the practical experience as may be determined by the Board;

paid the prescribed fee; and

complied with all the criteria to be determined by the Board,

may apply to be registered as a **Professional Technologist**.

(4) Upon application made under subsection (3), and based on the criteria as may be determined by the Board, the Board may approve the registration of a Graduate Technologist as a **Professional Technologist**.
ENGINEERING TECHNOLOGY IN MTUN
Malaysian Technical University Network (MTUN)
DNA OF MTUN

- Problem Centered Learning
- Action & Experimental Learning
- Applied Theory
- Teaching Factory
- Practical Oriented
Implementation for Engineering Technology Program at MTUN
### ESTIMATED BUDGET FOR ENGINEERING TECHNOLOGY PROGRAM IN MTUN

#### 2013-2015

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL [RM MILLIONS]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>272</td>
</tr>
<tr>
<td>2014</td>
<td>285</td>
</tr>
<tr>
<td>2015</td>
<td>365</td>
</tr>
<tr>
<td>TOTAL</td>
<td>922</td>
</tr>
</tbody>
</table>

**45 PROGRAMS & ~ 7000 STUDENTS**
Challenges and Future of ENGINEERING TECHNOLOGY
Engineering Technology Initiatives

Challenges:
- Awareness
- Right Model
- Funding
- Implementation
- Buying in
- Accreditation
1. Awareness

**Engineering vs. Engineering Technology**
- Terminology
- Functions and Roles

**Perception**
- Future Students and their Parents

**Presence**
- Few graduates in the market

**Availability**
- Started in UniKL
- Just recently established in MTUN
## The Right Model

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>BOARD</th>
<th>SCOPE</th>
<th>ACCORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaysia</td>
<td>Board of Engineers Malaysia (BEM)</td>
<td>Engineering Programme</td>
<td>Washington</td>
</tr>
<tr>
<td>UK</td>
<td>Engineering Council (EC)</td>
<td>Engineering, Technology, Construction &amp; Build Environment</td>
<td>Washington</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sydney Dublin</td>
</tr>
<tr>
<td>Canada</td>
<td>Canadian Council of Technicians &amp; Technologists (CCTT)</td>
<td>Bioscience, Building, Chemical, Civil, Electrical, Electronic, Forestry, Geomatics, Instrumentation, Industrial, Information Technology, Mechanical, Petroleum &amp; Geosciences</td>
<td>Sydney Dublin</td>
</tr>
<tr>
<td></td>
<td>Engineers Canada</td>
<td>All Engineering fields</td>
<td>Washington</td>
</tr>
<tr>
<td>USA</td>
<td>Accreditation Board for Engineering and Technology (ABET)</td>
<td>Education in Applied Science, Computing, Engineering and Technology</td>
<td>Washington</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sydney</td>
</tr>
<tr>
<td>Australia</td>
<td>Institution of Engineers Australia (IEA)</td>
<td>All Engineering fields</td>
<td>Sydney Washington</td>
</tr>
<tr>
<td>Ireland</td>
<td>Engineers Ireland</td>
<td>All Engineering fields and ICT</td>
<td>Washington</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sydney Dublin</td>
</tr>
</tbody>
</table>
### 3 Funding

<table>
<thead>
<tr>
<th>Univ has to bear the cost for</th>
<th>Government Fund</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Curriculum development</td>
<td>• Limited funding</td>
</tr>
<tr>
<td>• Administrative works</td>
<td>• Delay or uncertain</td>
</tr>
</tbody>
</table>
4 Implementation

- **Programs**
  - Searching for suitable programs
  - Dealing with host institutions

- **Delivery**
  - Curriculum
  - Teaching materials

- **Manpower**
  - Lecturers and Technicians
  - Industrial Experience

- **Students**
  - Promotion, Application and Selection
5 Buying In

**STAKEHOLDERS**
- society
- industry
- students

**SHAREHOLDERS**
- government
- ministry
Accreditation

- Documentation
- Academic Audit

ABET

MQA

MBOT

Program Accreditation

- Documentation
- Academic Audit
WAY FORWARD

MALAYSIA 2020

ENGINEERING TECHNOLOGY

RECOGNITION & ACCEPTANCE

BENCHMARKING

FOCUS

QUALITY
Thank You