Board of Engineers Malaysia
www.bem.org.my

Engineering Accreditation Council
www.eac.org.my

Program Evaluator Training for ET, SC & BM (Academics)

8th Oct 2019, New Council Hall, 1st Floor, IEB HQ, Ramna, Dhaka, Bangladesh
16.00 – 17.40 (1hr 40mn)
18.00 – 20.00 (2hr)

EAC Chair

Megat Johari Megat Mohd Noor

BEM Board Member & P.Eng.

MySET President & Fellow

MJIIT Professor (Retired)

Malaysian Society For Engineering & Technology
Nurturing 21st Century Professionals

UTM UNIVERSITI TEKNOLOGI MALAYSIA

MJIIT MALAYSIA-JAPAN INTERNATIONAL INSTITUTE OF TECHNOLOGY

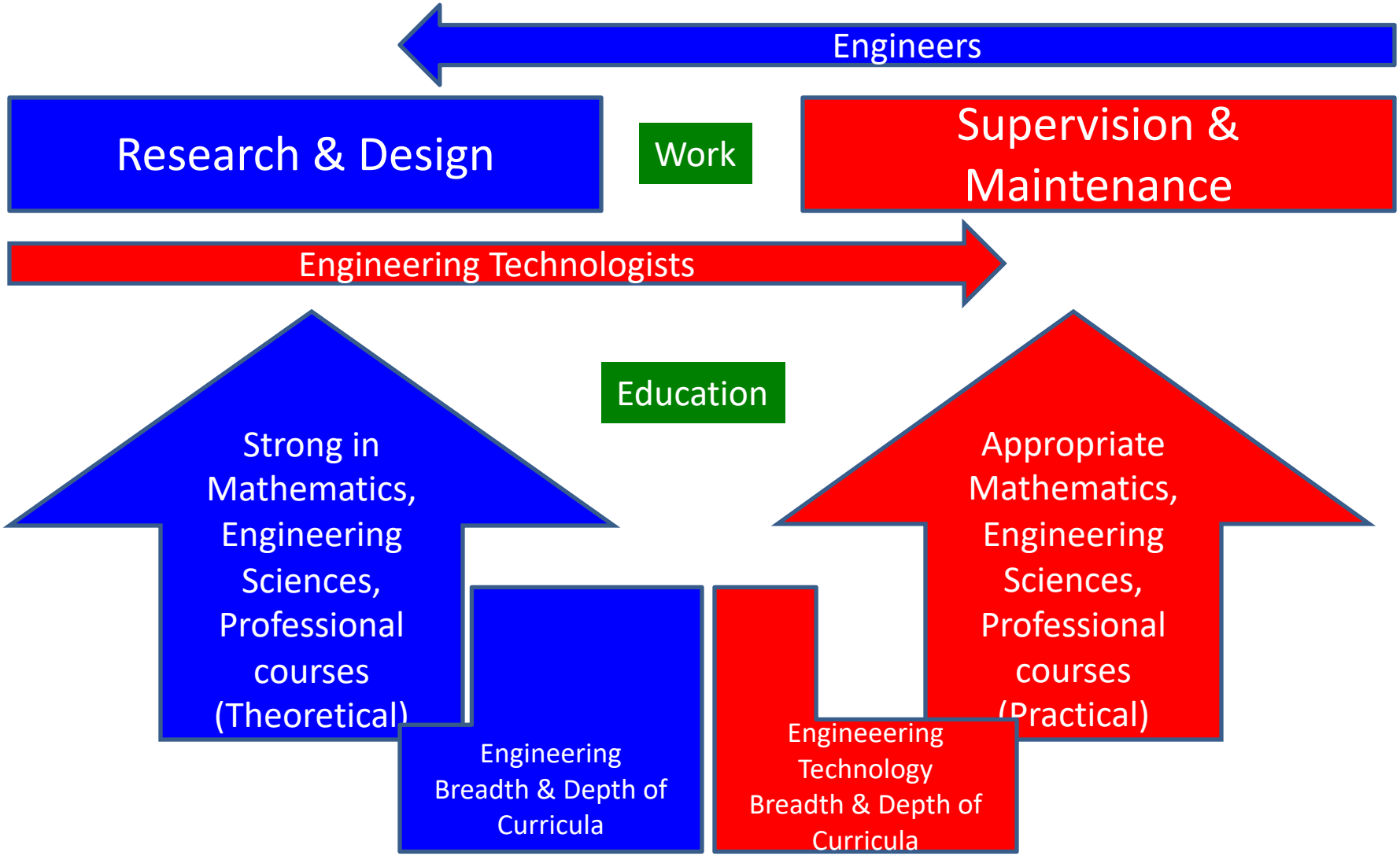
Megat Johari MEGAT MOHD NOOR

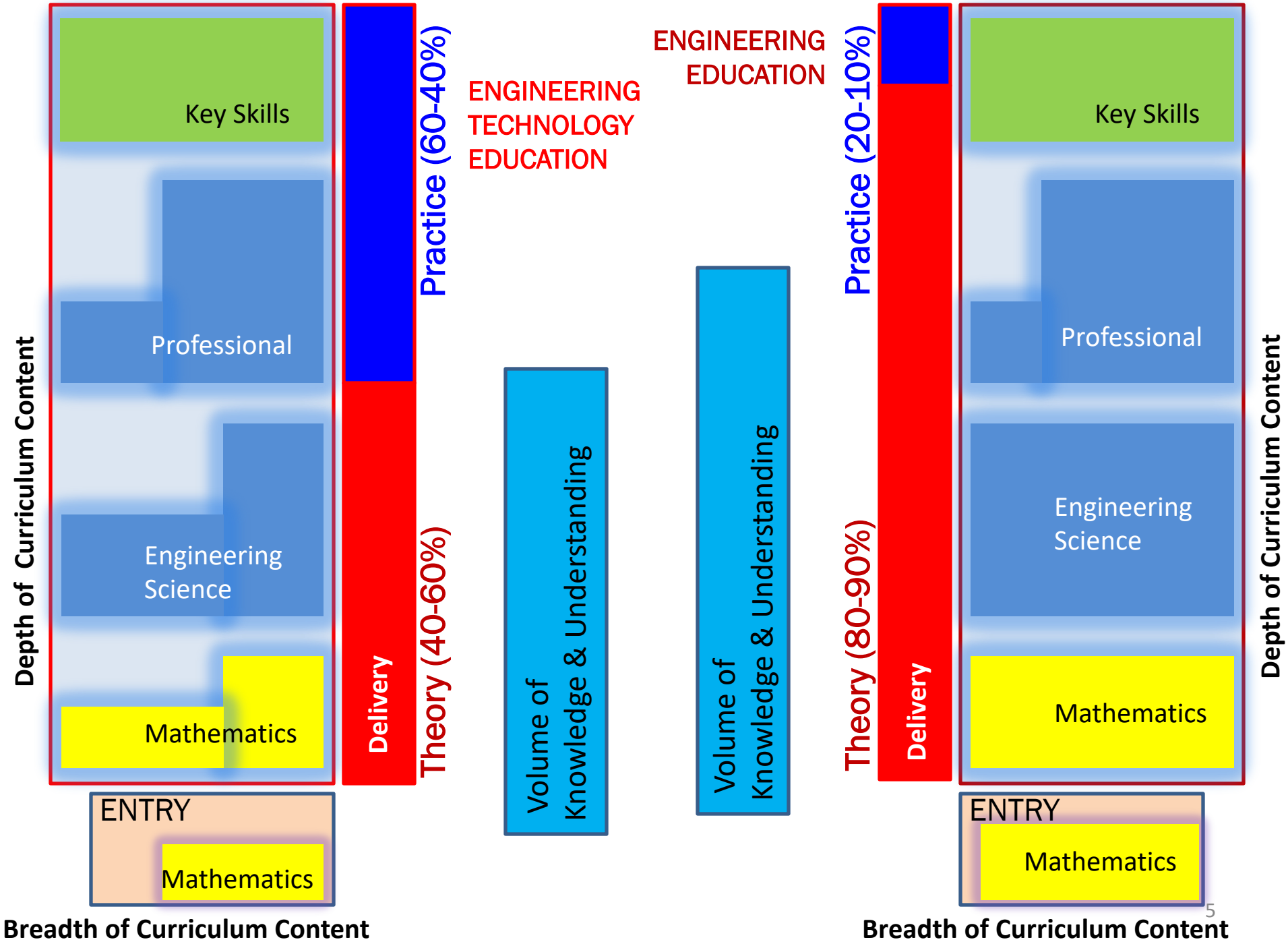
Board Member, BEM
Chair, Engineering Accreditation Council (EAC), BEM
Council Member, Engineering Technology Accreditation Council (ETAC), BEM
Professional Engineer with Practicing Certificate, BEM
Founding Director, Engineering Accreditation Department, BEM
Associate Director (International), Engineering Accreditation Department (EAD), BEM
President & Fellow, Malaysian Society for Engineering & Technology (MySET)
Vice President, Federation of Engineering Institutions of Islamic Countries (FEIIC)
Former Vice-President & Fellow, Institution of Engineers Malaysia (IEM)
Former Director, Centre for Quality & Risk Management (QRiM), UTM
Former Professor & Founding Dean, Malaysia Japan International Institute of Technology (MJIIT), UTM
Former Head, Department of Civil Engineering, UPM
Former Head, Quality Unit, Faculty of Engineering, UPM
Member, Malaysia Research University Committee, MoHE

9 October 2019

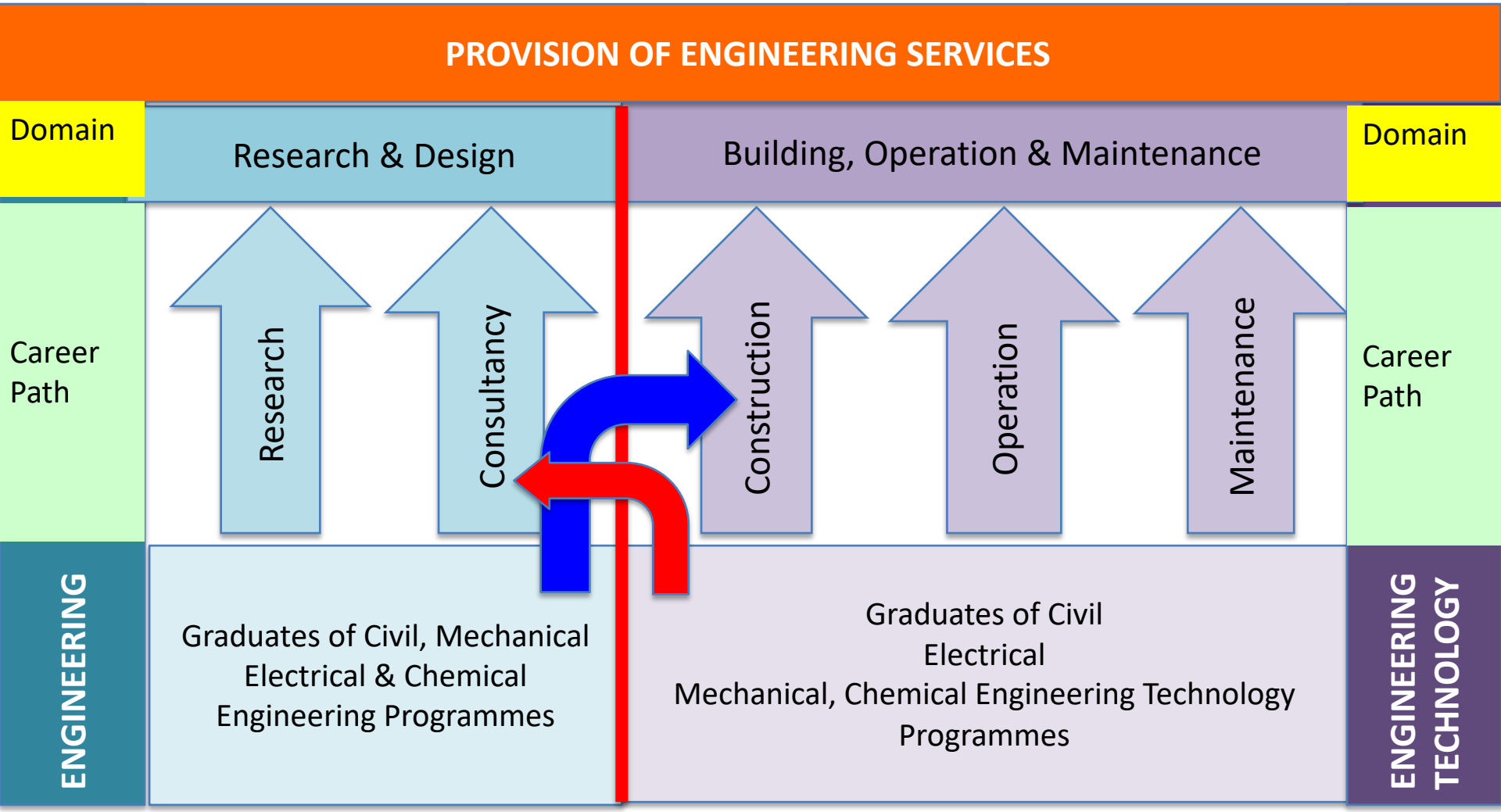
Introduction

Engineering & Engineering Technology Domains




Key Skills
Professional
Engineering Science
Mathematics
Depth of Curriculum Content
ENTRY
Mathematics
Breadth of Curriculum Content
Delivery
Practice (60-40%)
Theory (40-60%)
ENGINEERING TECHNOLOGY EDUCATION
Volume of Knowledge & Understanding
ENGINEERING EDUCATION
Volume of Knowledge & Understanding
Practice (20-10%)
Theory (80-90%)
Delivery
Key Skills
Professional
Engineering Science
Mathematics
Depth of Curriculum Content
ENTRY
Mathematics
Breadth of Curriculum Content

Career Paths



Accreditation

Accreditation Issues & Challenges

- Engineering education is to prepare graduates to face **challenges of the future** while meeting the **current needs**
- Paradigm Shift – **Outcome & Quality**
- Maintain **Fundamentals** while Encourage Inclusion of **Latest Technology** Advancement in the Curriculum
- Allow Academic **Innovation** and **Creativity**
- Variety of Modes of **Delivery**

The Dilemma

- Educational **delivery** systems may **change** dramatically
- Traditional educational providers will be different in the future – the **Mosaic degree**
- **Boundaries** between traditional disciplines will be increasingly **fuzzy**
- Exciting technical areas will be at the **boundaries** of **engineering and non-engineering disciplines**

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Importance of Accreditation to Institutions of Higher Learning

- Recognises institutional **missions and goals**
- Involves faculty/staff in **evaluation and planning**
- Assists institutions in determining the acceptability of **transfer credits**
- Promotes **"best practices"** in education
- Increases **visibility and reputation** of the institution
- Aids engineering schools to identify **required operational resources** to institution management

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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

Washington Accord Review

Bangladesh Washington Accord Route (till 2020?)

- **Nominator**
  First visit: …..
  Provisional Status: …..
- **Previous Mentor**
- **Current Mentor**
- **1a Reviewer (……..)**
  Visit: 2019 ?
- **1b Reviewer (ADM)**
  Visit: 2019 ?

Nominators

Mentors

Prof Wan (MAL)
Prof Siti (MAL)
Prof Lock (SIN)

Reviewers

?
?
?

Full Signatory in Jun 2020
at IEAM Cape Town, South Africa ?

WA is a long arduous journey

Common Questions on Outcome Based Education (OBE)

- What is OBE?
- Why OBE?
- When to start OBE?
- Who to develop and implement OBE?
- Where are the facilities for OBE?
- How to develop and implement OBE?

Paradigm shift!

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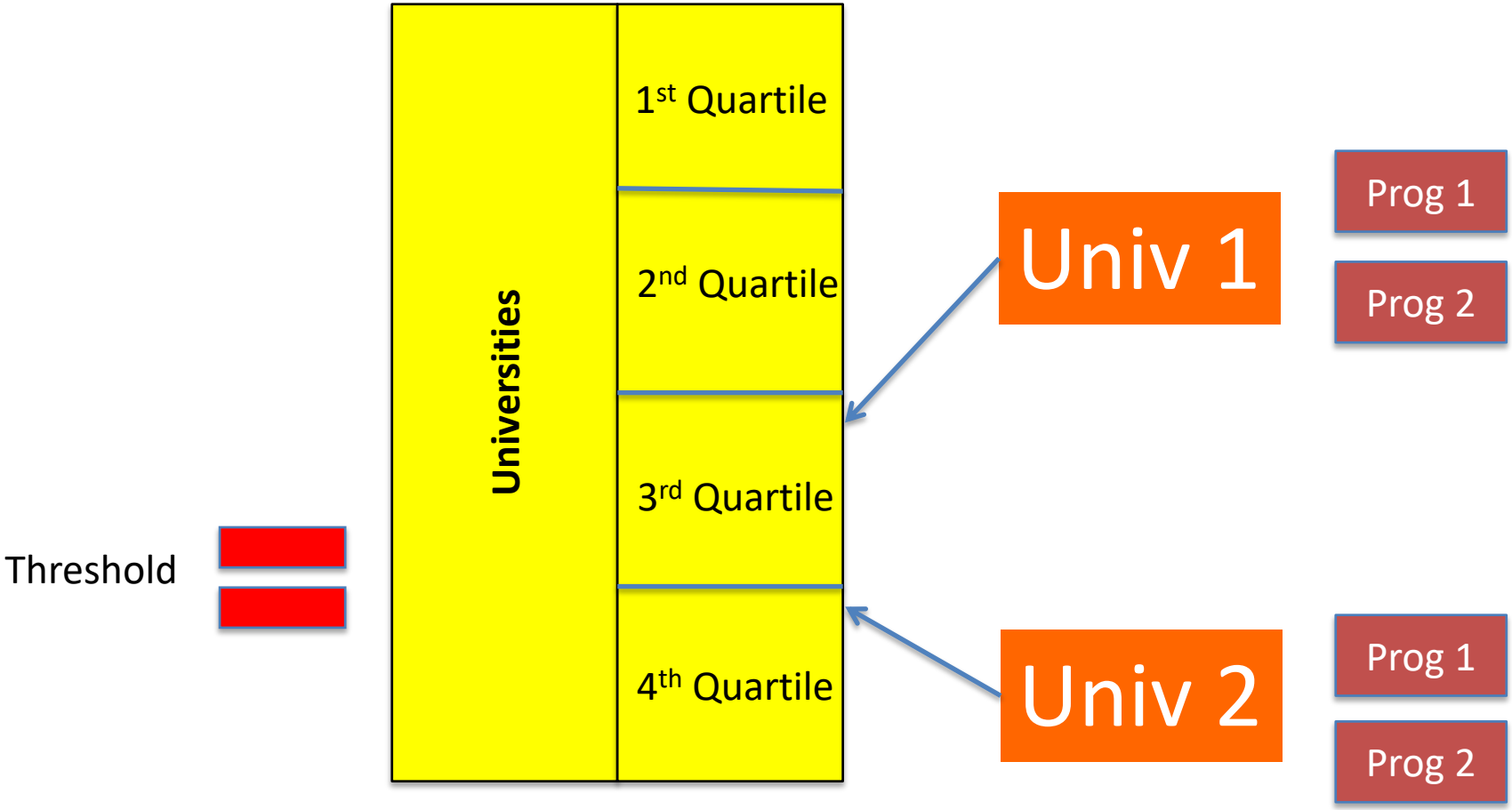
OBE & Malaysian Universities (Before 2005)

Preparation - Key Factors

- Accrediting Body
- Management Commitment
- Full Time Champion & Committed Knowledgeable Team
- Panel Evaluators Training & Commitment
- Institutions of Higher Learning Training & Commitment
- Financial Commitment

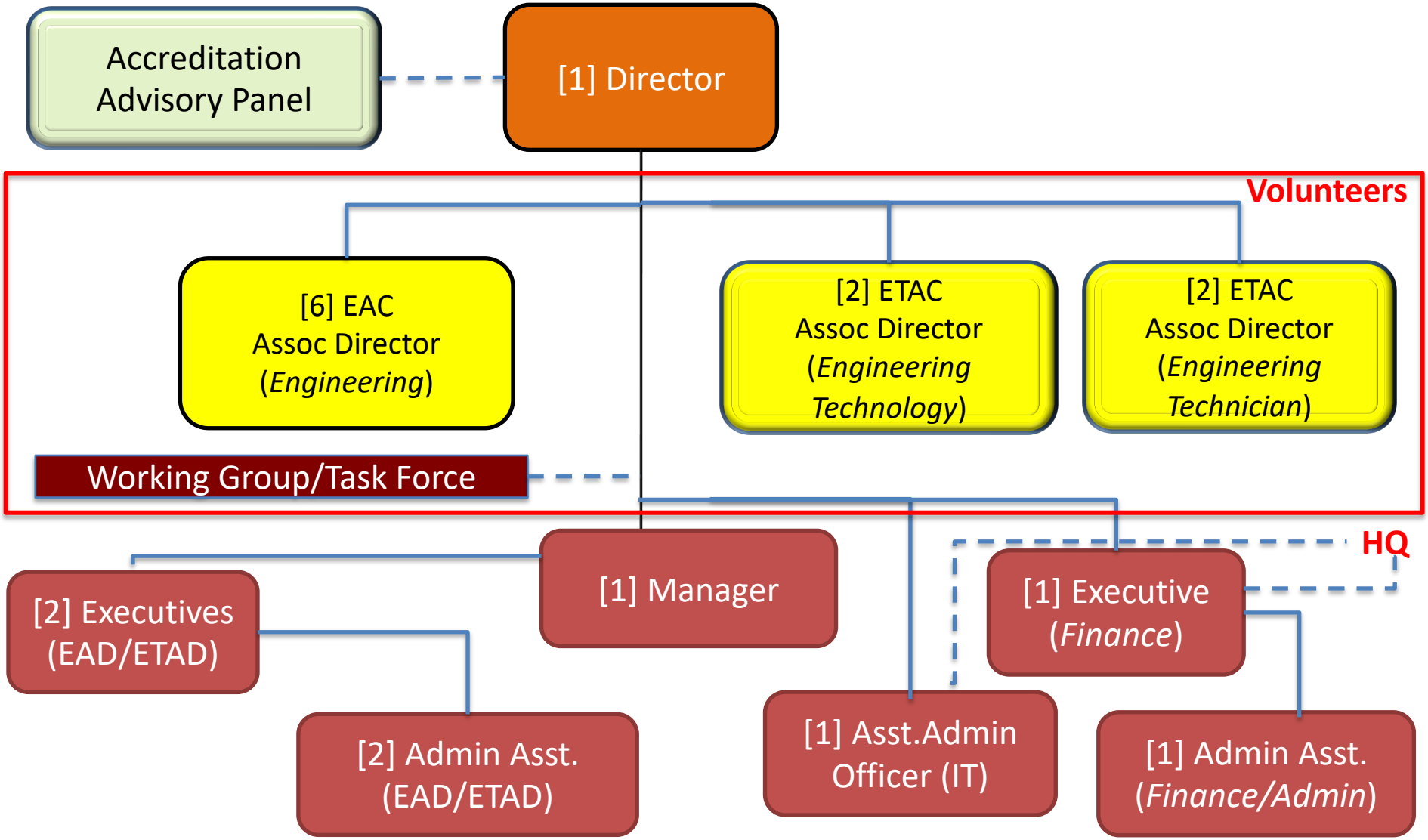
Universities at Threshold



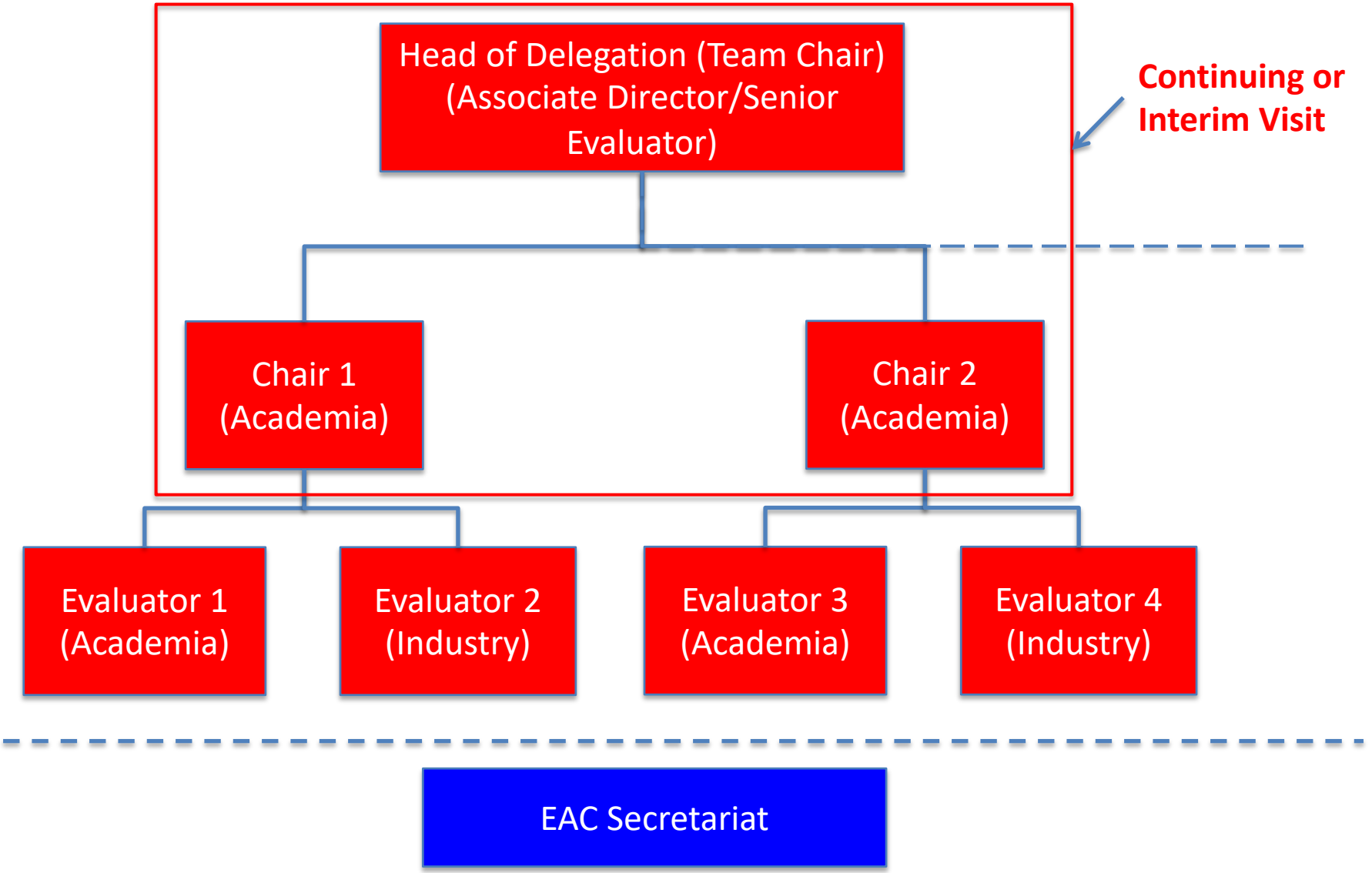
Itinerary of Reviewer Visit – an example

Date	Activities	Venue
3-6 Nov	Arrival of Washington Accords Reviewers	Royale Chulan, Kuala Lumpur & Sama-Sama Hotel KLIA
7 Nov	Meeting with Washington Accords Reviewers	Sama-Sama Hotel, KLIA
7-9 Nov	Accreditation Visit to Univ 1	Philea Resort & Spa, Melaka & Univ 2
10 Nov	Visit Melaka Historical City	Philea Resort & Spa, Melaka
11 Nov	Dinner with BEM	Royale Chulan, Kuala Lumpur & KL Tower
12-14 Nov	Accreditation Visit to Univ 2	Lights Hotel, Penang & Univ 2
15 Nov	Departure	Penang International Airport

Accreditation Department



Accreditation Visiting Team



Programme Evaluators (PEVs)

- **Chair** *(Criteria of appointment)*
- **Two members** *(Criteria of appointment)*

  - knowledgeable
  - trained
  - independent

EAC Panel Evaluators – Capacity Building

Year	No of Trained Evaluators (Cumulative)
2019	148
2020	200
2021	300
2022	400

Year	No of Trainings	No of Candidates
2019	4	100
2020	4	100
2021	4	100
2022	4	100

EAC Documents

EAC

Engineering

Programme Accreditation Manual

2020

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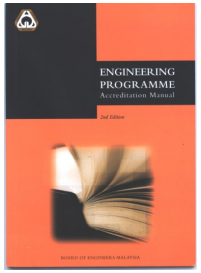
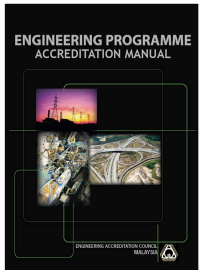
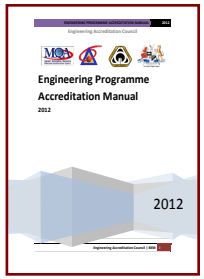
Full S

Accreditation Standard

- Malaysia's evolving accreditation standard from INPUT BASED to OUTCOME BASED







1999 **2003** **2006 & 2007 revision** **2012** **2017** **2020**

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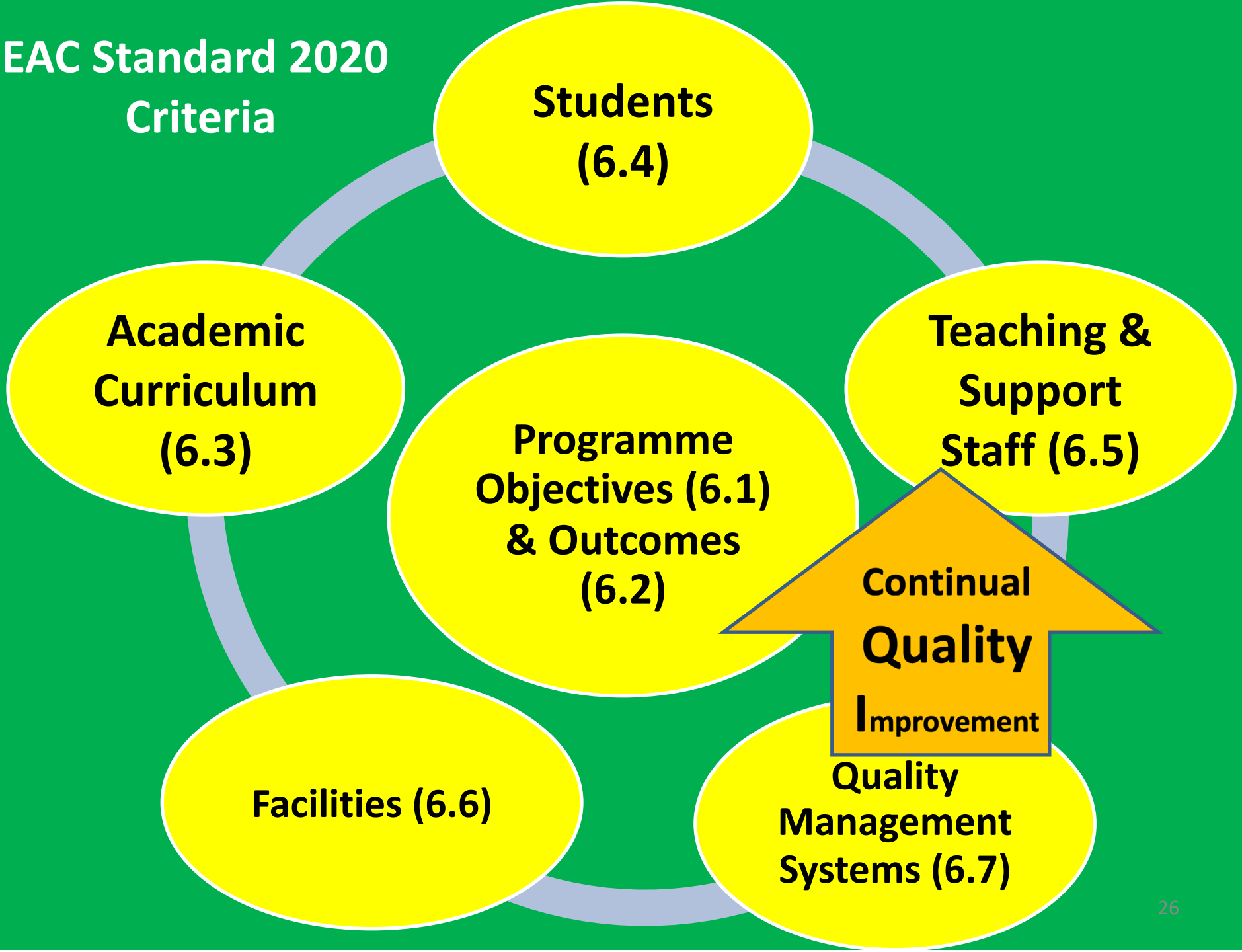
EAC Standard 2020 Criteria



SAR based on
Board of Accreditation for Engineering & Technical Education (BAETE) Manual (2nd Edition 2019) Effective 1st Jan 2020

Accreditation Criteria

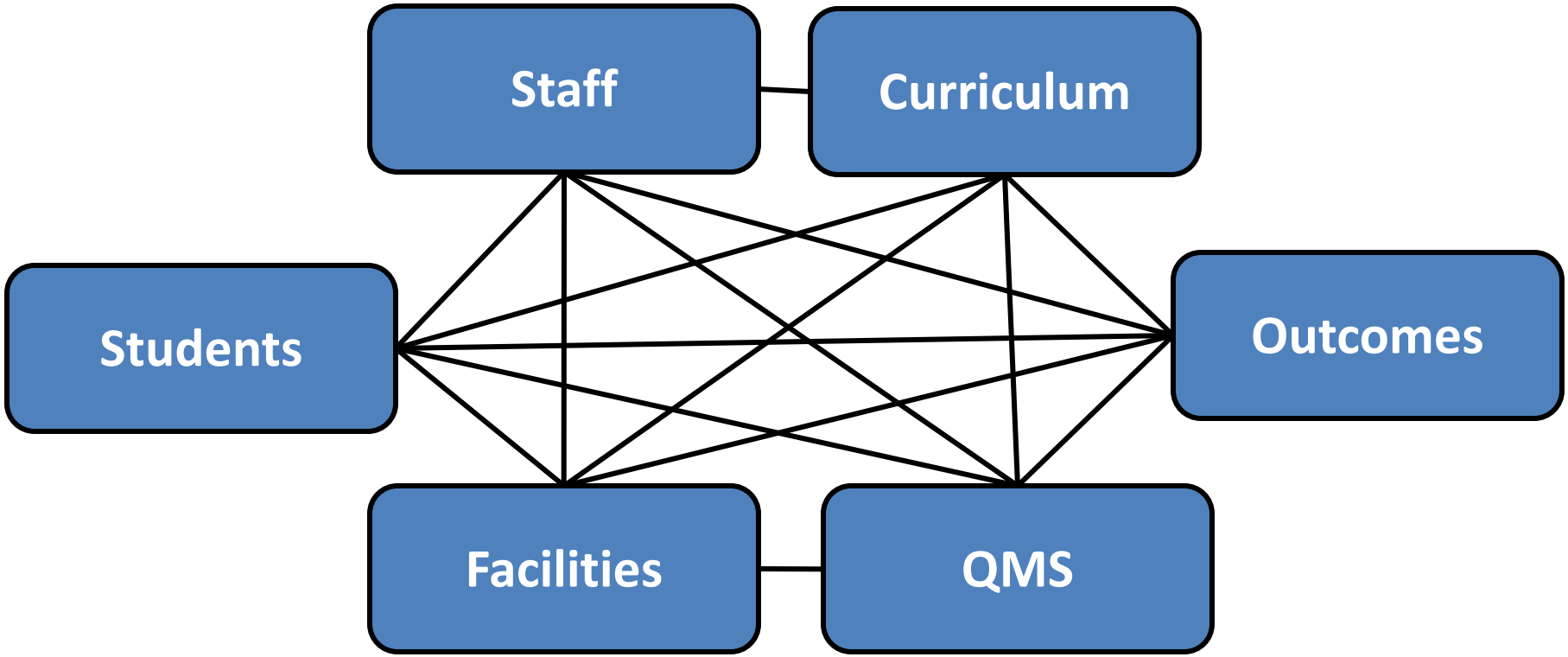
4.1 Organization and Governance
4.2 Financial and Physical Resources
4.3 Faculty
4.4 Students
4.5 Academic Facilities and Technical Support
4.6 Curriculum and Teaching-Learning Processes
4.7 Program Educational Objectives (PEO)
4.8 Program Outcomes and Assessment
4.9 Continuous Quality Improvement (CQI)
4.10 Interactions with the Industry……

COLD RECEPTION

Some are rigorous

Champion(s) & Teamwork

Triangulation



OBE

Outcome Based Education

Directed & Coherent Curriculum
Graduate Relevant to Industry

Programme Objective
(after 3-5 Years)

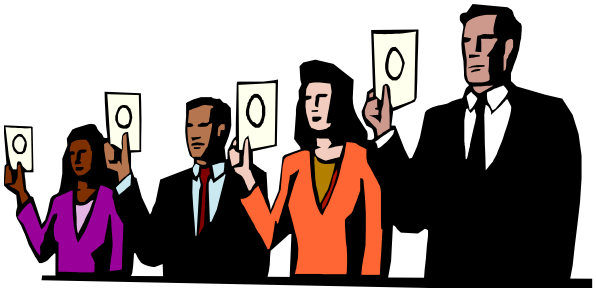
Programme Outcome
(at Exit)

Course/Unit/Learning Outcome
(Abilities & Intentional)

Accountable

Outcome Based Education

OBE is a process that involves **assessment** and **evaluation** practices in education to reflect the **attainment** of expected **learning** and **showing mastery** in the programme area



Characteristics of OBE curricula

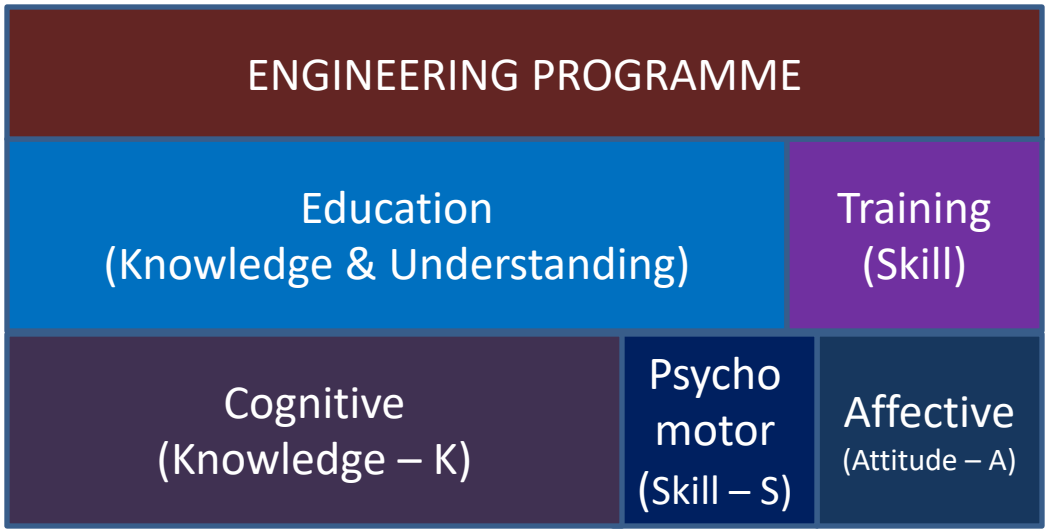
- Have **programme objectives, programme outcomes, course outcomes** and **performance indicators**.
- Stated objectives and outcomes can be **assessed and evaluated**.
- **Centered** around the needs of the **students** and the **stakeholders**.

Characteristics of OBE curricula
(cont)

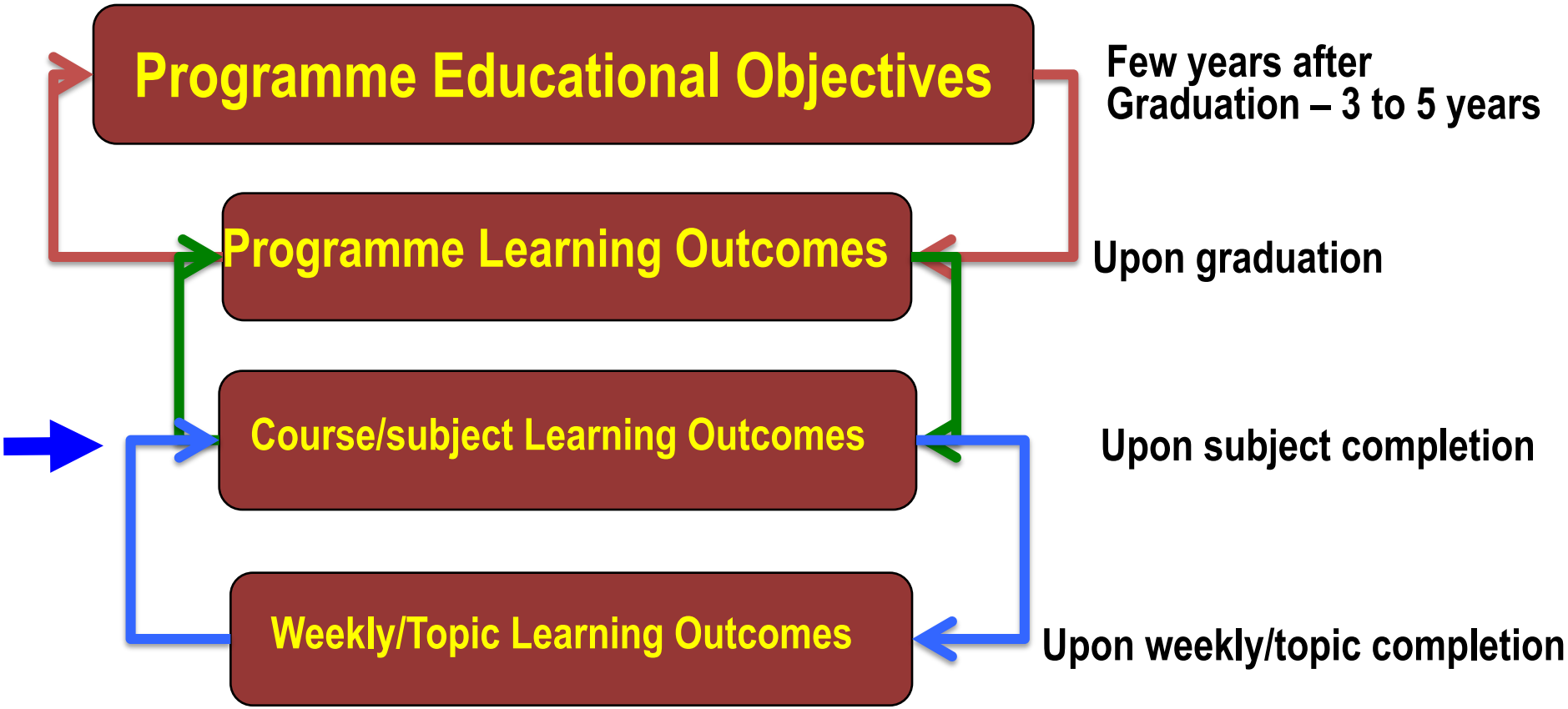
- **Learning outcomes** are **intentional** and assessed using suitable performance indicators.
- Programme **objectives** address the graduates attainment in their career within **3-5 years** after their graduation.
- Programme **outcomes** (**abilities** attained by students before they graduate) are formulated based on the programme objectives – **TOP DOWN**.

Characteristics of OBE curricula
(cont)

- Programme **outcomes** address **Knowledge, Skills** and **Attitudes** to be attained by students.
- Course outcomes must satisfy the stated programme outcomes. There is no need for ANY (individual) course to **address all programme outcomes.**
- Teaching/ Learning method may have to be integrated to include different **delivery methods** to complement the traditional Lecturing method.


ENGINEERING PROGRAMME
Education
(Knowledge & Understanding)
Training
(Skill)
Cognitive
(Knowledge – K)
Psycho
motor
(Skill – S)
Affective
(Attitude – A)

Different Levels of Outcomes



Bloom's Taxonomy

- Knowledge (list)
- Comprehension (explain)
- Application (calculate, solve, determine)
- Analysis (classify, predict, model, derived)
- Synthesis (design, improve)
- Evaluation (judge, select, critique)

New Bloom's Taxonomy

Remembering: can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce state
Understanding: can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase
Applying: can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write.
Analyzing: can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.
Evaluating: can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value, evaluate
Creating: can the student create new product or point of view?	assemble, construct, create, design, develop, formulate, write.

Psychomotor Domain

(doing, skills)

Perception

Definition:
Senses cues that guide motor activity.

Sample Verbs:
- detect
- hear
- listen
- observe
- perceive
- recognize
- see
- sense
- smell
- taste
- view
- watch

Set

Definition:
Is mentally, emotionally, and physically ready to act.

Sample Verbs:
- achieve a posture
- assume a body stance
- establish a body position
- place hands, arms, etc.
- position the body
- sit
- stand
- station

Guided Response

Definition:
Imitates and practices skills, often in discrete steps.

Sample Verbs:
- copy
- duplicate
- imitate
- manipulate with guidance
- operate under supervision
- practice
- repeat
- try

Mechanism

Definition:
Performs acts with increasing efficiency, confidence, and proficiency.

Sample Verbs:
- complete with confidence
- conduct
- demonstrate
- execute
- improve efficiency
- increase speed
- make
- pace
- produce
- show dexterity

Complete Overt Response

Definition:
Performs automatically.

Sample Verbs:
- act habitually
- advance with assurance
- control
- direct
- excel
- guide
- maintain efficiency
- manage
- master
- organize
- perfect
- perform automatically
- proceed

Adaption

Definition:
Adapts skill sets to meet a problem situation.

Sample Verbs:
- adapts
- reorganizes
- alters
- revises
- changes

Organization

Definition:
Creates new patterns for specific situations.

Sample Verbs:
- designs
- originates
- combines
- composes
- constructs

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor. 1956

Lower order | **Intermediate** | **Higher order**

Affective Domain

(feeling, attitudes)

Receiving

Definition

Selectively attends to stimuli.

Sample Verbs:

- accept
- acknowledge
- be aware
- listen
- notice
- pay attention
- tolerate

Responding

Definition:

Responds to stimuli.

Sample Verbs:

- agree to
- answer freely
- assist
- care for
- communicate
- comply
- conform
- consent
- contribute
- cooperate
- follow
- obey
- participate willingly
- read voluntarily
- respond
- visit
- volunteer

Valuing

Definition:

Attaches value or worth to something.

Sample Verbs:

- adopt
- assume responsibility
- behave according to
- choose
- commit
- desire
- exhibit loyalty
- express
- initiate
- prefer
- seek
- show concern
- show continual desire to
- use resources to

Organization

Definition:

Conceptualizes the value and resolves conflict between it and other values.

Sample Verbs:

- adapt
- adjust
- arrange
- balance
- classify
- conceptualize
- formulate
- group
- organize
- rank
- theorize

Internalizing

Definition:

Integrates the value into a value system that controls behavior.

Sample Verbs:

- act upon
- advocate
- defend
- exemplify
- influence
- justify behavior
- maintain
- serve
- support

Based on "Taxonomy of Educational Objectives", B.S. Bloom Editor. 1956

Lower order | **Intermediate** | **Higher order**

Course Outcome (CO) contributing to Programme Outcome (PO)

Ability to function in a multidisciplinary team

- Assign **multidisciplinary design** projects in engineering courses.
- Implement design projects with **multidisciplinary teams**

Exercise:
Identify a course and discuss how it can be implemented

Course Outcome (CO) contributing to Programme Outcome (PO)

Broad education necessary to understand the impact of engineering solutions in a global, environment and societal context + knowledge of contemporary issues

- Include structured **controversies** in engineering course
- Conduct class exercise or homework **problems that involve global/societal issues**

Exercise:
Identify a course and discuss how it can be implemented

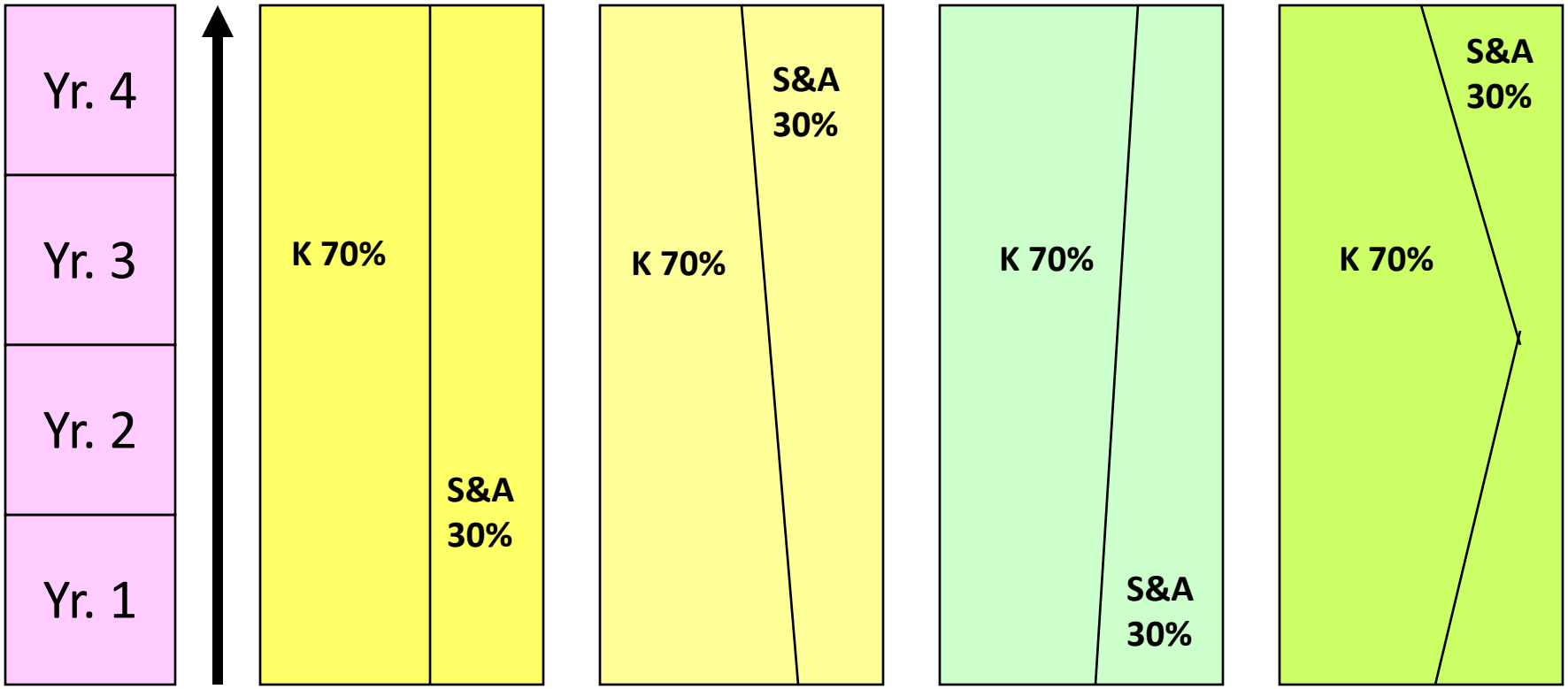
Course Outcome (CO) contributing to Programme Outcome (PO)

Life Long Learning

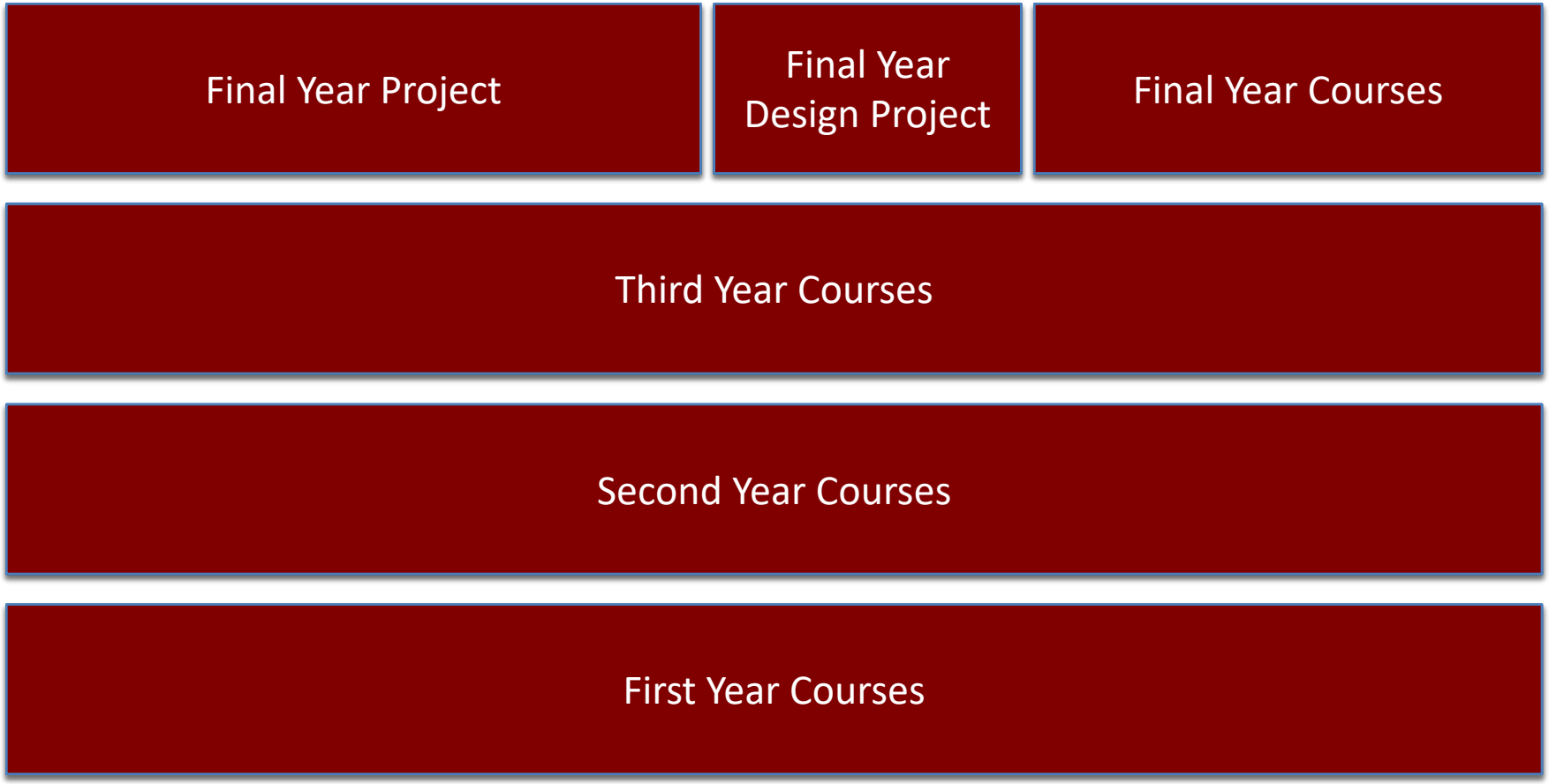
- Teach students about **learning styles** and help them identify the strength and weakness of their styles and give them strategies to improve
- Use **active learning** methods to accustom them to relying on themselves
- Give assignments that requires **library and www searches**
- Anything done to fulfil criteria on: (a) understanding ethical and professional responsibility and (b) understanding societal and global context of engineering solutions, will **automatically satisfy this criteria**

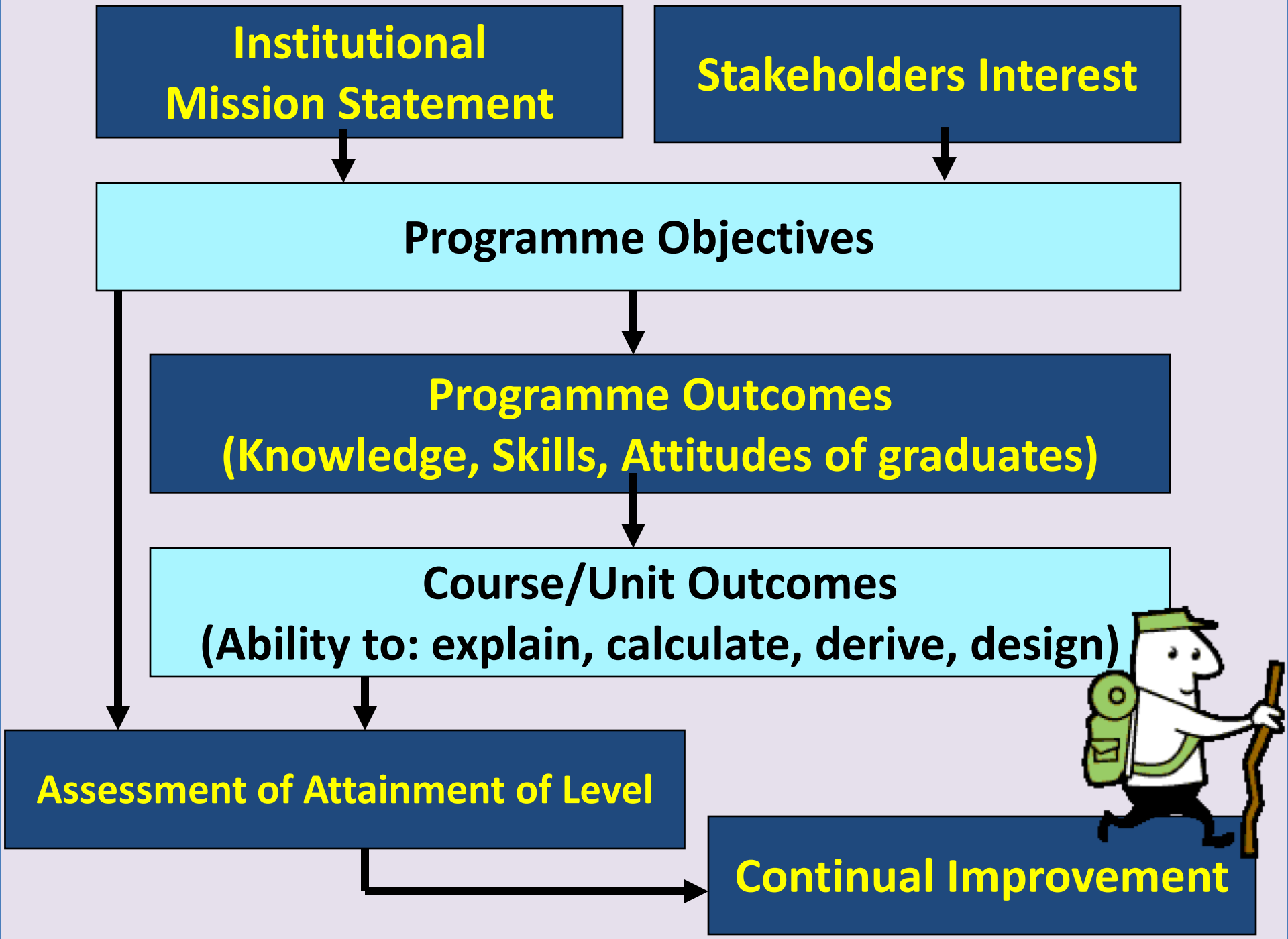
Curricula Models

Distribution of Knowledge, Skills & Attitude elements throughout the 4 years

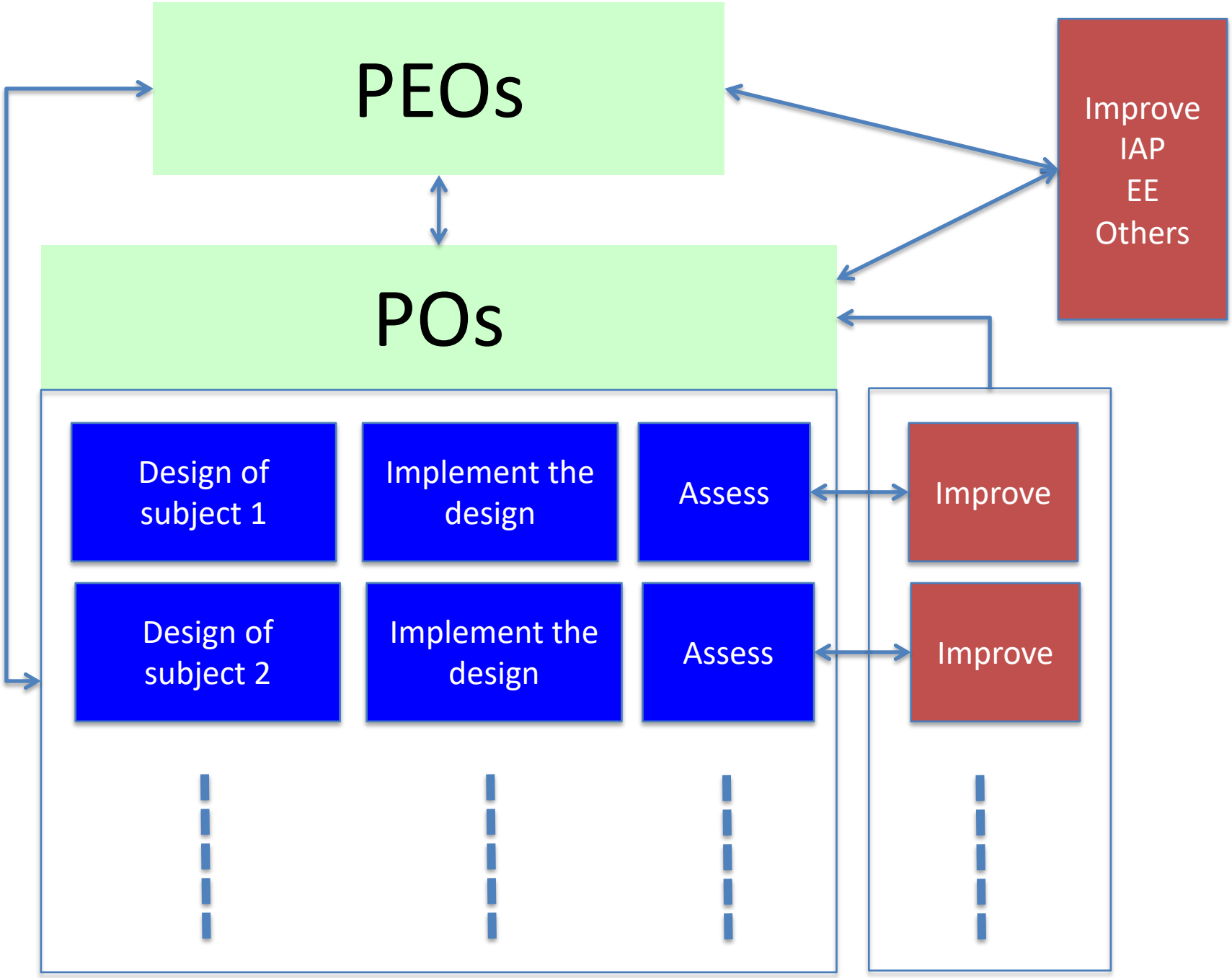


PO Attainment




Institutional Mission Statement
Stakeholders Interest
Programme Objectives
Programme Outcomes (Knowledge, Skills, Attitudes of graduates)
Course/Unit Outcomes (Ability to: explain, calculate, derive, design)
Assessment of Attainment of Level
Continual Improvement

Internally Driven CQI



OBE in a nut shell

- **What** do you want the students to have or able to do?
  - **Knowledge, Skill, Affective**
- **How** can you best help students achieve it?
  - **Student Centred Delivery**
- **How** will you know what they have achieved it?
  - **Assessment**
- **How** do you close the loop
  - **PDCA**

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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

Programme Outcomes or Graduate Attributes

Students are expected to know and be able to perform or attain (knowledge, psychomotor & affective) by the time of graduation

I. **Engineering Knowledge - Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialisation as specified in WK1 to WK4 respectively to the solution of complex engineering problems;**

II. **Problem Analysis - Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (WK1 to WK4);**

III. **Design/Development of Solutions - 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);**

IV. **Investigation – Conduct investigation of complex engineering 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;**

V. **Modern Tool Usage - 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);**

Programme Outcomes or Graduate Attributes

vi. The Engineer and Society - 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);

vii. Environment and Sustainability - Understand and evaluate the sustainability and impact of professional engineering work in the solutions of complex engineering problems societal and environmental contexts. (WK7);

viii. Ethics - Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice (WK7);

ix. Individual and Team Work - Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings;

x. Communication - Communicate effectively on complex engineering activities w[illegible] 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;

xi. Project Management and Finance - 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 in multidisciplinary environments;

xii. Life Long Learning - Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Focus of Accreditation (the big picture)

- Ensuring the expected engineering education level is maintained (Breadth & Depth)
- Outcome-based Engineering Education (OBE)
- Quality Management System (QMS)
- Continual Quality Improvement (CQI)

Accuracy & Consistency

Panel Evaluators

- Eyes & Ears
- Credibility
- Decorum
- Helicopter View
- Listening

- Triangulate
- Evidence based
- Standard
- Conclude
- Report

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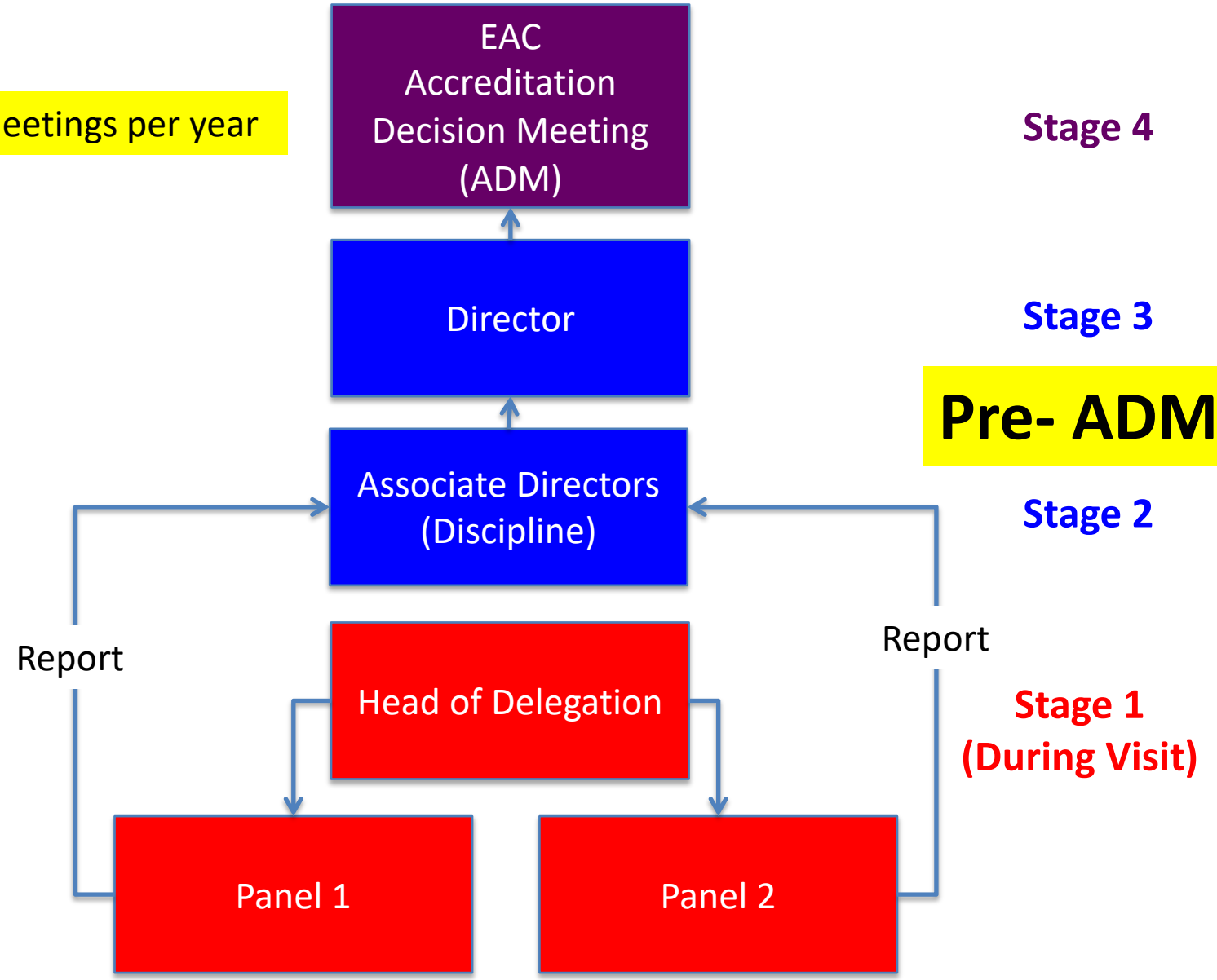
Consistency of Decision

3 decisions meetings per year



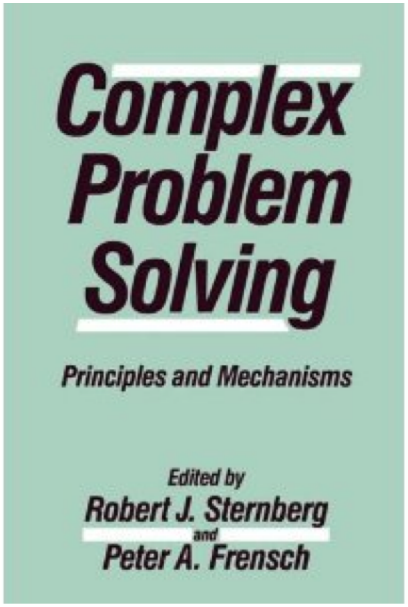
Cause for concerns at Decision Meetings in Malaysia

- Phases of OBE
  - Planning
  - Implementation
  - Effectiveness
- CQI
- List of concerns
- Breadth & depth (taxonomy & complex problem)
- Staffing
- Industrial Training
- Commitment to change
- System failure
- Stagnant (no improvement)
- Repeat offender
- Safety
- 3 PEs

Plan, Do, Check & Act (PDCA), 2015

2019

Complex Problem



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Complex Problem

Need to think broadly and systematically and **see the big picture**

Complex	**Problem**
Difficult	**Decision**
Uncertain	**Strategy**
Confusing	**Idea**
Contentious	**Product**
Intractable	**Change**

Difficulty & Uncertainty

- **Complexity** – the problem contains a large number of diverse, dynamic and interdependent elements
- **Measurement** – it is difficult or practically unfeasible to get good qualitative data
- **Novelty** – there is a new solution evolving or an innovative design is needed

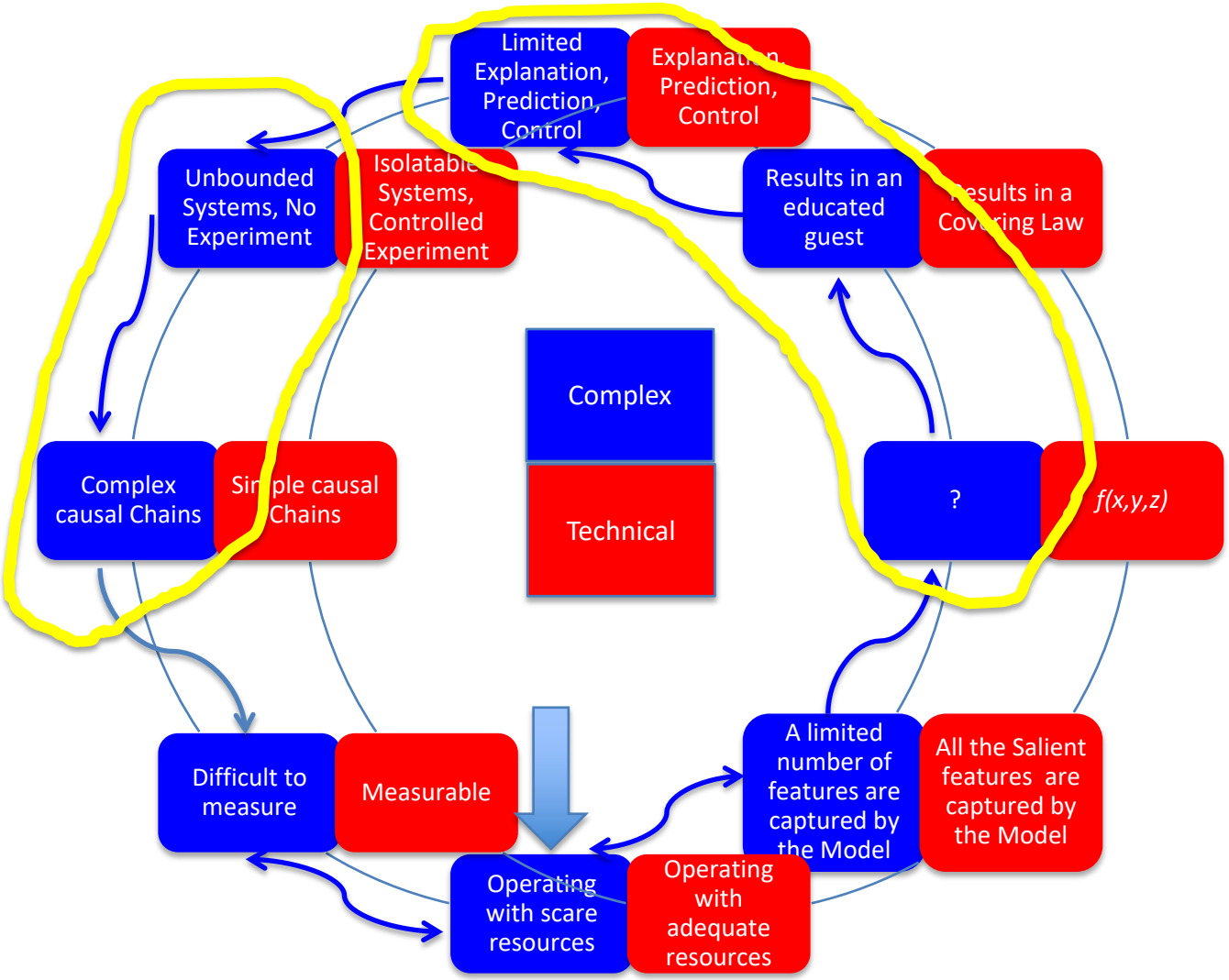
Characteristics

Technical Problems

- Isolatable boundable problem
- Universally similar type
- Stable and/or predictable problem parameters
- Multiple low-risk experiments are possible
- Limited set of alternative solutions
- Involve few or homogeneous stakeholders
- Single optimal and testable solutions
- Single optimal solution can be clearly recognised

Complex Problems

- No definitive problem boundary
- Relatively unique or unprecedented
- Unstable and/or unpredictable problem parameters
- Multiple experiments are not possible
- No bounded set of alternative solutions
- Multiple stakeholders with different views or interest
- No single optimal and/or objectively testable solution
- No clear stopping point


Limited Explanation, Prediction, Control
Explanation, Prediction, Control
Unbounded Systems, No Experiment
Isolatable Systems, Controlled Experiment
Results in an educated guest
Results in a Covering Law
Complex
Technical
Complex causal Chains
Simple causal Chains
?
f(x,y,z)
Difficult to measure
Measurable
A limited number of features are captured by the Model
All the Salient features are captured by the Model
Operating with scare resources
Operating with adequate resources

Scientific/Technical Problems can combine to form

→

A Complex Problem

Complex Engineering Activities *(Project based)*

Complex activities means (engineering) activities or projects that have **some or all** of the following characteristics listed below	
Range of resources	**Diverse resources** (people, money, equipment, materials, information and technologies).
Level of interaction	Require resolution of significant problems arising from interactions between **wide ranging** or **conflicting** technical, engineering or other issues.
Innovation	Involve creative use of engineering principles and **research-based** knowledge in **novel** ways
Consequences to society and the environment	Have **significant consequences** in a **range of contexts**, characterised by **difficulty** of prediction and mitigation.
Familiarity	Can extend **beyond previous** experiences by applying **principles-based** approaches.

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Complex Problems *(Need High Taxonomy Level)*

Complex Engineering Problems have characteristic WP1 and some or all of WP2 to WP7, EP1 and EP2, that can be resolved with in-depth forefront knowledge

WP1	Depth of Knowledge required	Resolved with **forefront in-depth** engineering knowledge (WK3, WK4, WK5, WK6 or WK8) which allows a fundamentals-based, first principles analytical approach
WP2	Range of conflicting requirements	Involve **wide-ranging or conflicting** technical, engineering and other issues.
WP3	Depth of analysis required	Have **no obvious solution** and require abstract thinking, originality in analysis to formulate suitable models.
WP4	Familiarity of issues	Involve **infrequently encountered** issues
WP5	Extent of applicable codes	**Beyond codes** of practice
WP6	Extent of stakeholder involvement and level of conflicting requirements	Involve **diverse groups of stakeholders** with widely **varying needs**.
WP7	Interdependence	Are **high level problems** including **many component** parts or sub-problems.
EP1	Consequences	Have **significant consequences** in a range of contexts.
EP2	Judgement	Require judgement in **decision** making

Example 1: Complex Problem Solving

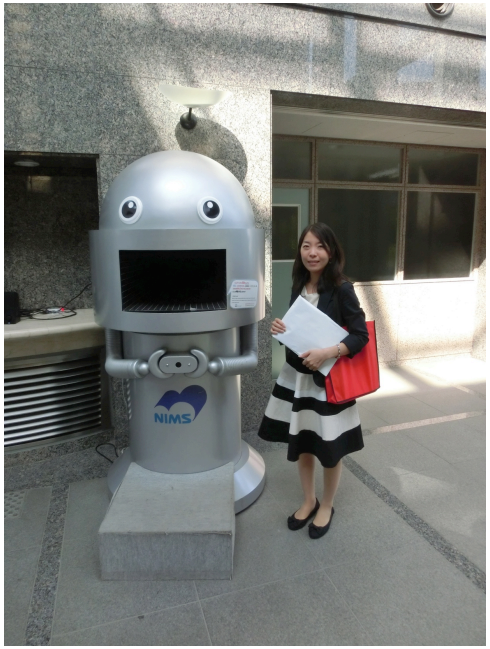
- Two villages in Timbuktu are **separated** from each other by a valley, at its **deepest** section about 30 metres.
- The valley is dry all the year around, except for the four months, from October to December each year, where torrential **rainfall** can flood major parts of the valley to a depth of over 12 metres in some site.
- The soil is generally **lateritic** with firm bedrock underneath. A **bridge** connecting the two villages is in a state of disrepair and has to be replaced.
- Write a project brief on how would you approach to design for the replacement bridge.
- You are limited to the use of locally available **building materials**.
- Heavy **equipment** is not available for the construction.

Aspects

- Economics
- Social
- Environment
- Ethics
- Management
- Technology
- Analysis
- Evaluation

Thinking

- Site condition
- Weather
- Available technology
- Building materials
- Design
- Costing
- Scheduling



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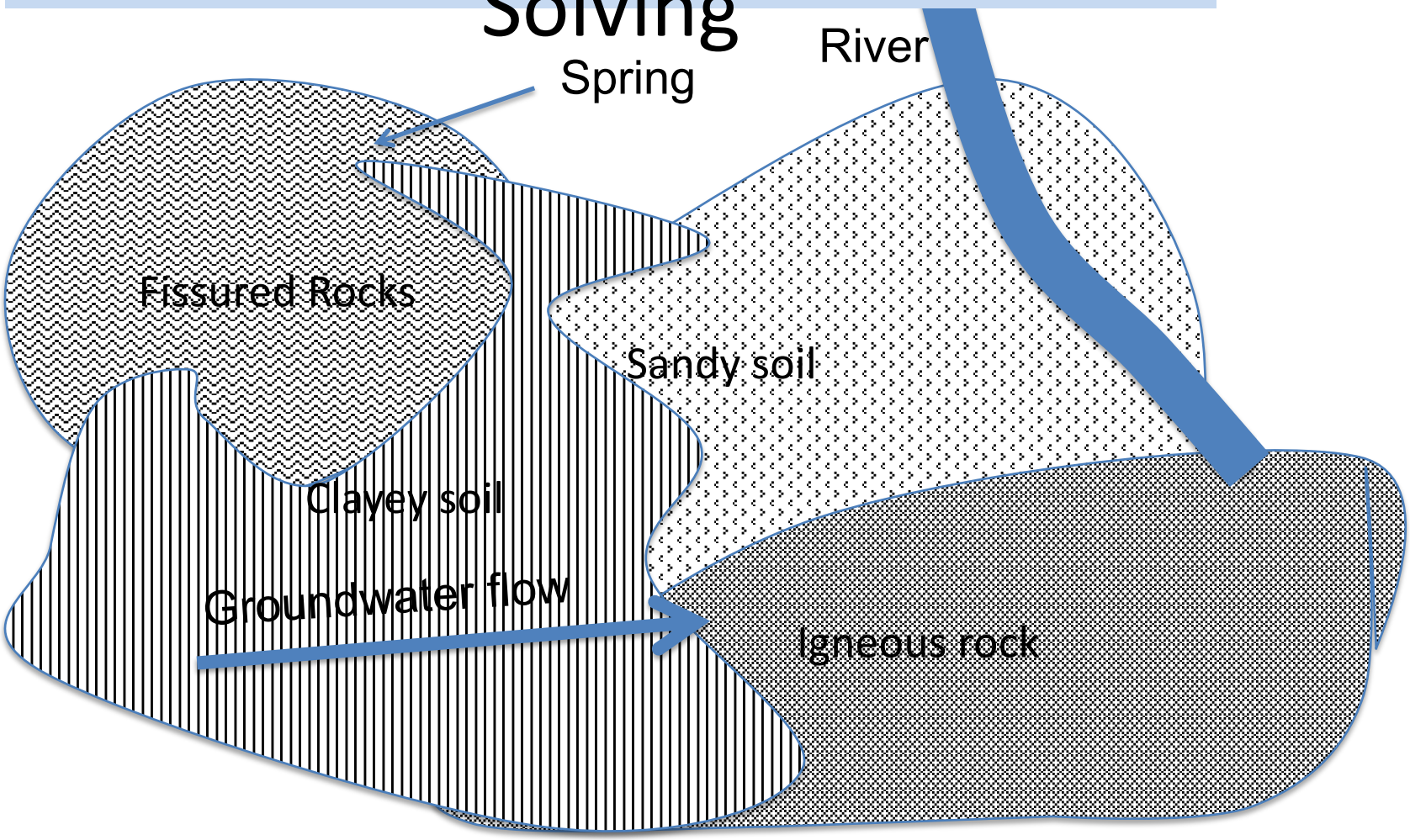
Solutions?

- Problem solving skills
- Formulate the pro
- Literature
- Experiment?

Assessment

- Report – style and content (flow)
- Display – attractive ?
- Viva / Articulation
- Teamwork
- Management – scheduling

Example 2: Complex Problem Solving



How does complexity relates to curriculum?

- General Subjects
- Industrial Placement
- Core & Specialist (Engineering) Subjects – *Complex Problem Solving*
- Elective Subjects – *Complex Problem Solving*
- Design Project – *Complex Engineering Activities*
- Final Year Project – *Complex Problem Solving*

Washington Accord Graduate Attributes
PROGRAMME OUTCOMES

WA1	Engineering Knowledge	Breadth & depth of knowledge
WA2	Problem Analysis	Complexity of analysis
WA3	Design/Development of Solutions	Breadth & uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified and coded
WA4	Investigation	Breadth & depth of investigation and experimentation
WA5	Modern Tool Usage	Level of understanding of the appropriateness of the tool
WA6	The Engineer and Society	Level of knowledge and responsibility
WA7	Environment and Sustainability	Type of solutions
WA8	Ethics	Understanding and level of practice
WA9	Individual and Team Work	Role in and diversity of team
WA10	Communication	Level of communication according to type of activities performed
WA11	Project Management and Finance	Level of management required for differing types of activity
WA12	Life-long Learning	Preparation for and depth of continuing learning

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WA1 ENGINEERING KNOWLEDGE WA2 PROBLEM ANALYSIS	WA9 IND & TEAM	WA3 DESIGN
	WA10 COMMUNICATION	WA5 MODERN TOOLS
	4 YEARS WA11 PROJ MGMT & FINANCE	WA6 ENGR & SOC WA7 ENV & SUST WA8 ETHICS
	WA12 LIFE LONG	WA4 INVESTIGATION

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WA – WK – WP Relationships

WA1 – Engineering Knowledge
(Science, Mathematics & Engineering)
(WK1, WK2, WK3, WK4)

to solve
Complex Engineering Problems

WP1 – Depth of Knowledge required:
Resolved with **forefront in-depth** engineering knowledge
(WK3, WK4, WK5, WK6 or WK8)
which allows a fundamentals-based, first principles analytical approach

WK1 - natural sciences **(WA1)** **(know what)**

WK2 - mathematics, numerical analysis, statistics, computer and information science **(WA1)**

WK3 - engineering fundamentals **(WA1)**

WK4 - engineering specialist knowledge **(WA1)**

WK5 - engineering design **(know how)**
WA3 - Design

WK6 - engineering practice **(know how)**
WA5 - Modern Tools

WK8 - research literature **(know why)**
WA4 - Investigation

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to solve
Complex Engineering Problems

WK1 - natural sciences **(WA1)**

WK2 - mathematics, numerical analysis, statistics, computer and information science **(WA1)**

WP1 – Depth of Knowledge required:

Resolved with **forefront in-depth** engineering knowledge (WK3, WK4, WK5, WK6 or WK8) which allows a fundamentals-based, first principles analytical approach

WK3 - engineering fundamentals **(WA1)**

WK4 - engineering specialist knowledge **(WA1)**

WK5 - engineering design
WA3 - Design

WK6 - engineering practice
WA5 - Modern Tools

WK8 - research literature
WA4 - Investigation

WP2	**Range of conflicting requirements**
WP3	**Depth of analysis required**
WP4	**Familiarity of issues**
WP5	**Extent of applicable codes**
WP6	**Extent of stakeholder involvement and level of conflicting requirements**
WP7	**Interdependence**
EP1	**Consequences**
EP2	**Judgement**

Some or all
WP2 – WP7, EP1 & EP2

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to solve
Complex Engineering Problems

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WA3 - Design

WK6 - engineering practice
WA5 - Modern Tools

WK8 - research literature
WA4 - Investigation

WP2	**Range of conflicting requirements**
WP3	**Depth of analysis required**
WP4	**Familiarity of issues**
WP5	**Extent of applicable codes**
WP6	**Extent of stakeholder involvement and level of conflicting requirements**
WP7	**Interdependence**
EP1	**Consequences**
EP2	**Judgement**

WK7 - engineering in society
WA6 - engineer & society
WA7 - environment & sustainability
WA8 - ethics

Breadth

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Design Course

WK1 - natural sciences **(WA1)**

WK2 - mathematics, numerical analysis, statistics, computer and information science **(WA1)**

WP1 – Depth of Knowledge required:
Resolved with **forefront in-depth** engineering knowledge (WK3, WK4, WK5, WK6 or WK8) which allows a fundamentals-based, first principles analytical approach

WK3 - engineering fundamentals **(WA1)**

WK4 - engineering specialist knowledge **(WA1)**

WK5 - engineering design
WA3 - Design

WK6 - engineering practice
WA5 - Modern Tools

WK8 - research literature
WA4 - Investigation

WP2	**Range of conflicting requirements**
WP3	**Depth of analysis required (WA2)**
WP4	**Familiarity of issues**
WP5	**Extent of applicable codes**
WP6	**Extent of stakeholder involvement and level of conflicting requirements WK7 (WA6, WA7, WA8)**
WP7	**Interdependence**
EP1	**Consequences**
EP2	**Judgement**

WK7 - engineering in society
WA6 - engineer & society (WK7)
WA7 - environment & sustainability (WK7)
WA8 – ethics (WK7)

WA2 - Problem Analysis (WK 1-4)
WA9 - Individual and Team Work
WA10 - Communication
WA11 - Project Management and Finance
WA12 - Life-long Learning

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How does complexity relates to curriculum?

- General Subjects
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- Final Year Project – *Complex Problem Solving*

Panel Evaluators

Expectations on Evaluators

- Commitment
- Not “Auditors”
- Reference Material: Accreditation Standards
- Pre-Visit Planning & Discussion
- Day -1 meeting (be seen doing it)
- Visit Day Aplomb & Decorum
- Reporting
- Response to factual inaccuracies

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Pre-Accreditation Visit Meeting

- Meet at least **once** (in addition to the meeting on Day -1) **before** the **Accreditation Visit**, to study and discuss documents, and systematically identify shortcomings.
- Strategically plan and/or request supplementary input from the University to fill the gaps. (**Prepare interim report, checklist, schedule and assignment**)
- Further information required, communicate through …..

Day -1 Meeting

- Findings (interim report)
- Strategy (schedule & assignment)
- Update checklist

EVALUATION DAY

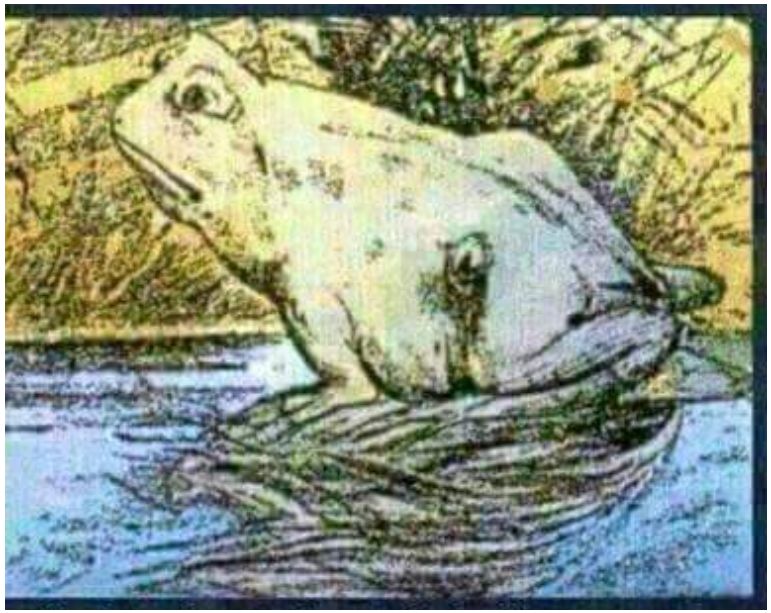
- **Opening meeting**
- Meeting with
  - staff members,
  - students,
  - external stakeholders such as alumni, employers, and industry advisor
- Visiting facilities.
- Checking relevant documents.
- **Exit meeting**

OPENING MEETING

- **Introduce** evaluation **team** members
- Mention the **objective** of the visit (programmes)
- Mention that it is **not fault finding** exercise but to identify the programme conformance to the Accreditation criteria
- Explain the **methods** of conducting the evaluation
- **Review** the plan and **schedule**
- **Confirm** the time of the **closing meeting**
- Invite the Programme owner to fill up **the latest** (within a specified timeframe) if any

TRIANGULATION … example

- Curriculum development (specification/input)
- Curriculum implementation (process)
- Demonstrated outcomes (output)



Its a horse?

Objective Evidence

Evidence is the facts or information used to prove or disprove a proposition. It should be collected through:

- Interviewing
- Observation of environment
- Observation of implementation
- Checking of records or document

Objective Evidence

- Evidence that exists
- Not influenced by emotion or prejudice
- Can be documented
- Is about quality
- Can be quantitative or qualitative
- Can be verified

Objective Evidence

The facts or information used to conclude whether a programme has or has not undertaken appropriate activities effectively to demonstrate attainment of the necessary outcomes.

EVALUATOR'S APPROACH

- Sensible questioning
- Check records
- Observing processes
- Analyse inputs and outputs
- Organised using tables, matrices, flowcharts and checklists

Questioning

6 friends – What, When, Why, Who, Where, How

Best friend – Show Me

Additional skills of LISTENING and OBSERVING

EFFECTIVE COMMUNICATION

Occurs when the right person, says the right things, to the right people, at the right place at the right time and in the right way to be heard and understood and to produce the right response.

Important

- Person is at ease in communicating with the Evaluator.
- Evaluator should do all he/she can to make person feel at ease.

EFFECTIVE COMMUNICATION (Cont..)

Tips

- Gain attention from the person before starting.
- Explain clearly the purpose of the session/visit.
- Include friendly remarks or express your interest in what he/she is doing.
- Politeness all the way never antagonise or belittle the person.
- Establish eye contact all the times.
- Communicate in the language he/she is comfortable.
- Use of body language to promote the dialogue. (Spoken message is 7%, verbal and vocal 38% and 55% facial).
- Listen, listen, listen, an Evaluator need to train himself to be an active listener.

POINTS TO CONSIDER IN DERIVING FINDINGS/CONCLUSION

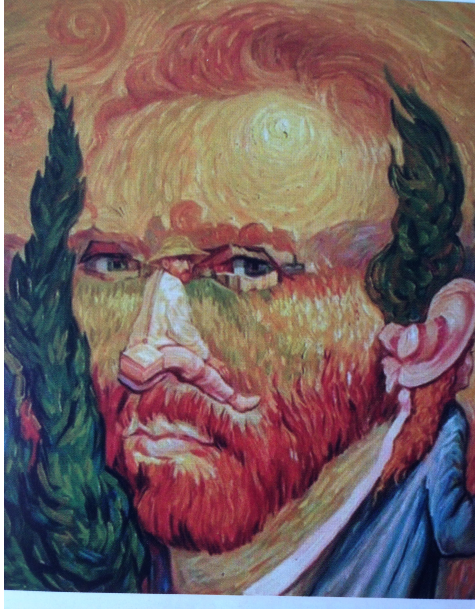
- Establish requirement
- Probe process
- Whom do you speaks to?
- What to look for?
- Sampling
- How long to persist?
- Is there any shortcomings?
- Is it significant?
- Consult team members

Exit Meeting - Evaluators

- Greetings
- Thank IHL
- Relate strength
- Raise concerns
- Mention “detailed report & response to factual accuracies”
- Decision

Evaluators

Aplomb & Decorum



- Peer Assessment
- Common Sense
- Commitment
- Before
- During
- After

- Assurance
- Self-confidence
- Composure
- Cool
- Confident poise

ignity
orrectness
estraint
oliteness
act
iquette
espectability
ood manners

CONCLUSION

- **Punctual**
- **Knowledgeable**
- **Industrious**
- **Inquisitive**
- **Analytical**
- **Pleasant**

Dos & Don’ts
Aplomb & Decorum

Dos	Don’ts
Formal attire	Track suit
Preparedness	Based on presentation
Time management	Not punctual
Well versed	Lack of knowledge
Probing	Surface
Big Picture	Compartmentalized
Triangulate	Single evidence
State the fact	Giving solutions
No surprises	Shocking decision
Collegial	Too formal
Serious	Too lighthearted

Don’ts

- Answering phone calls
- Silent
- Excused early
- Poor listener
- Opinionated
- Argumentative
- Please complete the list ….

COMPETENCY OF EVALUATORS

- Organizing skills
- Knowledge of the manual
- Questioning skills
- Comprehensiveness of the evaluation
- Listening to persons
- Overall appearances
- Reporting
- Overall judgment
- Overall rapport with persons
- Aplomb (self-confidence) and decorum (etiquette)

Random Observations

- Bullet points & Aggregation
- Ambiguous
- Poor time management
- Guidelines supersede Manual
- Keywords as sole determination
- Interrogative

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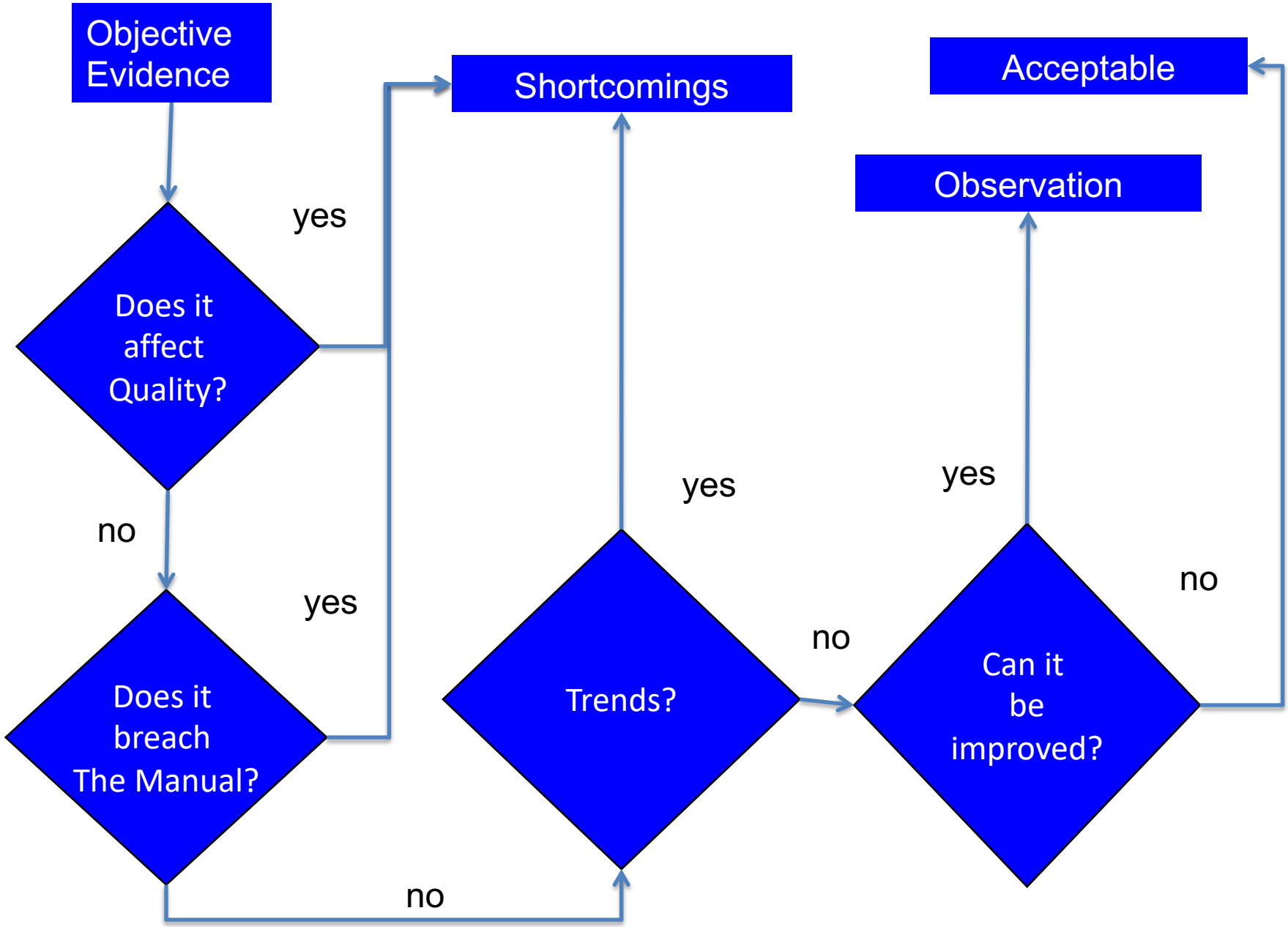
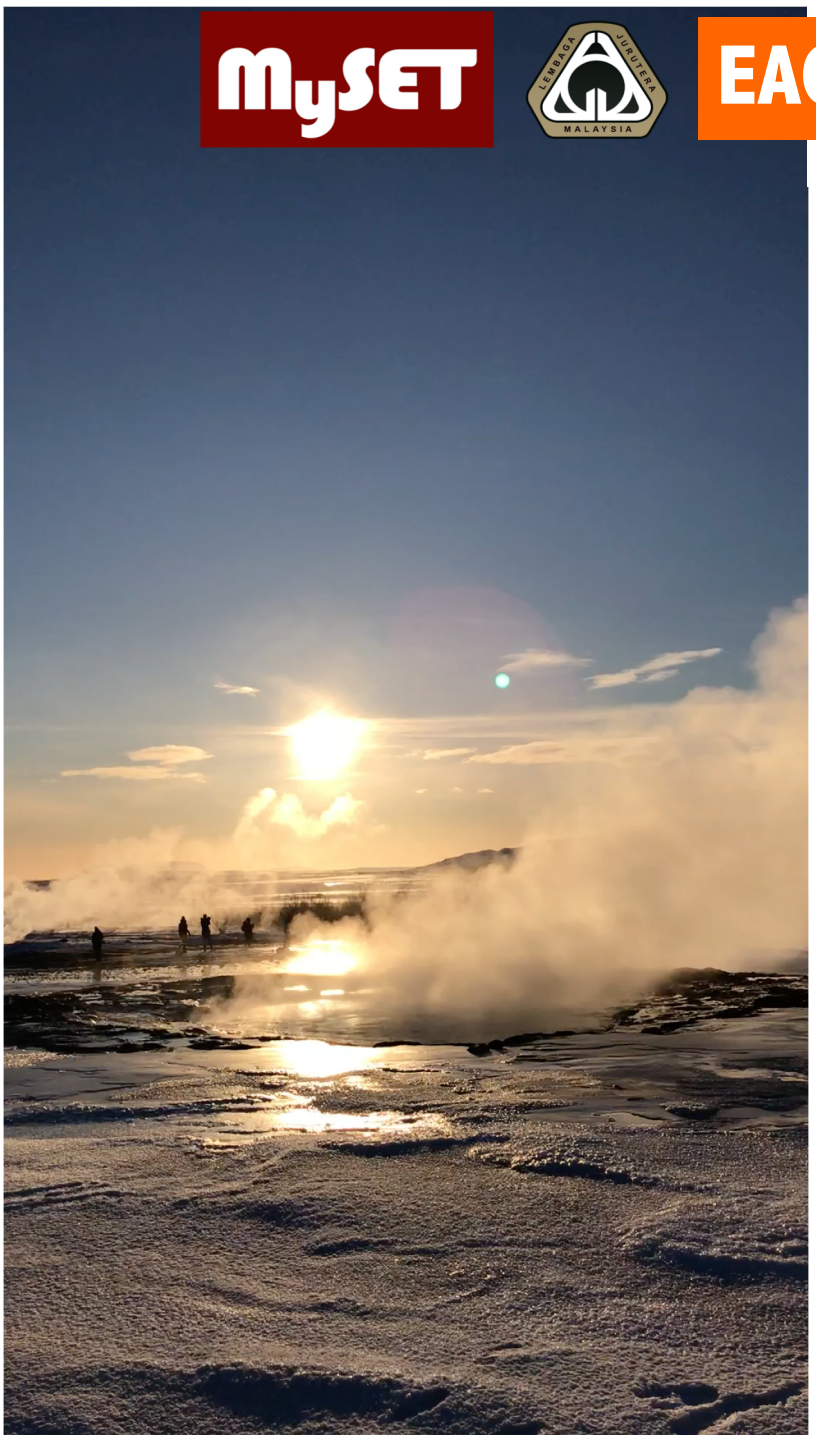
Assessment for Decision

EVALUATION FLOW CHART



Reporting

- Qualitative
- Strength
- Shortcomings (weaknesses)
- Concerns
- Opportunities for Improvement



ধন্যবাদ

Terima kasih

Thank You

Arigato-gosai-masu