Quality Assurance, Outcome Based Education & Accreditation

(Panel Discussion)

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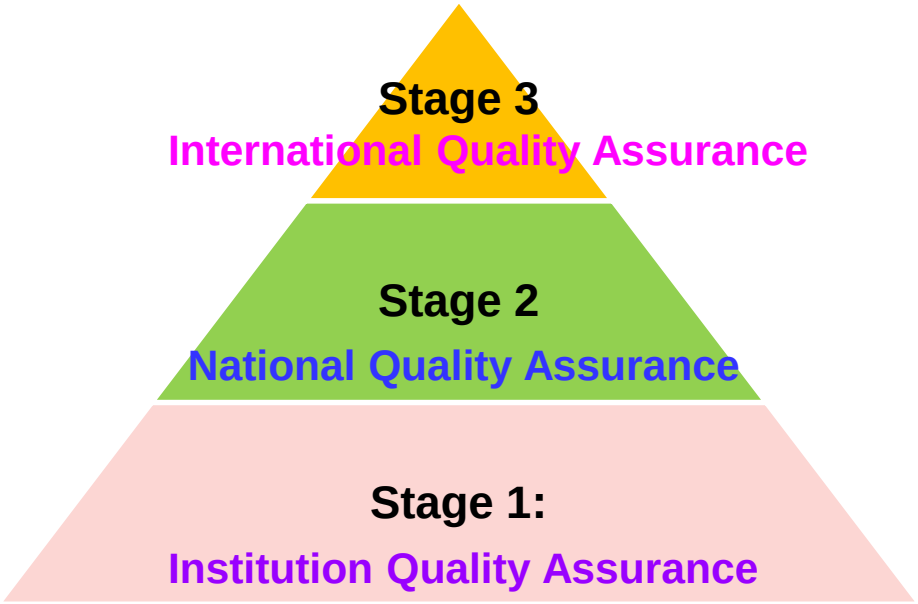
RMIT UNIVERSITY

Quality Assurance Processes



Washington Accord (IEA), **ENAEE**, etc.

Professional Accreditation, **NQF**, etc.

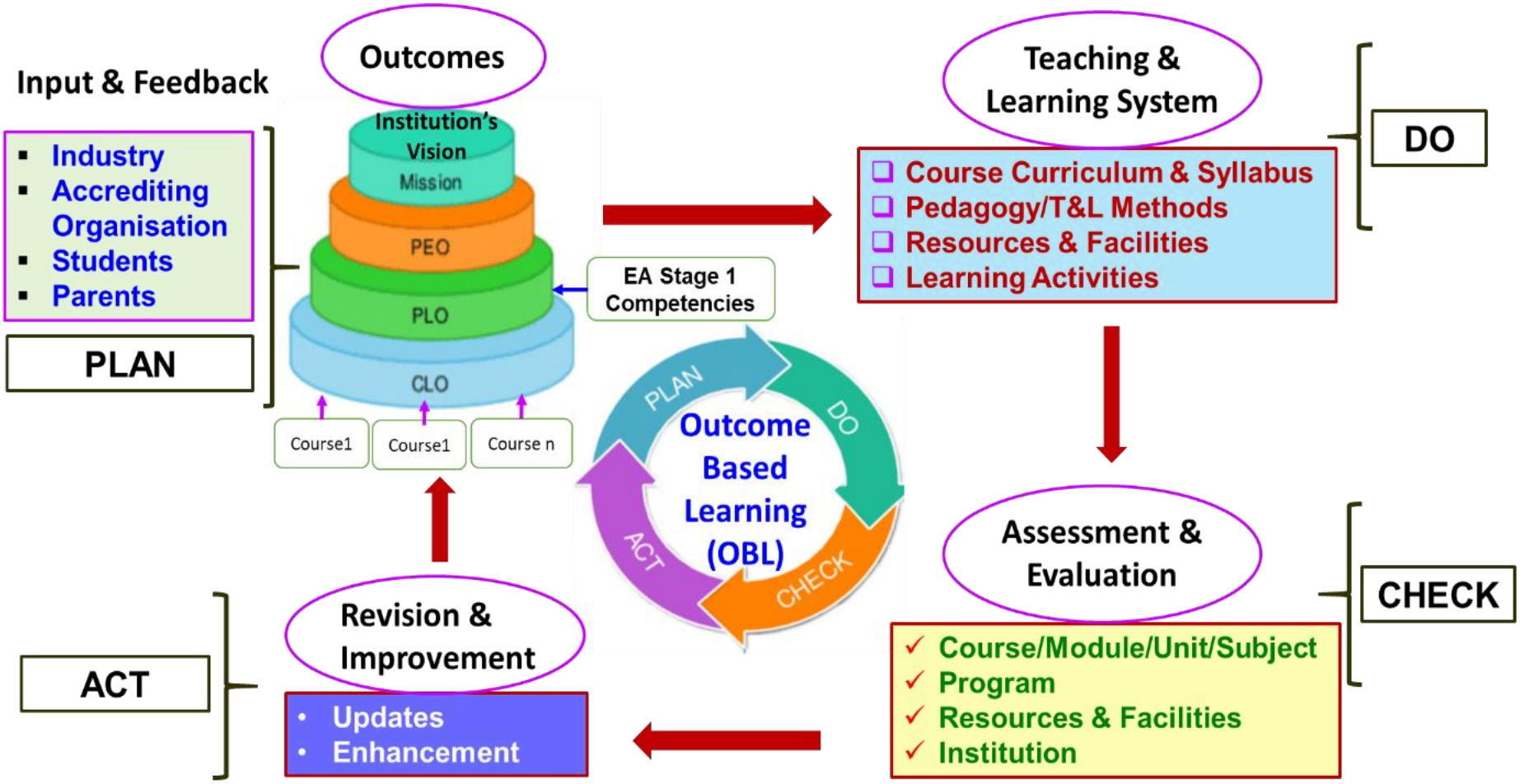
Courses, **Program**, **Pedagogy**, **Infrastructure**, **Resources**, etc.

Primary Objectives of Quality Assurance Processes are to:

- Undertake **Continuous Improvement** of **Academic Courses**, **Programs**, **Pedagogy** with **Reflective Feedback**.
- Carry out **Continuous Improvement** of **Institution's Infrastructures**, **Teaching** & **Learning Resources**.
- Undertake regular **National** and **International Benchmarking** of **Program Qualities**, **Curriculum** & **Pedagogy** to establish **Good Practices**.
- Enhance **Institutional Management Efficiency**.

Source: Alam F & Kootsookos A (2021), Engineering Education - Accreditation & Graduate Global Mobility, Taylor & Francis, London, ISBN-13: 978-0815396017

Outcome Based Learning



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Example of Australia's National Competency Standard for Bachelor Degree Engineering

Stage 1: National Generic Competency Standard (Institution of Engineers Australia)

- **Knowledge and Skill base**

  1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
  1.2 Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
  1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline.
  1.4 Discernment of knowledge development and research directions within the engineering discipline.
  1.5 Knowledge of contextual factors impacting the engineering discipline.
  1.6 Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.

- **Engineering Application Ability**

  2.1 Application of established engineering methods to complex engineering problem solving.
  2.2 Fluent application of engineering techniques, tools and resources.
  2.3 Application of systematic engineering synthesis and design processes.
  2.4 Application of systematic approaches to the conduct and management of engineering projects.

- **Professional and Personal Attributes**

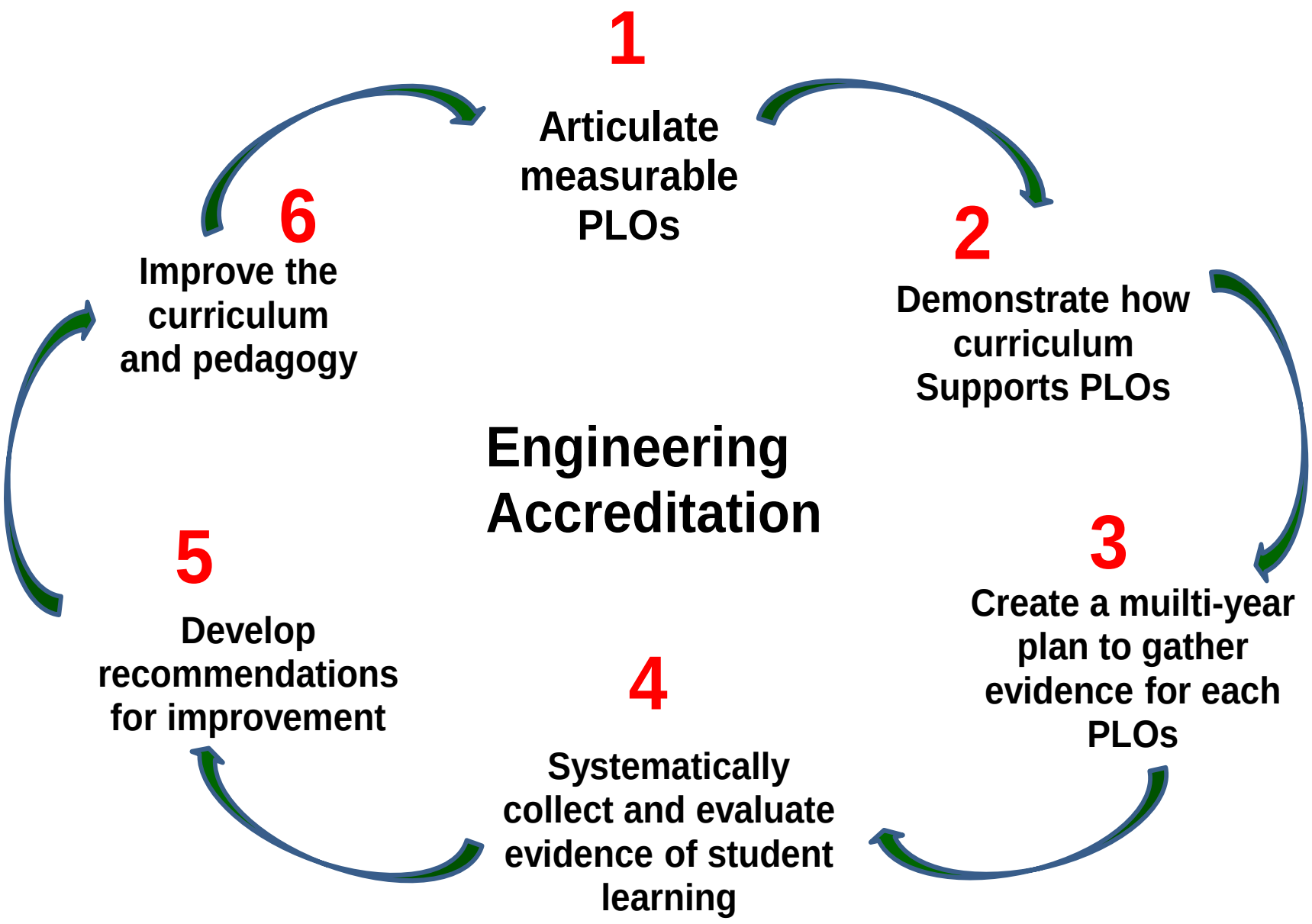
  3.1 Ethical conduct and professional accountability
  3.2 Effective oral and written communication in professional and lay domains.
  3.3 Creative, innovative and pro-active demeanour.
  3.4 Professional use and management of information.
  3.5 Orderly management of self, and professional conduct.
  3.6 Effective team membership and team leadership.

Example: Academic Program Development as per National Competency Standard, EA Stage 1

Subject Titles & Credit Points		Program Learning Outcomes (PLO) as per EA Stage 1 Competencies															
		1.1	1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	3.5	3.6
YEAR 1																	
Engineering, Society and Sustainability	12						TPM				TPM	TP	TP	TP			TPM
Engineering Mathematics C	12	TPM	TPM														
Computer Aided Design	12	TPM	TP	TPM					TP								
Mechanics and Materials 1	12	TPM	TP	TPM				TP									
Applied Thermodynamics	12	TPM	TP	TPM				TP									
Further Engineering Mathematics C	12	TPM	TPM														
Manufacturing Systems	12	TPM	TP	TPM				TP									
Fluid Mechanics of Mechanical Systems	12	TPM	TP	TPM				TP									
YEAR 2																	
Math & Stats for Aero, Mech & Auto	12	TPM	TPM						TPM								
Mechatronics Principles	12	TPM		TPM				TP	TP								
Mechanics and Materials 2	12	TPM	TP	TPM				TP									
Engineering Dynamics	12	TPM	TPM	T		TPM											
Mechanical Design 1	24	TP	TP	TPM		TP		TP	TPM								
Student Elective	12																
Student Elective	12																
YEAR 3																	
Management of Mechanical Design and Research	12	T	T	TPM	TP	TPM	TP	TP	TP	TPM	TPM	TPM	TP	TP	TP	TP	TP
Solid Mechanics 3	12	TP	TPM	TPM	T	T		TP	TP	TP							
Mechanical Vibrations	12	TP	TPM	TPM	T	T		TP	TP	TP		T	TPM				
Advanced Thermo-Fluid Mechanics	12	TP	TPM	TPM	T	T		TP	TP	TP			TPM				
Mechanical Design 2	12	TP	T	TP		TPM	TP	TP	TPM	TP	TP	T	TP		TP		
Mechanics of Machines	12	TPM	TPM	T	T	TP	T	TPM	T	T							
Finite Element Analysis	12	TP	TPM	TPM	TP	T	T	TP	TPM	TP		T	TP				
Engineering and Enterprise	12		T		TP	TP	TPM	T	TP	T	TPM	TP	TP	TP	TP	TP	TPM
YEAR 4																	
Professional Research Project 1	24	TP	TP	TP	TPM	TPM	TP	TPM	TPM	TPM	TPM	TP	TPM	TPM	TPM	TPM	TPM
Professional Research Project 2	24	TP	TP	TP	TPM	TPM	TP	TPM	TPM	TPM	TPM	TP	TPM	TPM	TPM	TPM	TPM
Renewable Energy Systems	12	TP	TPM	TP	TP	TPM		TP	TPM	TP			TP		TP		TP
Automatic Control (Mechanical Elective)	12	TPM	TPM	TP		TP			TP	T		T					
Applied Heat and Mass Transfer (Mechanical Elective)	12	TPM	TPM	TP		TP			TP	T		T					

T- Teach: P- Practice; M- Measured (through a range of assessments)

Main Features of Accreditation Process



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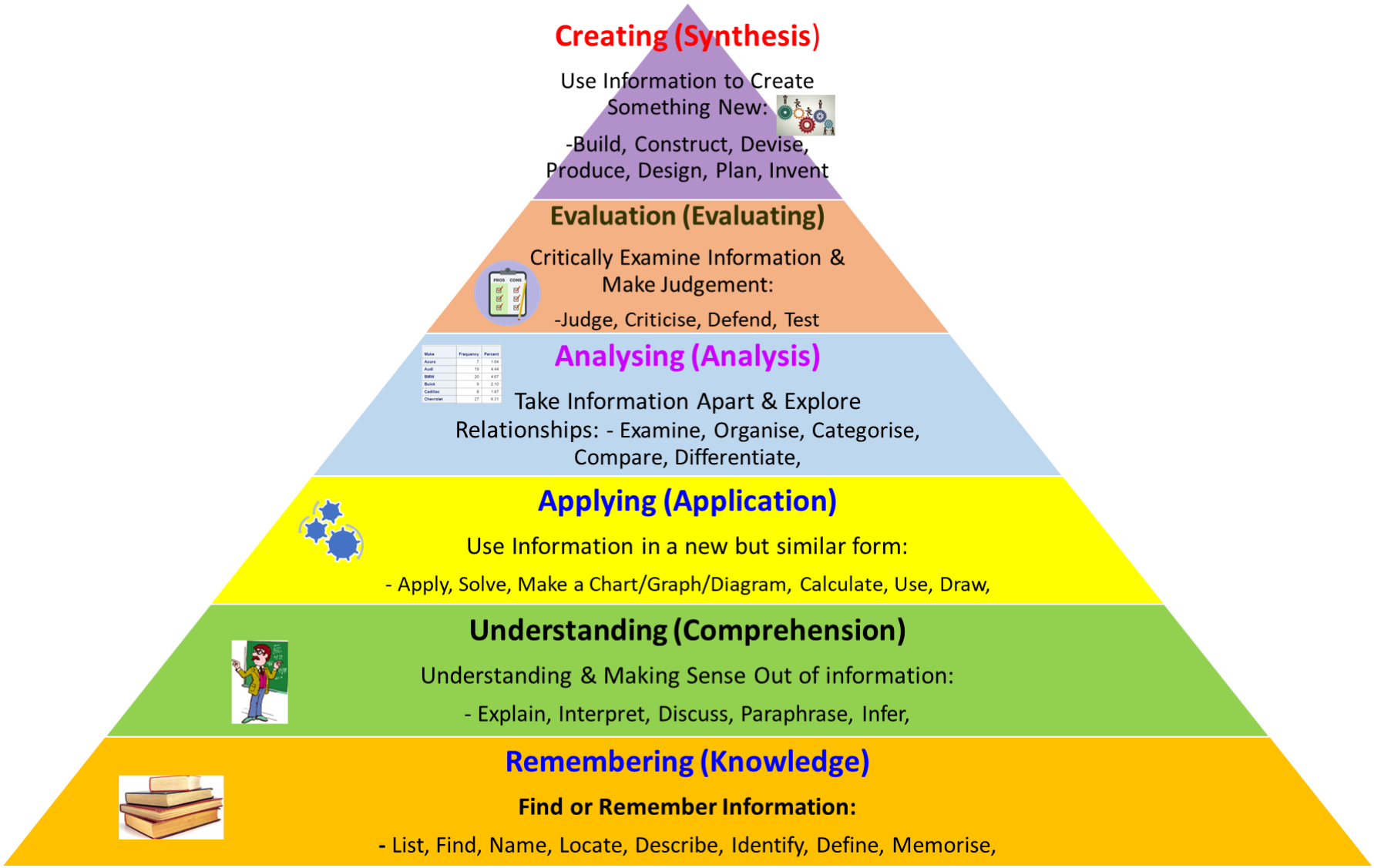
Bloom's Taxonomy for Learning



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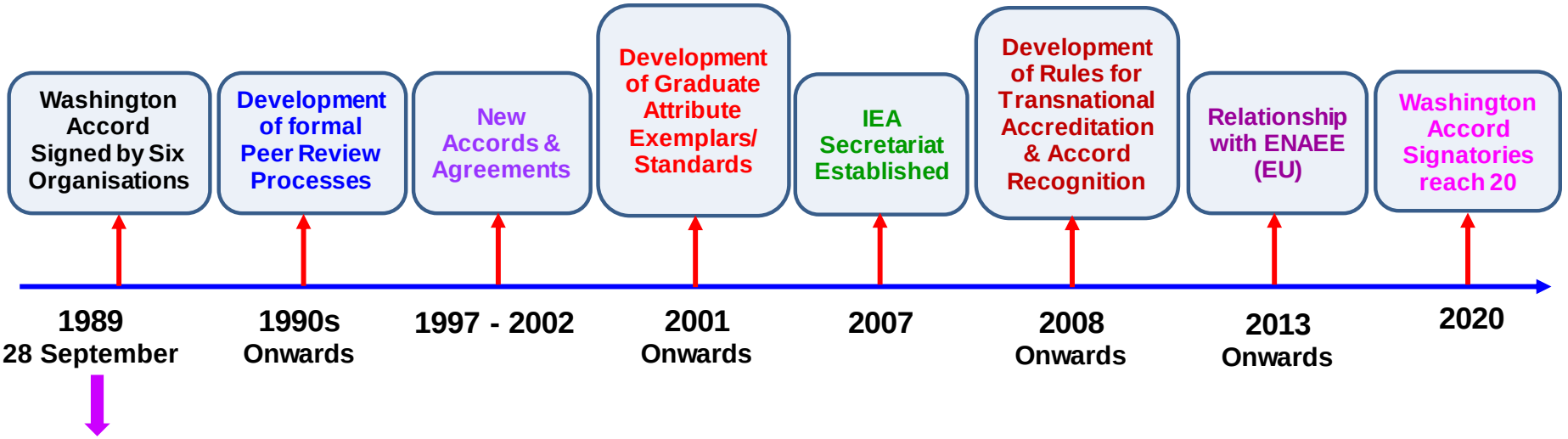
Milestones of Washington Accord from 1989 to 2020



Founding Members:

- Engineers Australia
- ABET USA
- Engineers Canada
- Engineering New Zealand
- Engineers Ireland
- Engineering Council United Kingdom

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