

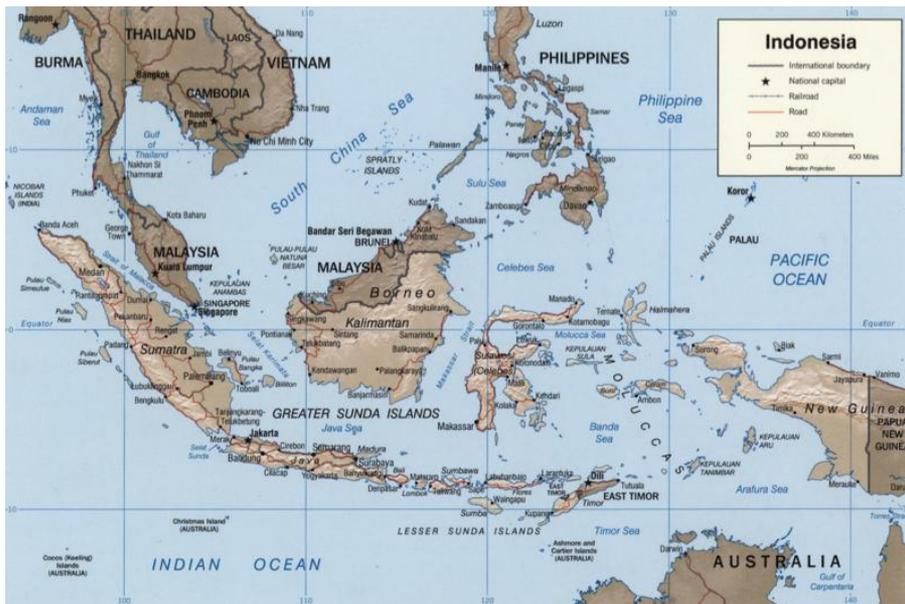
IE Education in Indonesia

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Study Program of Industrial Engineering
Faculty of Industrial Technology
Bandung Institute of Technology - Indonesia

Republic of Indonesia



- Latitude 11°S and 6°N – Longitude 95 °E and 141°E
- 17,058 islands, more than 6000 are inhabited
- 300 ethnic group and 742 language & dialects

- Capital: Jakarta
- Language: Bahasa Indonesia
- Area: 1,919,400 km² – 7th in the world
- Population: 237.6 million
- GDP: US\$ 928.274 billion
- GDP per Capita: US\$ 3,797
- GDP Contributors
 - **Industry 46.4%**
 - **Services 38,6%**
 - Agriculture 14,2%

Higher Education Institutions in Indonesia: 3,268 Institutions

**University (491) , Institute (61),
Advanced Tertiary School
(1,406)**

- May offer undergraduate and post graduate programs
- If eligible could offer vocational and professional programs

**Polytechnic (184), Academy
(1,126), and Community
College**

- Focus on Vocational Programs
- If eligible could offer master and doctoral programs in Technology (applied science)

Higher Education Institutions in Indonesia

- Government owned Higher Education Institution (99)
 - 4,249 Study Programs
- Private Higher Education Institutions (3,169)
 - 11,993 Study Programs

Higher Education Institution in Indonesia

- 16,242 Study Programs
 - 9,888 Undergraduate Study Programs
 - 1,583 Engineering Undergraduate Study Programs
 - 220 IE Undergraduate Study Programs

IE Study Program:

13.9% of All Engineering Study Programs

BKSTI: Indonesian Association of IE Higher Education Institutions (IAIE)

- Rapid Growth of IE Study Programs has attracted many heads of study programs (departments) of IE
- Initiated in 1996:
 - Congress held at Bandung Institute of Technology
 - Attended by not less than 150 Head of IE Study Programs
 - The establishment of the Indonesia Assoc. of IE Higher Education Institutions
- Institutional Membership: Represented by Head of Study Program
- **Objective:** Improve quality and relevance of IE Education in Indonesia

IE in Bandung Institute of Technology

- Stage 1: 1958-1968
 - IE courses were taught in Mechanical Engineering Department;
- Stage 2: 1968-1973
 - Establishment of IE Department at BIT in 1971, a long process of nurturing
- Stage 3: 1973-1979
 - System Approach in IE Education, introduced to non-manufacturing
- Stage 4: 1979-1982
 - Establishment of Master and Doctoral Program
- Stage 5: 1982-1987
 - Manufacturing System as Platform of Education
- Stage 6: 1987-1993
 - 7 areas of specialization in manufacturing
- Stage 7: 1993-1998
 - 2 areas of specialization: Manufacturing System & Industrial Management
- Stage 8: 1998-2003
 - ABET criteria were introduced
- Stage 9: 2003-2008
 - No specific focus in undergraduate program and 7 groups in post graduate program
- Stage 10: 2008-2013
 - 5 groups in post graduate program

IE in Bandung Institute of Technology

2013-2018 Student Outcome:

- a. an ability to apply knowledge of mathematics, science, and engineering to industrial engineering area.
- b. an ability to design and conduct experiments, as well as to analyze and interpret data.
- c. an ability to design a system, component, or process consist of people, materials, equipment, information, equipment, and energy to meet desired needs within realistic constraints
- d. an ability to function on multidisciplinary or cross-cultural team.
- e. an ability to identify, formulates, and solves industrial engineering problems.
- f. an understanding of professional and ethical responsibility.
- g. an ability to communicate effectively.
- h. the broad education necessary to understand the impact of industrial engineering solutions in a global, economic, environmental, and societal context.
- i. a recognition of the need for, and an ability to engage in life-long learning.
- j. a knowledge of contemporary issues relevant to industrial engineering.
- k. an ability to use the techniques, skills, and modern engineering tools necessary for industrial engineering practices.

IE in Bandung Institute of Technology

Integrated and Inter-Disciplinary Design Experience

Practices of the Integrated System Design

- Basic Engineering Design
- Work System Design
- Production System Design
- Enterprise System Design

Industrial Internship

Inter disciplinary Engineering Project

- Senior Students
- Work in Group of Students from Different Study Programs
- Solve Daily Life Problem
- Assessment: Students, Lecturer, Industrial Professional

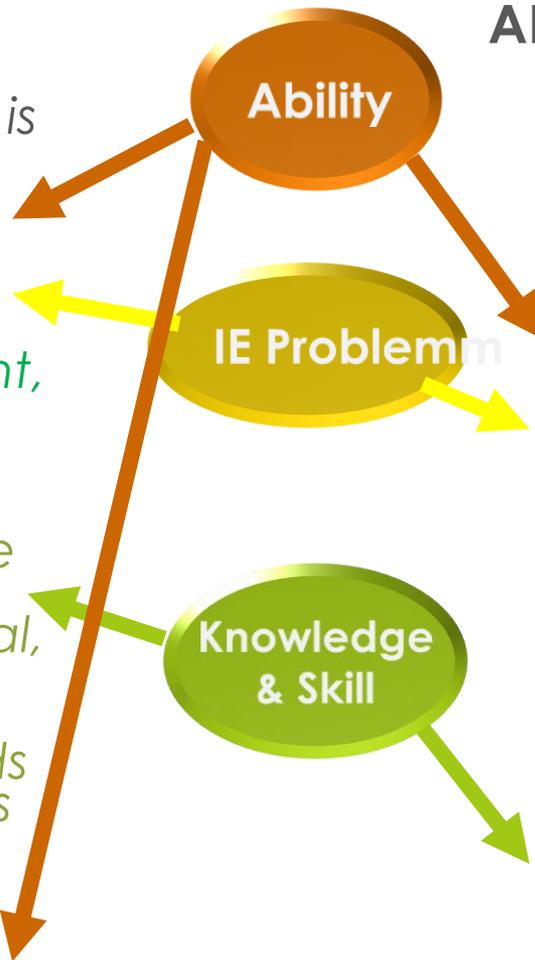
Final Project I & II

Industrial Engineering in Indonesia

IIE DEFINITION

"Industrial Engineering is concerned with the **design, improvement, and installation** of *integrated systems of people, materials, information, equipment, and energy.*

It draws upon specialized knowledge and skill in the *mathematical, physical, and social sciences* together with the principles and methods of engineering analysis and design to **specify, predict, and evaluate** the results to be **obtained** from such systems."

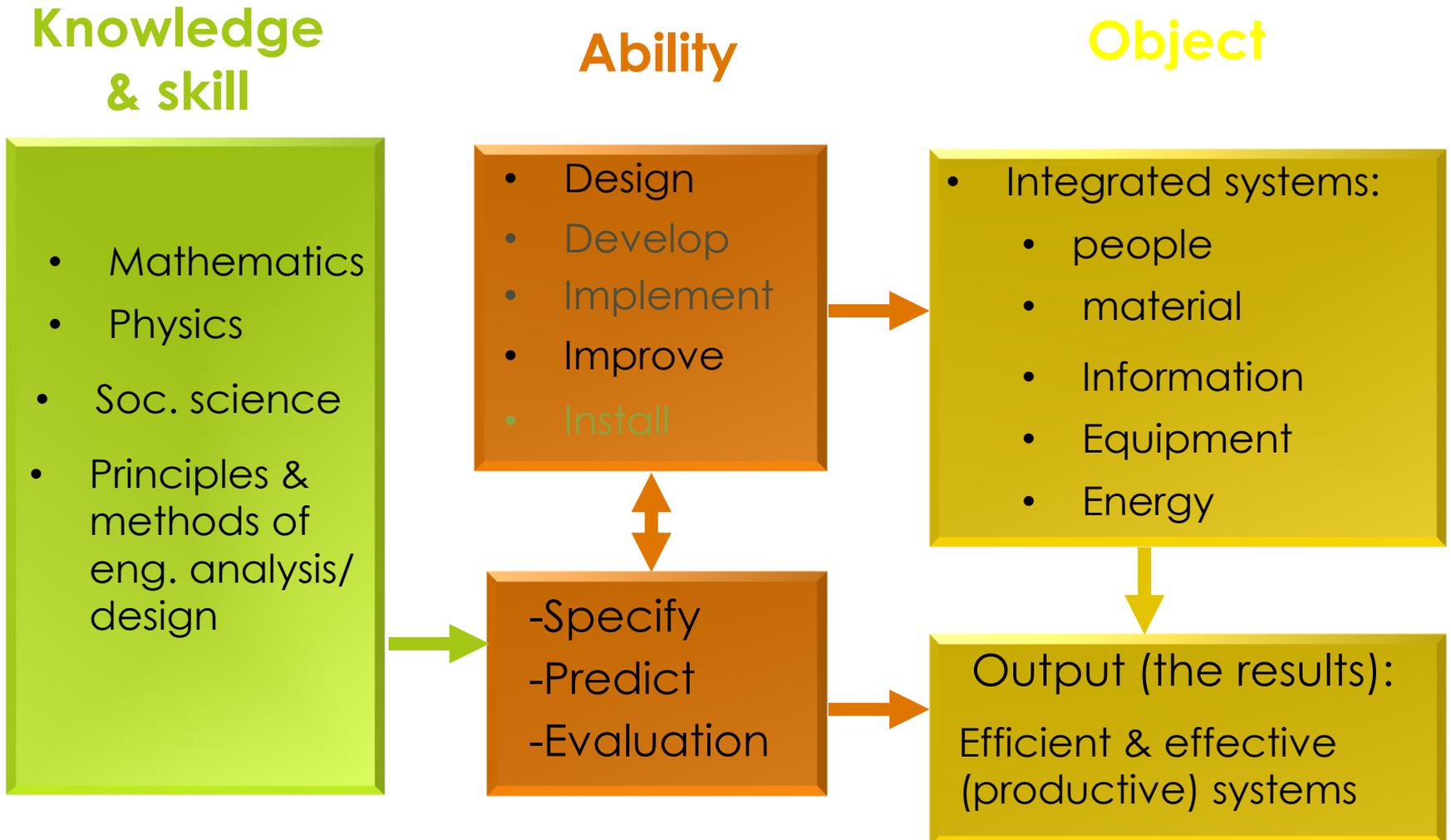


ABET CRITERIA

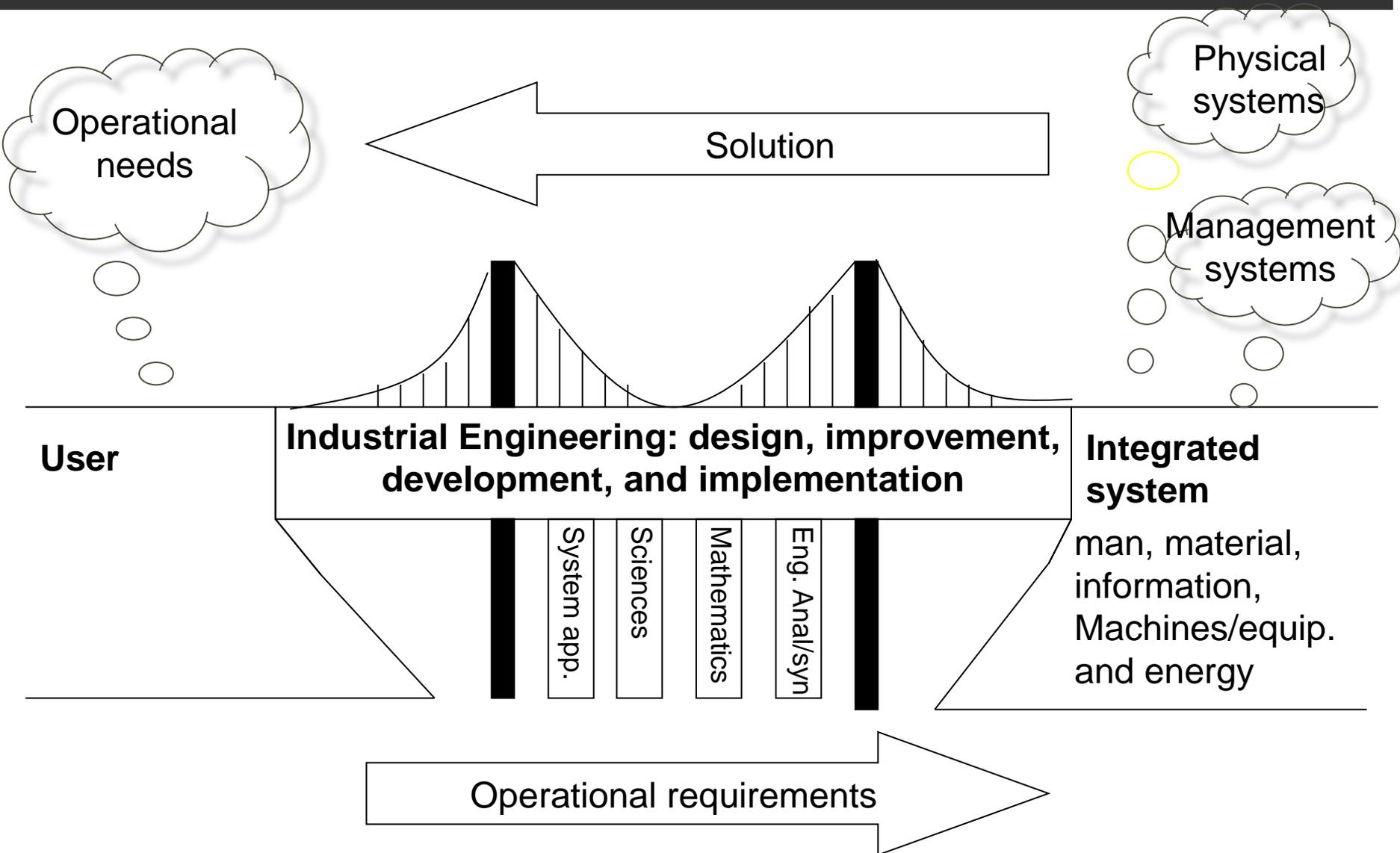
"The program must demonstrate that graduates have the **ability to design, develop, implement, and improve** integrated systems that include *people, materials, information, equipment and energy.*

The program must include in-depth instruction to accomplish integration of systems using *appropriate analytical, computational and experimental practices*"

Industrial Engineering in Indonesia



Industrial Engineering in Indonesia



Industrial Engineering in Indonesia

- Broad/general definition of a system
 - Keywords: *subsystems/elements, interaction/interoperable, and objectives/specified outcome*
- The main concern of IE is not with the object but the methodology: **The system approach**
- System (Wasson [2006]):

“An integrated set of interoperable elements, each with explicitly specified and bounded capabilities, working synergistically to perform value added processing to enable a user to satisfy mission-oriented operational needs in a prescribed operating environment with a specified outcome and probability of success.”
- The *system approach*: how to solve a problem holistically, not isolated, integrated, synergistically

Industrial Engineering in Indonesia

- To educate people about IE (i.e. the system approach), we need a learning model
- 'Industrial' in 'Industrial Engineering' includes not only Manufacturing Systems but any other systems: hospital, airline, banking, construction, government
- The learning model: **a Manufacturing system**
- Why the Manufacturing System has been chosen as a learning model?

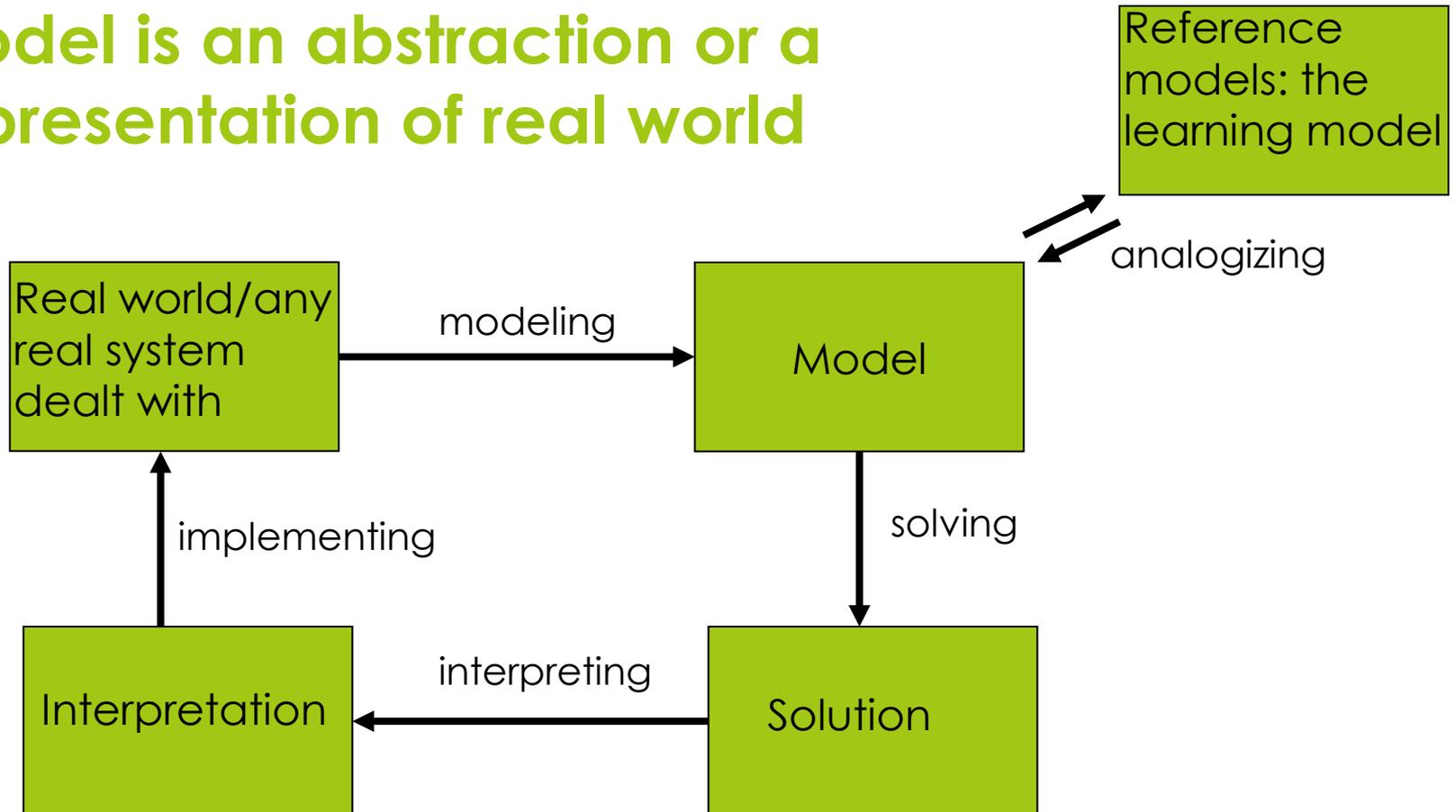
Industrial Engineering in Indonesia

- The reasons of choosing the Manufacturing System as a learning model
 - All subsystems of a manufacturing system could easily be recognized
 - A manufacturing system constitutes a visible (concrete, real) system
 - A manufacturing system is easy to be found in daily life
 - Manufacturing systems contribute to the national economy significantly
- The manufacturing system is considered as only a learning model. The graduates from an IE Department could choose their respective jobs at any system:
 - Using the system approach
 - Analogizing the chosen system to the manufacturing system: modeling process
- The IE graduates are more flexible in choosing jobs



Industrial Engineering in Indonesia

Model is an abstraction or a representation of real world



Indonesia National Qualification Framework

■ DGHE – 2004:

Design and implementation of a curriculum of a study program has to be based on competence

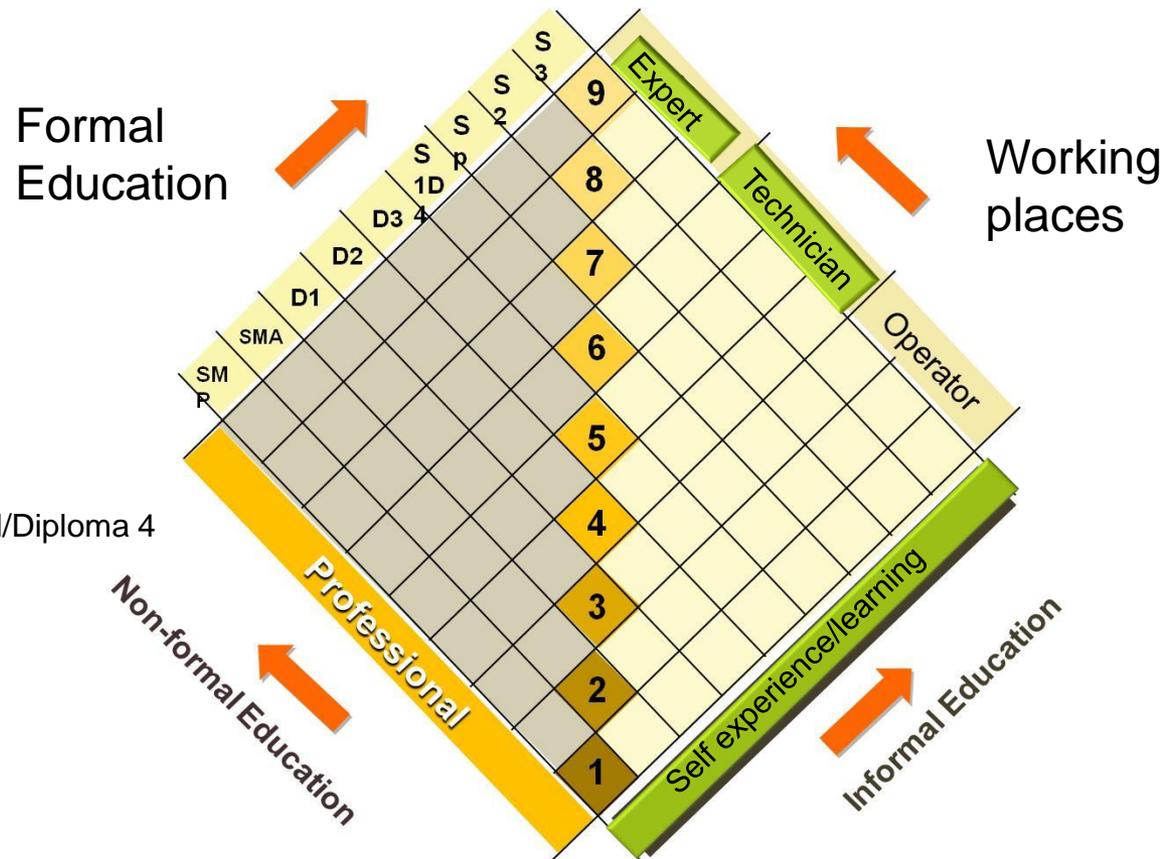
■ BKSTI – 2007:

Core IE curriculum – 92 credits (out of 144); the remaining credits (52 credits) for specialization

■ President Regulation No 8/2012:

INQF leveling competences acquired from formal, non-formal, informal education, and working experience

Indonesia National Qualification Framework



Note for formal education:

SMP: Junior high school

SMA: Senior high school

D1: Diploma 1

D2: Diploma 2

D3: Diploma 3

S1/D4: Undergraduate level/Diploma 4

Sp: Specialist level

S2: Master level

S3: Doctorate level

Concluding Remarks

The methodology is the emphasis for solving any system

The characteristic of IE problems can be concluded as follow:

- Integrated systems of people, materials, information, equipment, and energy
- The problem has a single or multiple objectives that should be optimized under a number of constraints
- The problems could be unsolvable but commonly there is a unique or alternate solutions
- There are trade offs among feasible solutions

Thank You

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