THE INSTITUTION OF ENGINEERS, BANGLADESH

BOARD OF ACCREDITATION FOR ENGINEERING AND TECHNICAL EDUCATION

TRANSFORMING EDUCATION FOR THE INDUSTRY: ENGINEER'S PERSPECTIVE IN ACHIEVING VISION 2041

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THE INSTITUTION OF ENGINEERS, BANGLADESH

20 APRIL 2024, SATURDAY

RUPOSHI BANGLA GRAND BALL ROOM, INTERCONTINENTAL HOTEL, DHAKA

PREAMBLE

The educators in engineering programs prepare their graduates for the industry. The industry in Bangladesh is advancing to make up for its grave post-independence deficits. The foreseen national growth per the national visions needs to be visible in the international arena.

Vision 2041 highlights the need for accelerated developments at higher altitudes with the local customization of high-end up-to-date engineering and technological know-how, which must trickle down into the profession as the fruits of Industry 4.0 and the upcoming Industry 5.0.

Engineers from all disciplines will be the prime movers. Our current graduates enhance their knowledge and skills through lifelong learning while the educators prepare our future graduates with up-to-date knowledge. The academic arena and the industry floors need to be under the same roof for the acquisition and delivery of knowledge and skills and their enhancement. A transformation in the teaching and learning process is on the horizon. Engineering graduates will display their learning in the industry at home and abroad consistently over time. In the future, our industry will have to recruit more high-grade professionals from our accredited engineering programs, which are well recognized at home and abroad. The local availability of capable engineers is an attractive ingredient for foreign direct investments (FDIs). The contribution to the national economy from enhanced FDIs is unfathomable. The international job markets will see our graduates as active contributors to the causes of the world. The country can expect to see them as high-income wage earners to enrich our foreign-currency reserves. The visibility in circularity in investment in engineering education is imminent.

All these accomplishments are rooted in an internationally recognized accreditation system for engineering education, which the Board of Accreditation for Engineering and Technical Education (BAETE) of the Institution of Engineers, Bangladesh has been pursuing since 2003 for the entire spectrum of engineering in Bangladesh. BAETE's accreditation criterion, the "Program Outcomes and Assessment," focuses on the industry's needs and describes the industry's most sought attributes in engineering graduates. The "Interaction with Industry" criterion focuses on how the students are exposed to the relevant industries. The "Program Educational Objectives" provide a means to monitor the graduates' development for up to 5 years after graduation.

BAETE's accreditation has led to the formation of industrial advisory panels in many engineering programs to bring the industry closer to academia. Our continuous effort is to bring them even closer together. As BAETE updates its requirements for graduates with the incorporation of sustainable development goals, we must start with the right footing. Our goal is to set a guiding path for the programs to be on the right course, and we need the industry's close collaboration to do that.

With this aim, we are organizing the first national symposium with the theme "Transforming Education for the Industry: Engineer's Perspective in Achieving Vision 2041" to bring faculty members and industry personnel under the same roof.

Landscape of Engineering Education and Industry: Present and Future

Kazi Bayzid Kabir

Member Secretary, BAETE

The Institution of Engineers, Bangladesh

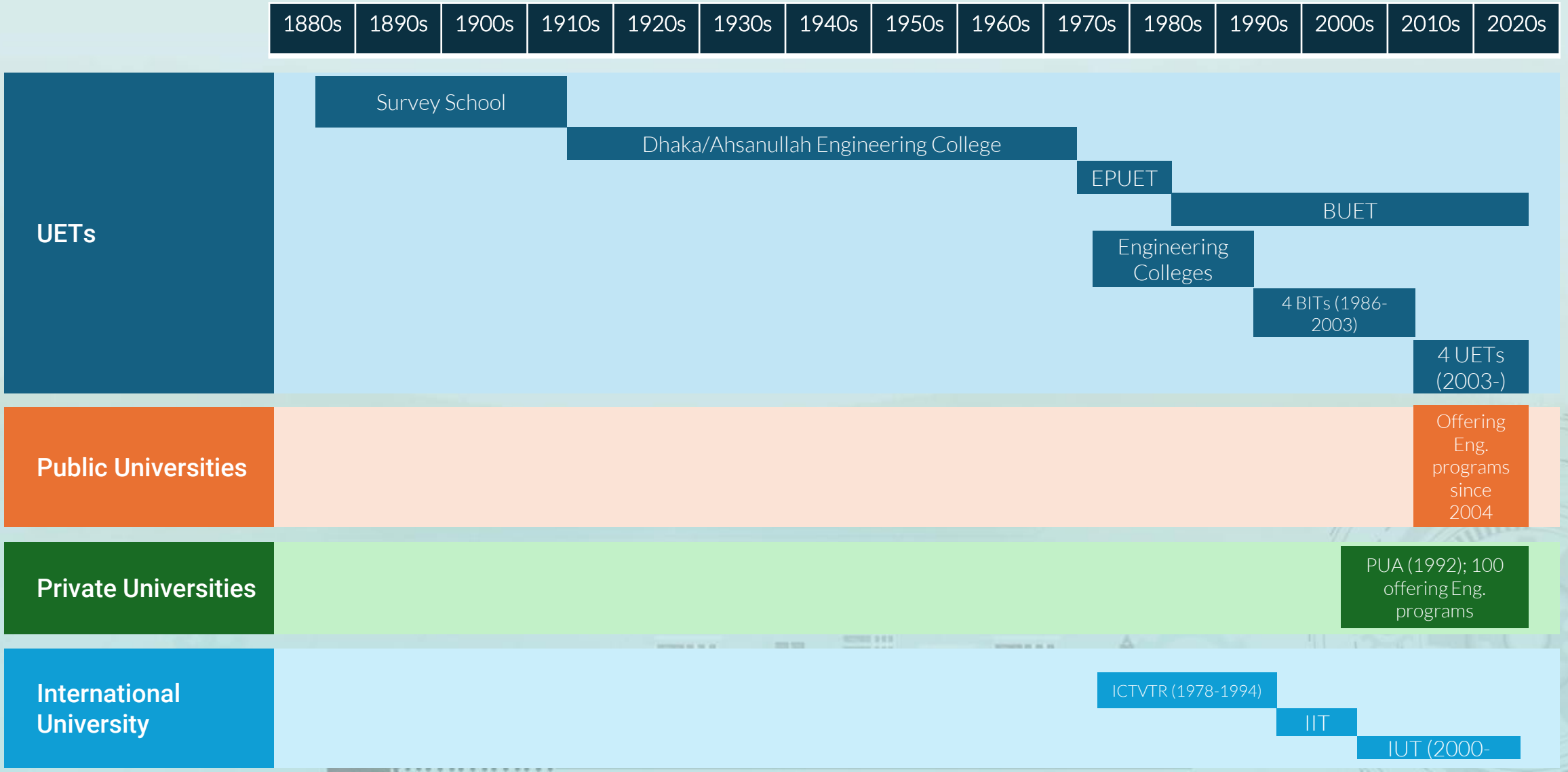
What are the most popular bachelor’s degree globally?

Engineering education over the years!

- Level 1: Kinship relationship: Father to son [Predates the appearance of Homo Sapiens]
- Level 2: Guilds: Master – Apprentice [Around 620 BC]
- Level 3: Trade (Technical) School [Early 1900 AD]
- Level 4: Technical college [Around 1700 AD]
- Level 5: University [Around 1700 AD]

D. N. P. Murthy, N. W. Page. Education and Research for the Future: Engineering as an Illustrative Case, Springer Nature, 2023

How our engineering programs evolved?



Five major shifts in engineering education

- Shift 1: Shift from hands-on and practical emphasis to engineering science and analytical emphasis (starting around 1950).
- Shift 2: Shift to outcome-based education and accreditation (starting around the mid-1980s).
- Shift 3: Shift to emphasising engineering design (starting around the 1990s). The CDIO Approach evolved in response to this.

J. E. Froyd, P. C. Wankat and K. A. Smith, "Five Major Shifts in 100 Years of Engineering Education," in Proceedings of the IEEE, vol. 100, no. Special Centennial Issue, pp. 1344-1360, 13 May 2012, doi: 10.1109/JPROC.2012.2190167.

Five major shifts in engineering education

- Shift 4: Shift to applying education, learning, and social behavioural sciences research.

- Shift 5: Shift to integrating information, computational and communications technology in education.

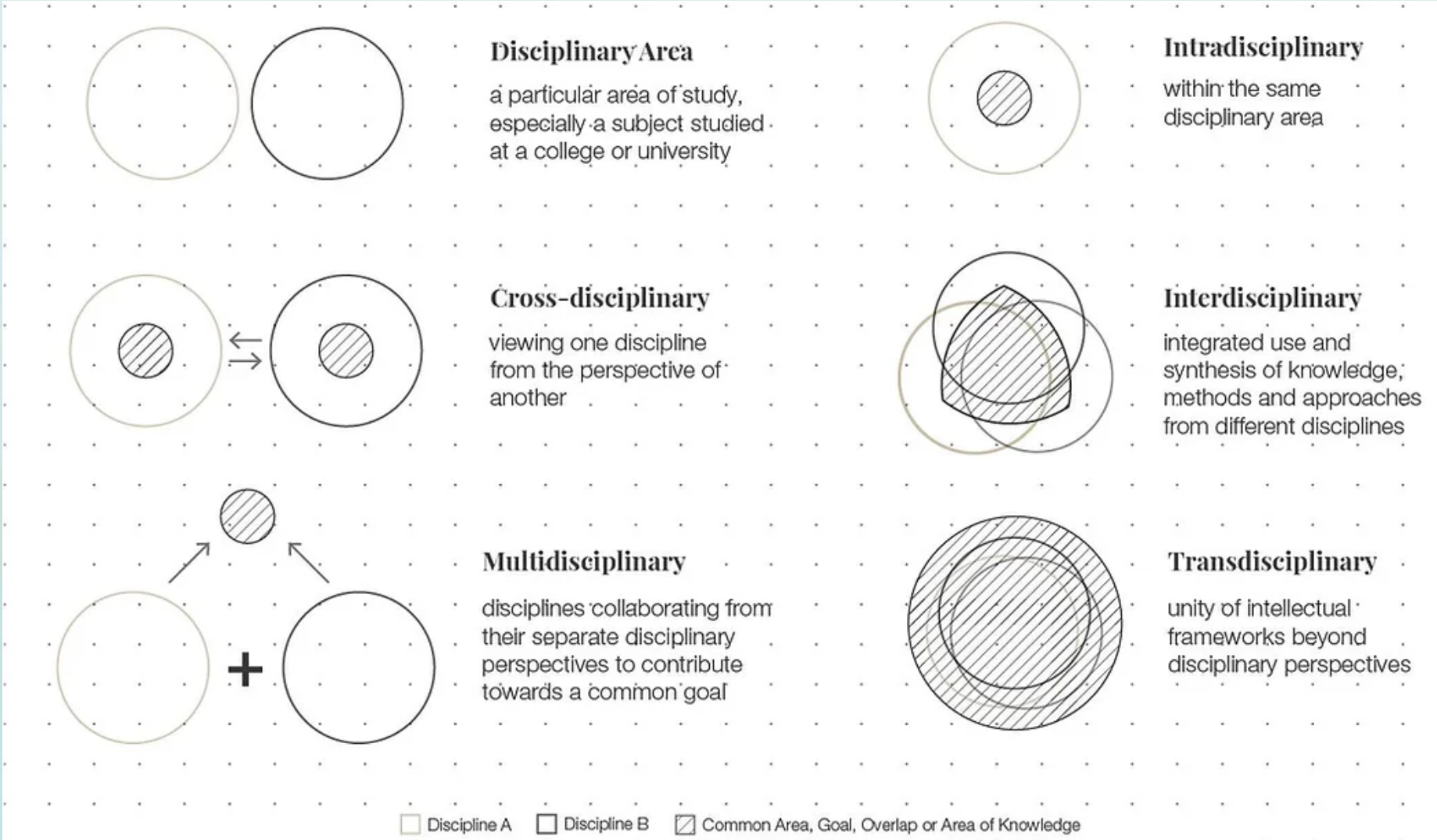
J. E. Froyd, P. C. Wankat and K. A. Smith, "Five Major Shifts in 100 Years of Engineering Education," in Proceedings of the IEEE, vol. 100, no. Special Centennial Issue, pp. 1344-1360, 13 May 2012, doi: 10.1109/JPROC.2012.2190167.

Where are we now?

- **Completed Shift 1**
- **Completed Shift 2**
- **Completed Shift 3**
- **Completed Shift 4**
- **Completed Shift 5**

“It is so much easier to educate students for our past than their future” – Aldert Kamp (a Dutch academician)

We have clear boundaries!!

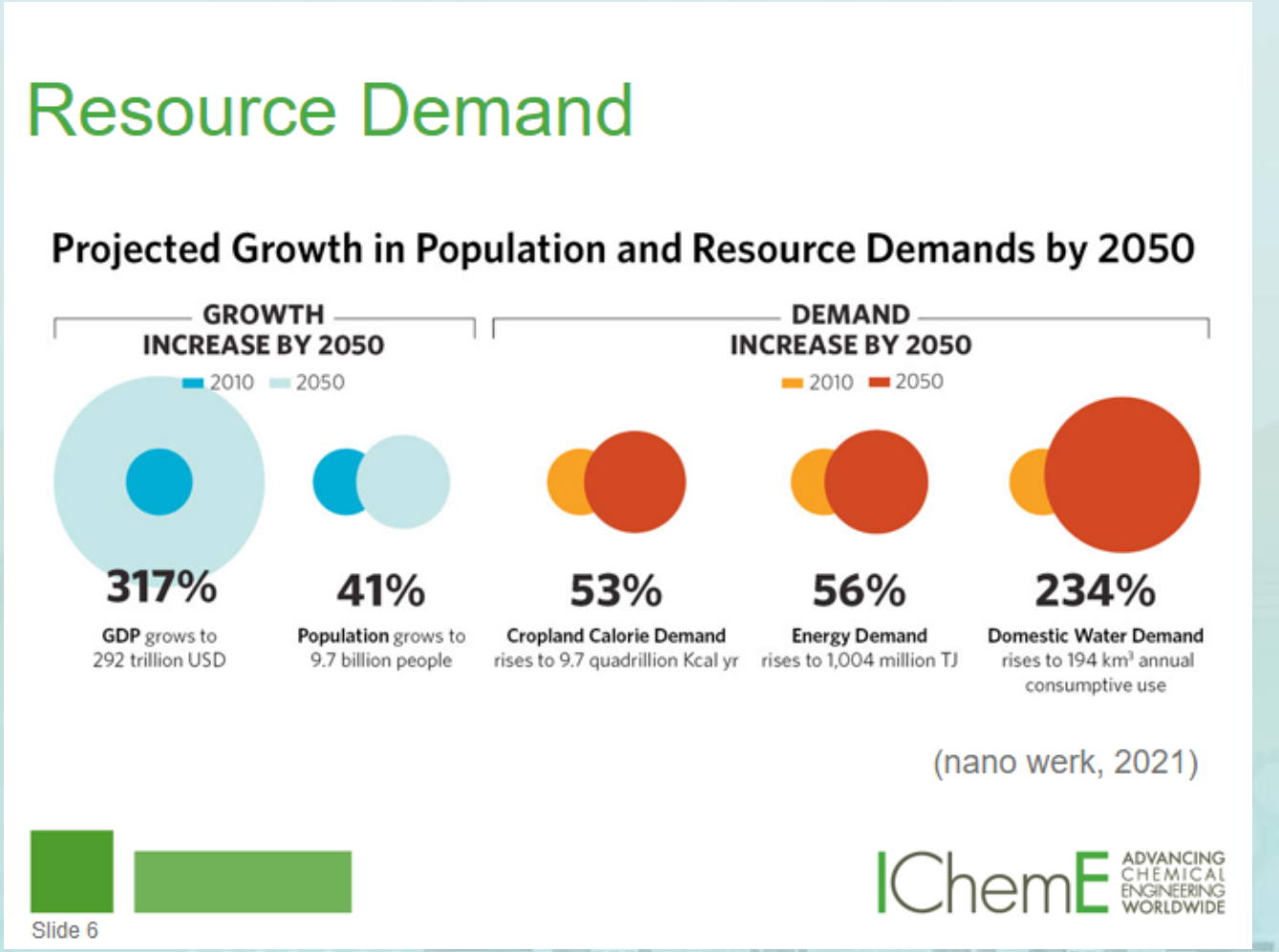


https://www.archpsych.co.uk/post/disciplinarities-definitions

Knowledge is indivisible. When people grow wise in one direction, they are sure to make it easier for themselves to grow wise in other directions as well. On the other hand, when they split up knowledge, concentrate on their own field, and scorn and ignore other fields, they grow less wise–even in their own field.

In his book "The Roving Mind (1983), p.116

Population vs resources projection (Global)



Current state of the Industry –Linear economy

Linear Economic Model

Recycle/Re-use Economic Model

Circular Economy Model

Linear Economic Model

Linear economy is an open-loop process that adapts the concept of 'take, make, dispose'.

The growth of most of the modern industries is built on linear processes that convert resources into products, which are then disposed of at the end of their shelf life.

As the handling of a products= after its disposal is not carefully thought about as a designed resource system, the main issue of a linear economy is its high exploitation of natural resources, and high discharge of waste. Hence, a linear economy is considered as non-sustainable.

IChemE training materials

What do we do?

The Ellen MacArthur Foundation: https://www.ellenmacarthurfoundation.org/

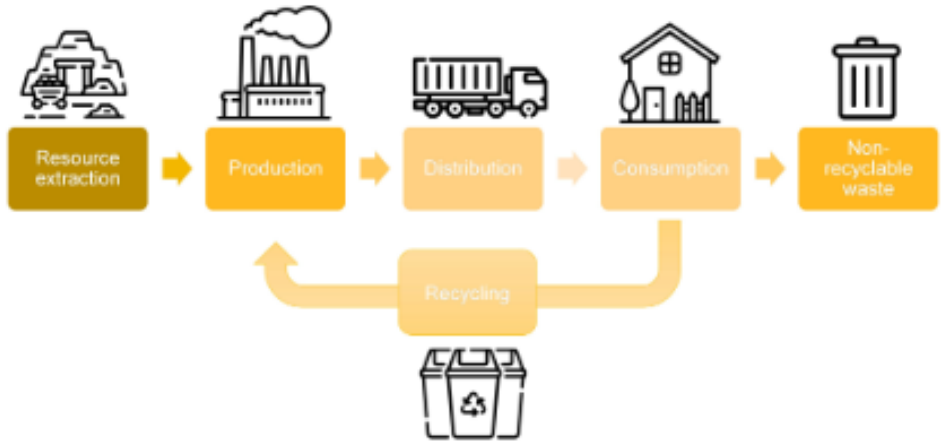
Shift 1: Recycle/re-use

Linear Economic Model

Recycle/Re-use Economic Model

Circular Economy Model

Recycle/Re-use Economic Model



Next, we have the recyle or reuse economy. This is a closed loop process, contained within an open-loop process.

In this model, some of the waste generated from production processes and consumer usage, is recycled to the beginning of the process, and utilised as raw materials.

Compared to a linear economy, the action of recycling and reusing in this economic model, decreases the impact on the

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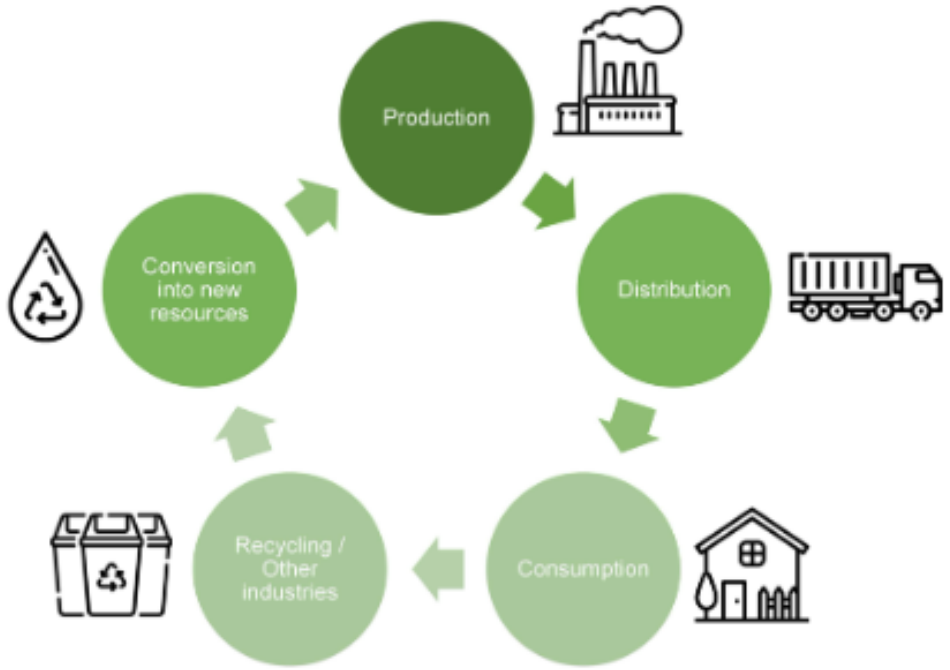
Shift 3: Circularity

Linear Economic Model

Recycle/Re-use Economic Model

Circular Economy Model

Circular Economy Model



The third economic model is circular economy.

The core concept of circular economy is to maintain the value of material, regardless of whether the material is in the

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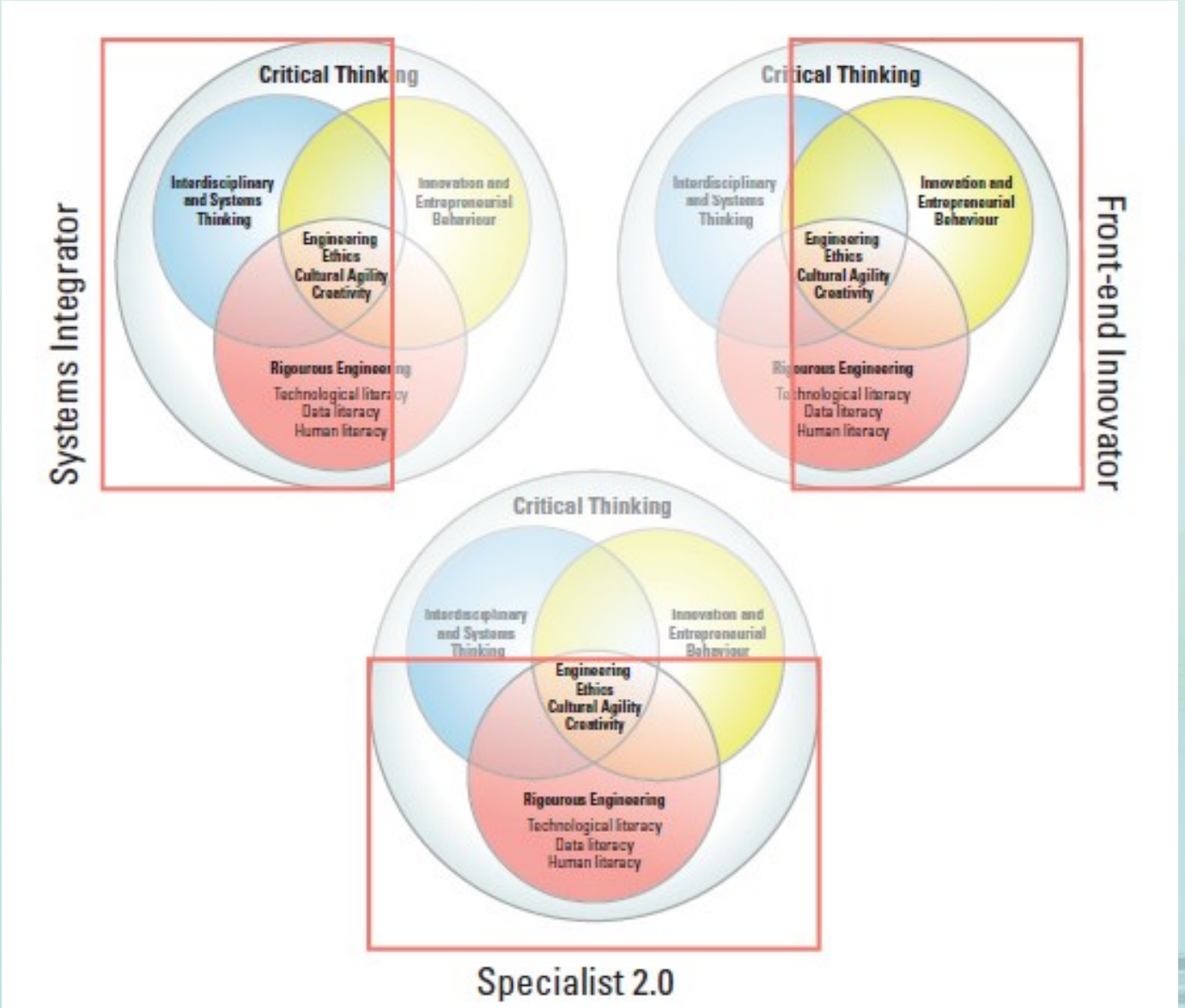
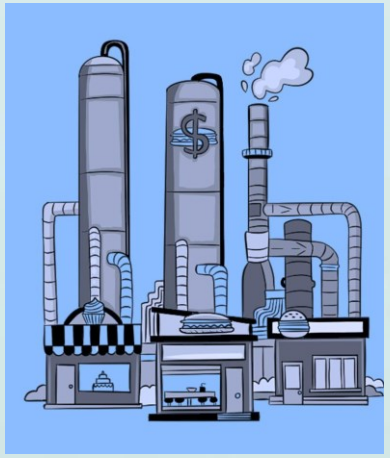
How do the academia meet the industry need?



- shift from “learning knowledge-as-a-thing” to “learning knowledge-for-purposeful-application”
- Impact focused learning
- Become socially responsible

Image source: Aldert Camp (2020). Navigating the Landscape of Higher Engineering Education. TU Delft

Partnership



SHORT BIO OF KAZI BAYZID KABIR

Kazi Bayzid Kabir is a Professor of Chemical Engineering at Bangladesh University of Engineering and Technology (BUET). Dr. Kabir completed his PhD from Monash University in 2014. Before that, he completed his MSc in Chemical Engineering in 2009 and BSc in Chemical Engineering in 2004 from BUET.

Dr. Kabir has been involved in energy research with emphasis on solid fuel conversion (pyrolysis and energy through hydrothermal treatment, and life-cycle assessment and techno-economic assessment of energy conversion processes. Apart from teaching and research, Dr. Kabir also has keen interest in academic quality assurance. He is currently the Director of BUET's Institutional Quality Assurance Cell and works closely with the Strategic Planning and Quality Assurance Division of UGC.

Dr. Kabir is also the Member Secretary of the Board of Accreditation for Engineering and Technical Education since March 2021. Prof. Kabir is a Life Member of The Institution of Engineers, Bangladesh, as well as Senior Member of the American Institute of Chemical Engineers and Associate Member of the Institution of Chemical Engineers.

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