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CDIO Introduction Sessions

Session [1]

Impact and Benefits of the CDIO Approach
to Engineering Education

CDIO Introduction Sessions

Conference visitors new to CDIO and those who would like to know more about the framework, can visit the CDIO Introduction Sessions. There are four in total, which can be followed in order or cherry-picked as desired. Expect to be informed and work actively with other participants in each session, and become a pro at CDIO!

Overview of the CDIO Introduction Sessions

The sessions have just been revamped and revised and will run in their new form for the second time in the Liverpool conference. We would be very happy to receive your feedback!



Day 1 (Monday)

Session 1

Impact and Benefits of CDIO Approach to Engineering Education, introduces the CDIO initiative, clarifying its purpose, scope, and key resources. Participants gain an overview of how CDIO can enhance programmes and student learning through practical examples and case studies.



Day 1 (Monday)

Session 2

Using the CDIO Standards in Education Development, explores the CDIO Standards as a framework for curriculum design and evaluation. Participants learn to interpret and apply the standards to their teaching practices.



Day 1 (Monday)

Session 3

Using the CDIO Syllabus in Education Development, focuses on the structure and application of the CDIO Syllabus in curriculum planning. Participants practise linking syllabus elements to their course design and educational development initiatives.



Day 3 (Wednesday)

Session 4

CDIO Collaboration and Community, highlights strategies for adopting CDIO, including implementation timelines and early success tips. Emphasises collaboration within the CDIO community and the benefits of shared practices and continuous development.



Introductory Programme

Objectives of Sessions

Impact and Benefits of CDIO Approach to Engineering Education

- Participants will be able to explain the overarching purpose of CDIO Initiative
- Participants will be able to describe how their programme and students might benefit from CDIO

Using the CDIO Standards in Education Development

- Participants will be able to explain the holistic nature and purpose of the CDIO Standards
- Participants will be able to interpret and apply the CDIO Standards
- Participants will be able to understand to what extent their current practice is similar to the CDIO Approach

Using the CDIO Syllabus in Education Development

- Participants will be able to explain the nature and purpose of the CDIO Syllabus
- Participants will be able to understand how the CDIO Syllabus is organised and can be applied
- Participants will be able to define connections between syllabus and their own educational designs

CDIO Collaboration and Community

- Participants will be able to describe the nature of collaborative activities in CDIO and the associated benefits
- Participants will be able to devise a broad timeline for their own adoption of CDIO

Today's Outcomes

1. Explain the overarching purpose of CDIO Initiative
2. Explain What it is and what it is not
3. Understand the variety of CDIO resources (Website and CDIO Knowledge Library)
4. Describe how their programme and students might benefit from CDIO (case study of CDIO implementation)

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Session 1: Impact and Benefits of the CDIO Approach to Engineering Education

Session 2: Using the CDIO Standards in Educational Development

Session 3: Using the CDIO Syllabus in Educational Development

Session 4: CDIO Collaboration and Community

A Very Warm Welcome Again!

University of
Hertfordshire **UH**

SP Singapore
Polytechnic

Thomas Baker

- Discovered CDIO organisation in 2018
- Lead implementation of CDIO at UH, from 2020
- Currently CDIO lead at University of Hertfordshire
- Academic Lead for Engineering supporting & leading CDIO activities at UH across a 9 CDIO based Engineering Programmes

Mark Nivan Singh

- Active in CDIO for the past 5 years. So I am relatively new
- Lead in the implementation of education initiatives like CDIO, Data-Enabled Flipped Learning, Self-Directed Learning and AI-Assisted
- Work closely with faculty to re-design their curriculum, innovate their teaching and learning approaches and conducting relevant workshops and other professional development activities

Activity 1 – What Does CDIO Mean to Me?

- This is an individual exercise and will help the facilitators tailor the session more effectively
- Pen down your thoughts on what you think CDIO is, and what CDIO can do
- You have 5 mins

Now It's Your Turn!

- **Please introduce yourself and share with us**
 1. The institution that you teach in and what do you teach
 2. A cool or little known fact about yourself
 3. Share your thoughts on what you think CDIO is, and what CDIO can do

What is CDIO & How Can It be Used to Enhance Engineering Education and Learning



Over 200 universities worldwide and still growing!



MIT



Chalmers



KTH



Linköping



CDIO | A Worldwide Innovative Educational Framework

The “Problem”

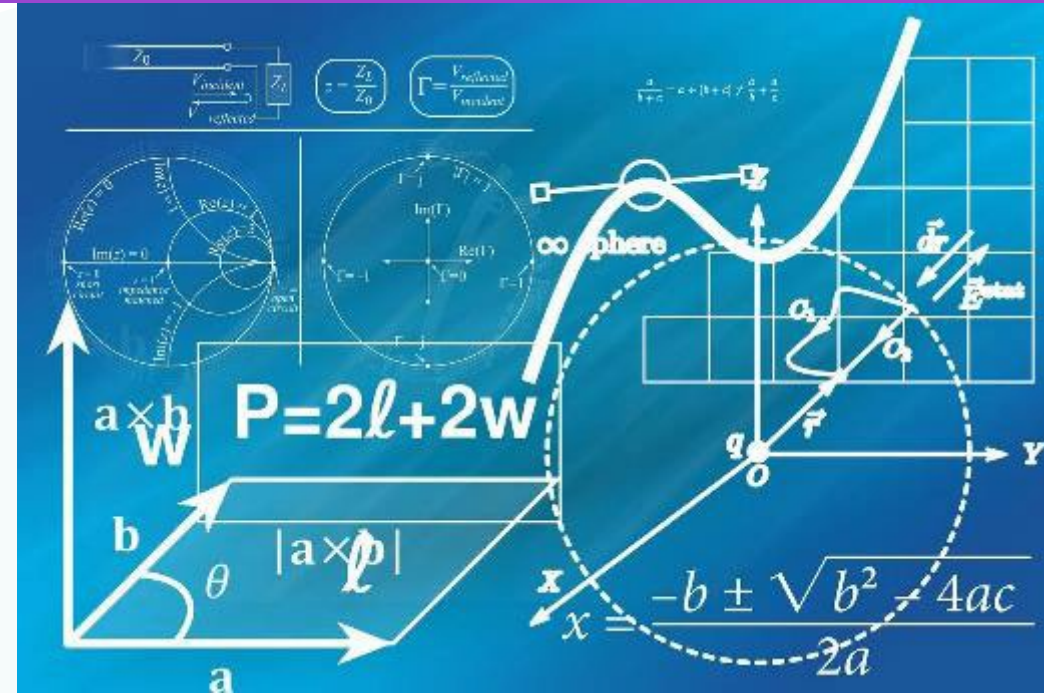
By the late 1990’s:

“engineering education [had] evolved into the teaching of engineering science.

Teaching engineering ***practice*** was increasingly de-emphasized”

As a result, industry in recent years has found that graduating students, while technically adept,

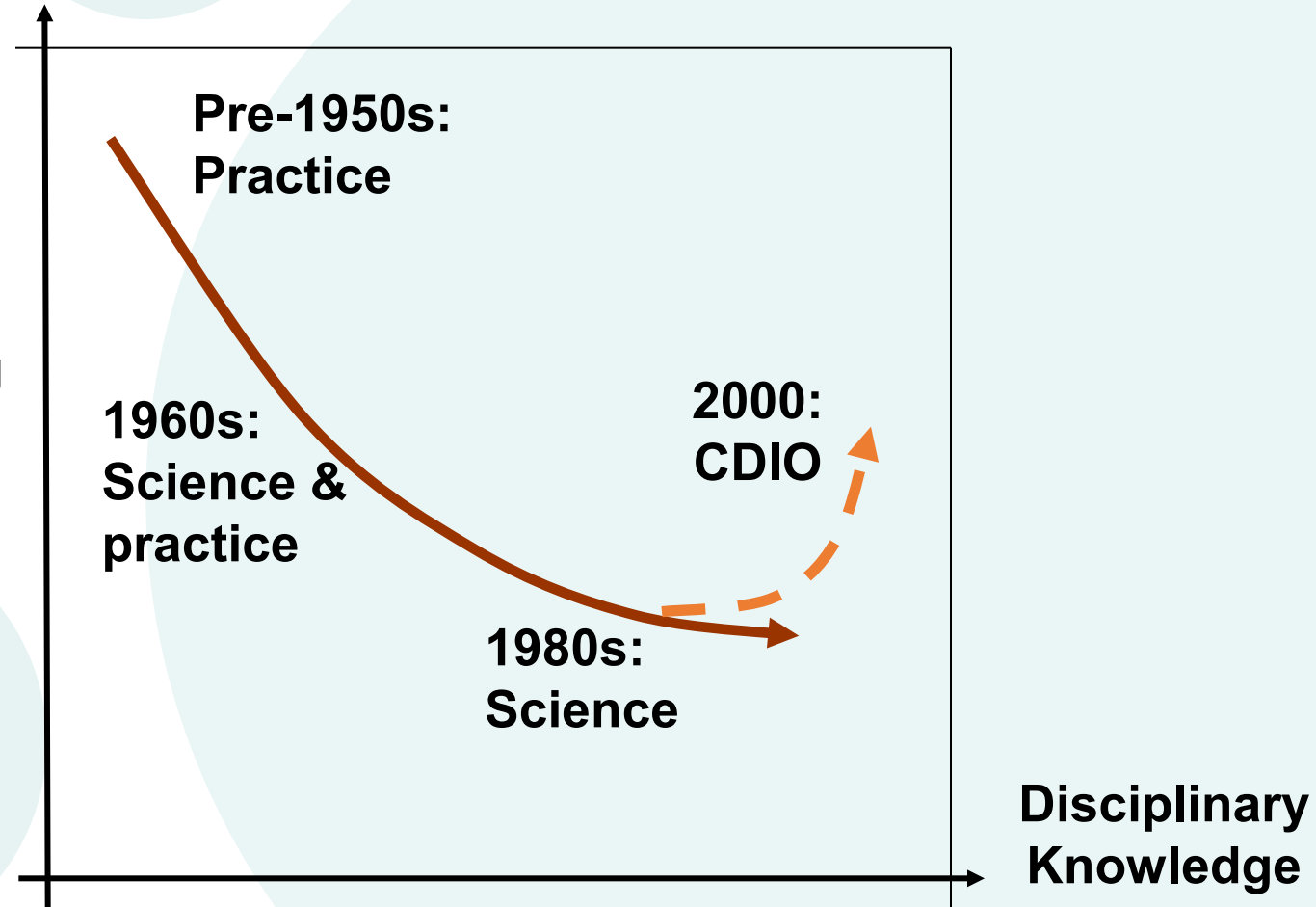
lack many abilities required in real-world engineering situations”



Source <https://cdio.org/cdio-history>, Emphasis added

NOTIONAL DEVELOPMENT OF ENGINEERING EDUCATION

Personal and Interpersonal Skills, and Product, Process, and System Building Skills



Engineers need *both* dimensions, and we need to develop education that delivers both

The question that underlies the CDIO approach:

“What are the knowledge, skills and attitudes that the graduating engineer should possess?”

Activity 2 - “Essential Functions” of an Engineer

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- **Graduating engineers should be able to?**

“Essential Functions” of an Engineer

- **Graduating engineers should be able**
 - ◆ **Conceive-design-implement-operate**
 - ◆ **Manage complex value-added engineering systems**
 - ◆ **Collaborate in a modern team-based environment**
 - ◆ **Grow into mature and thoughtful individuals”**

Why is it called CDIO?

Conceive-Design-Implement-Operate is the **context** of Engineering Education

It's what engineers do

(Crawley et al 2007)

Conceive: customer needs, technology, enterprise strategy, regulations; and conceptual, technical, and business plans

Design: plans, drawings, and algorithms that describe what will be implemented

Implement: transformation of the design into the product, process, or system, including manufacturing, coding, testing and validation

Operate: the implemented product or process delivering the intended value, including maintaining, evolving and retiring the system

The CDIO Education Framework was the result of...

- Feedback from industries, graduates and practising engineers that certain important **professional skills are not developed** in the existing curriculum. (knowledge, skills and identity)
- **Need to meet standards and criteria** set by accreditation bodies such as ABET- Accreditation Board for Engineering & Technology
- **Falling Engineering Enrolment** as well as students finding that engineering is too dry and theoretical in the first year of study

Are these familiar issues for you too?

Vision of CDIO initiative

- **An integrated curriculum** – CDIO skills are interwoven into mutually supporting technical contents
- Rich with student **design-implement** experiences
- Using **active** and **experiential** learning
- Set in classrooms and modern **functional** learning laboratories and **workspaces**
- Constantly improved through robust **assessment** and **evaluation** processes

CDIO OVERVIEW

The activities within the CDIO Initiative are based on two BIG questions

WHAT knowledge, skills and attitudes should students possess as they graduate from university?	HOW can we do better at ensuring that students learn these skills?
CDIO Syllabus Disciplinary Knowledge Personal Skills Interpersonal Skills CDIO Skills	CDIO Standards Curriculum T&L methods Assessment Faculty Competence Workspace

“Let’s Be
CLEAR”

What **CDIO** is **NOT**...

- ❌ It is not a pedagogy
- ❌ It is not a “prescription”
- ❌ It is not a “cookie cutter”
- ❌ It is not a certification
- ❌ It does not automatically lead to an accreditation



Activity 4 - The main characteristics of a CDIO-based education:

- ◆ ???
- ◆ ???

The main characteristics of a CDIO-based education:

- ◆ A curriculum organised around mutually supporting courses, but with CDIO activities highly interwoven
- ◆ Rich with student design-build-test projects
- ◆ Integrating learning of professional skills such as teamwork and communication
- ◆ Featuring active and experiential learning
- ◆ Constantly improved through quality assurance process with higher aims than accreditation”

Let's Take a Deeper Dive

Case Studies to better understand how Institutions have adopted CDIO

Activity 5 – Analysing Case Studies

- In Groups of 2 or 4, select which case your group would like to analyse
- As you read and analyse the case, please use the following reflective questions to guide your discussions

Reflective Questions

From the case studies identify how the “functions” of an engineer have been developed in students:

1. Conceive-design-implement-operate
2. Manage complex value-added engineering systems
3. Collaborate in a modern team-based environment
4. Grow into mature and thoughtful individuals

We will invite groups to share their observations.

Case Studies for Reference

Case Study 1 University of Hertfordshire	Case Study 2 Singapore Polytechnic
 UH Case Study	 Case Study SP

Let's Share!

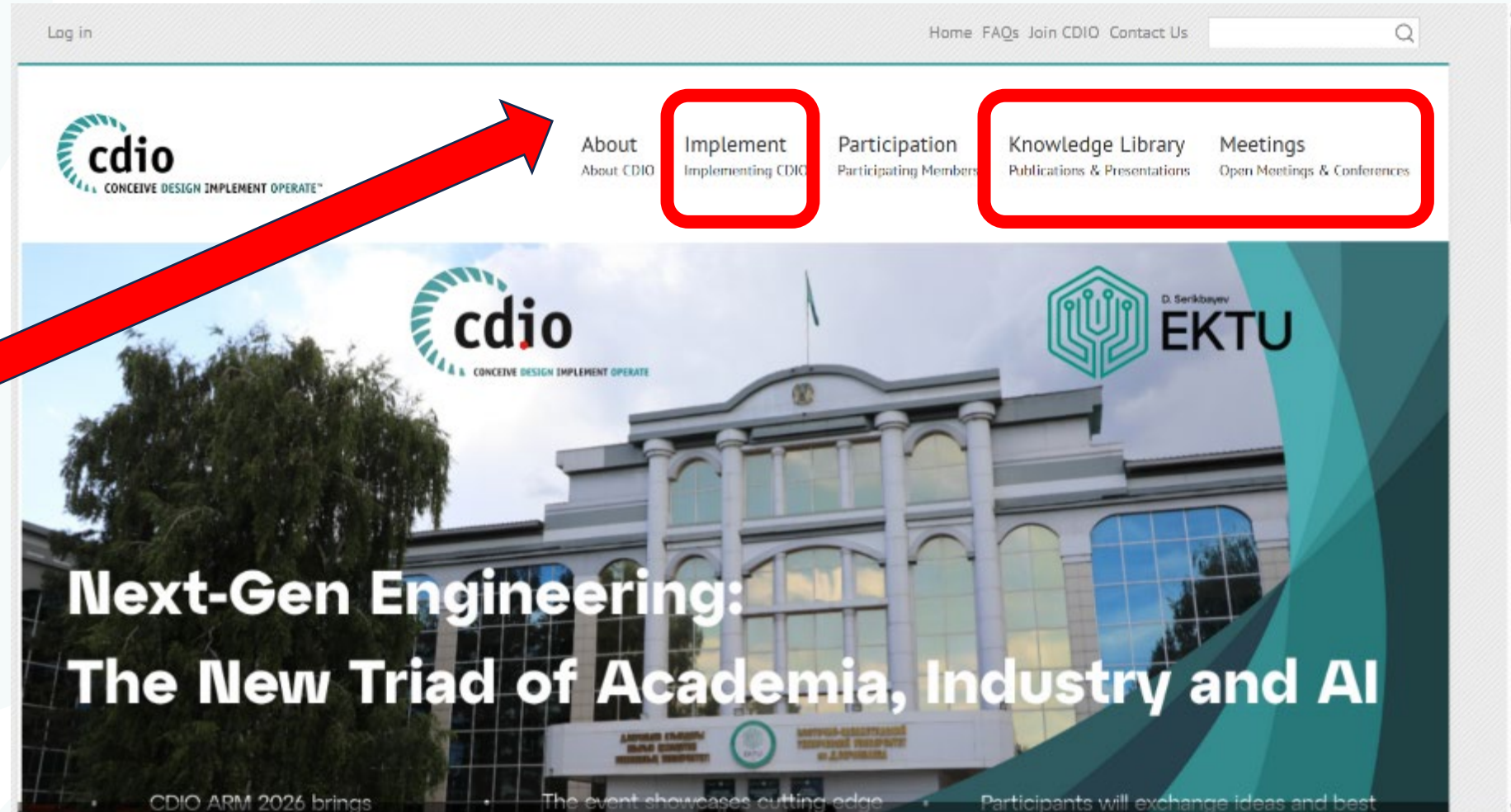
Resources to Assist You

Your First Stop Should Be...

www.cdio.org

You can find useful resources such as:

- 1) How to implement CDIO
- 2) Useful publications
- 3) Past conference papers



In Conclusion

- We hope that Session 1 has given you a good insight to CDIO and its elements as well as shown you how CDIO has been successfully implemented in 2 institutions
- Some key takeaways are:
 1. CDIO is a framework, not a prescription — it's not a pedagogy, not a certification, and not a cookie-cutter. Each institution adapts it to their own context and curriculum.
 2. The vision is an integrated curriculum — professional skills like teamwork and communication are woven into technical content, powered by active/experiential learning and design-build-test projects.
 3. Resources and community support exist — cdio.org and the CDIO Knowledge Library are the go-to starting points for implementation guides, publications, and past conference papers

In Session 2..

- You are highly encouraged to attend Session 2 as the session will focus on:
 1. Using the CDIO Standards for Educational Development

Muddy cards – Please give us feedback on today’s session

On a GREEN post-it....

Write down the most valuable thing you gained from today’s session.

On a YELLOW post-it....

Write down those things that most need to be improved in the session.

Stick them on the wall on the way out.

Thank You and Have a
Fruitful Conference!