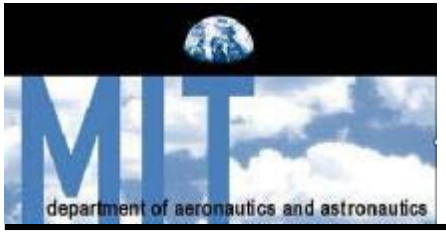


SP4: Engineering Education and Baseline Assessment

Unified Engineering Spring 2004

Thu 3-Mar-04

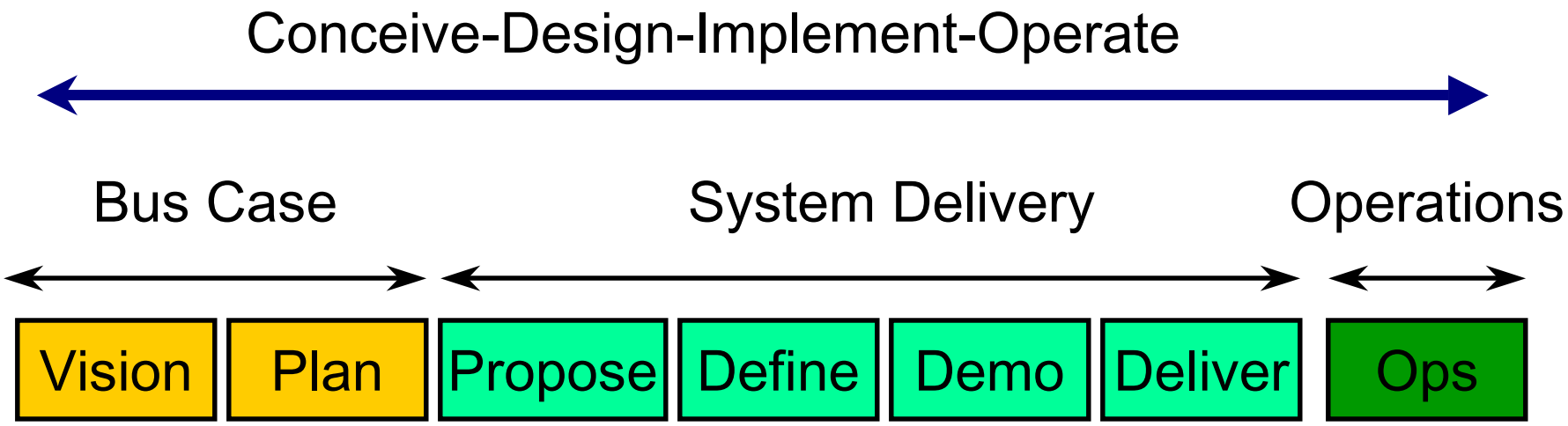
Charles P Coleman, MIT

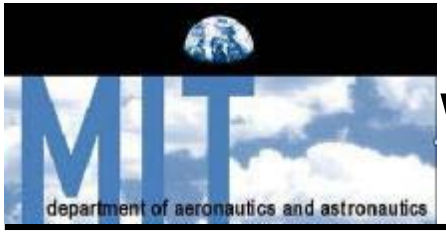
Outline

- Reflections on Seering 2003
- SP4

Seering 2003:
Same story!

Life Cycle: CDIO in Industry

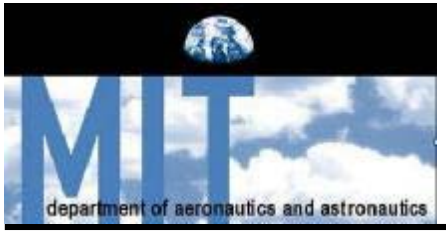




Why is Reform/Redefinition Needed?

- **Emphasis** on teaching of engineering science.
- **De-emphasis** on teaching engineering practice.
- Students lacking abilities required in real world engineering situations.

Widening Gap between engineering education and engineering practice.



Attributes: Desired Outcomes

Boeing

- Good understanding of engineering science
- Good understanding of design and manufacturing
- Multi-disciplinary, systems perspective
- Understanding of the *context* in which engineering is practiced.
  - Economics
  - History
  - The environment
  - Customer and societal needs
- Good communication skills
- Profound understanding of the importance of teamwork

ABET

- Ability to apply knowledge
- Ability to design and conduct experiments
- Ability to design system, component, or process
- Ability to function on multi-disciplinary teams
- Understanding of ethical responsibility
- Understand impact of engineering in global and societal context
- Ability to use techniques, skills and tools necessary for engineering practice

Teaching the Engineering Method?

Essential Functions of an Engineer:

Graduation engineers should be able to:

Conceive-design-implement-operate (CDIO)

Complex value-added engineering systems (Technical)

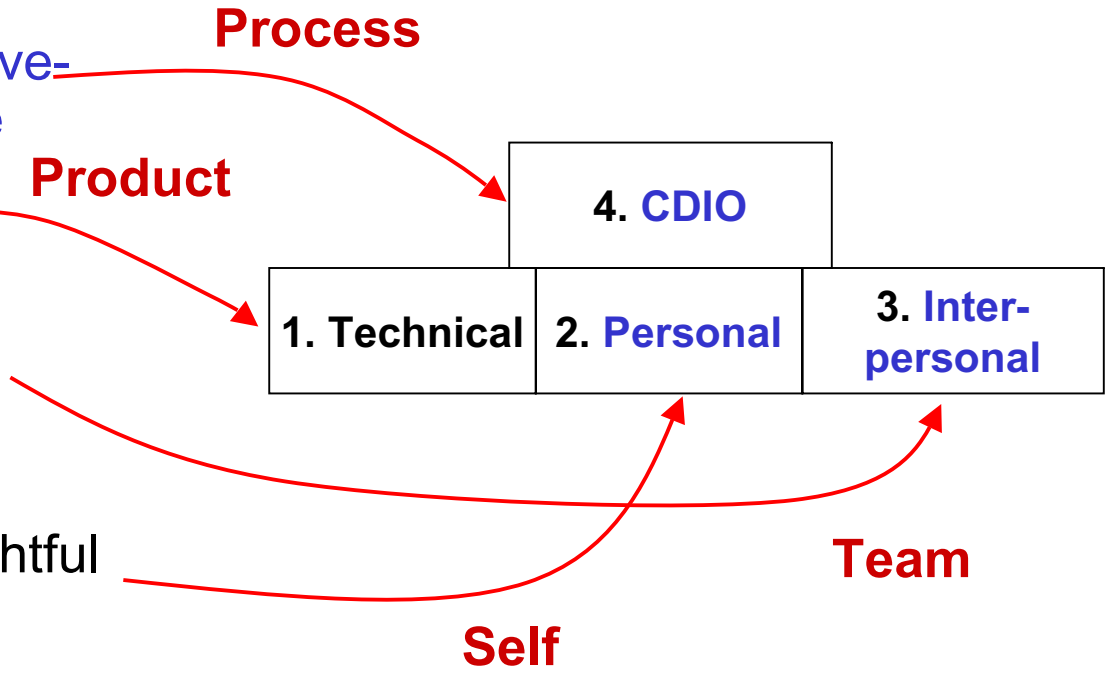
In a modern team-based environment (Interpersonal)

And are mature and thoughtful individuals (Personal)

Map of the new CDIO syllabus

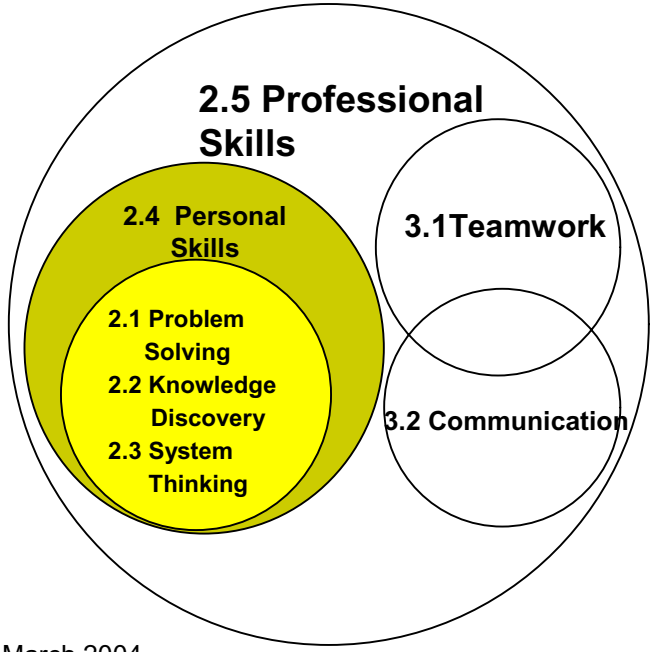
Educate students who:

- Understand how to conceive-design-implement-operate
- Complex value-added engineering systems
- In a modern team-based engineering environment
- And are mature and thoughtful individuals



CDIO Syllabus covered by System Problems

Fall	Spring
Weekly individual assignments	Semester long team assignment
Self-contained assignments	Interdependent assignments
Progressively more complex assignments	Progressively more complex assignments
Integration of 1-2 disciplines	Integration of 2-3+ disciplines



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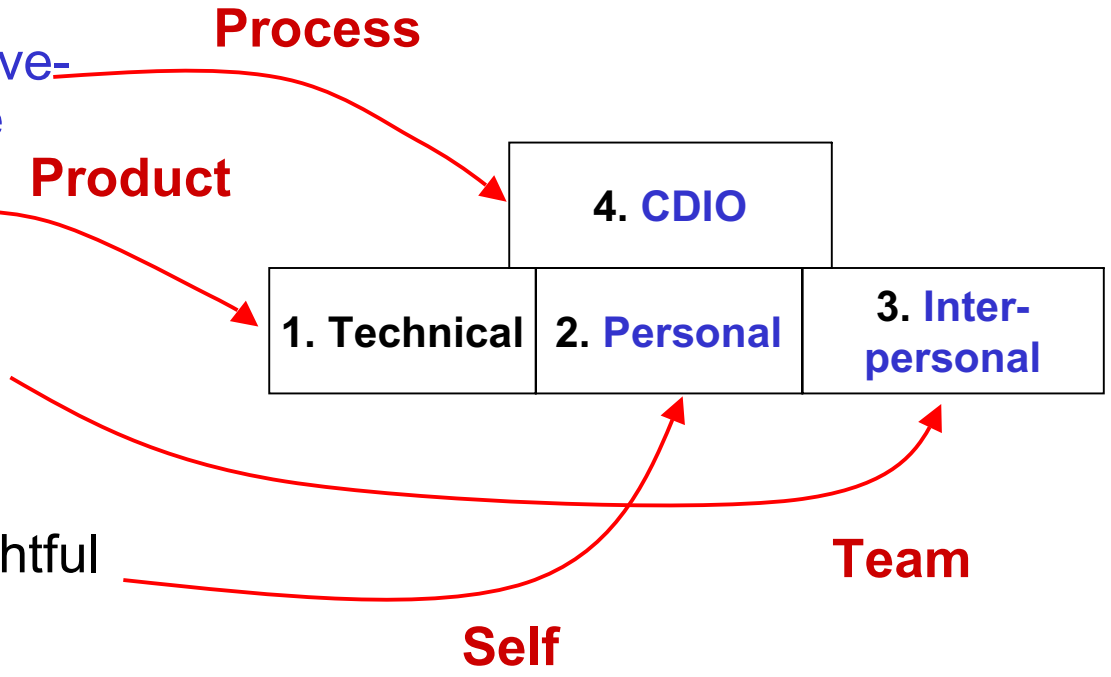


Engineering Method Tools

Design

- Process
- Analysis

Tools:

- FRDIARRC
- Design Selection Matrix

Project Mgmt

- Time
- Resources
- Risk

Tools:

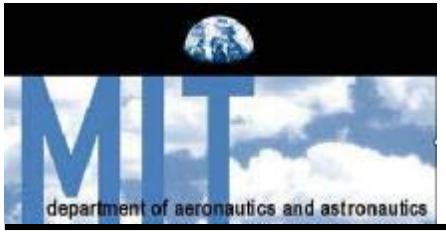
- WBS
- Gantt Chart

Teamwork

- Communication
- Coordination
- Roles & Responsibilities
- Motivation!

Tools:

- Comm Plan
- Roles & Resp
- Ground Rules
- Effective Mtgs



McDonald's Functional Requirements Design Ideas

Functional Requirements	Design Idea	**Analysis**
Take orders	Internet At counter terminal	Cost, Time Efficiency, Course 6
Cook burgers	Flame broil Nuke Fry	Patent infringement? Course 22 Thermo, Course 2
Deliver burgers	Delivery At the counter Dispensing machine	Cost,Time, Cust Sat Efficiency, packaging Robotics, Course 2