INDUSTRIAL ENGINEERING

Lesson 1
Introduction to Industrial Engineering

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Synopsis

This chapter briefs the history & development of IE, its definition, objectives, activities & future challenges of industrial engineers. This chapter also highlights the relationship of IE with other engineering disciplines. At the end of this chapter, employability of industrial engineers are also discussed.

Expected Outcome

1. Explain the history & development of IE.
2. Understand the general concepts of IE
3. To gain insight into the future challenges of industrial engineers.
4. Understand relationship of IE with other engineering disciplines.

History & Development of IE

Industrial Revolution (1760-1840)

It is the change from an agrarian economy to industry.

Adam Smith (1776)

Coined the idea of division of labour.

History & Development of IE

James Watt (1864)

Steam engine leverages productivity.

Frederick W. Taylor (1859-1915)

Initiated investigations of better work methods & develop an integrated theory of management principles.

History & Development of IE

Henry L. Gantt (1861-1919)

- ✓ Work in the area of motivation field, development of task & bonus plan.
- ✓ Founder of Gantt Charts.
- ✓ Recognition of CSR.

History & Development of IE

Frank Gilbreth (1868-1924) & Lilian Gilbreth (1878-1972)

- ✓ Pioneer of time & motion study.
- ✓ Broke down works into fundamental elements called Therblig.

Source: https://en.wikipedia.org/wiki/Therblig

History & Development of IE

Harrington Emerson (1953-1931)

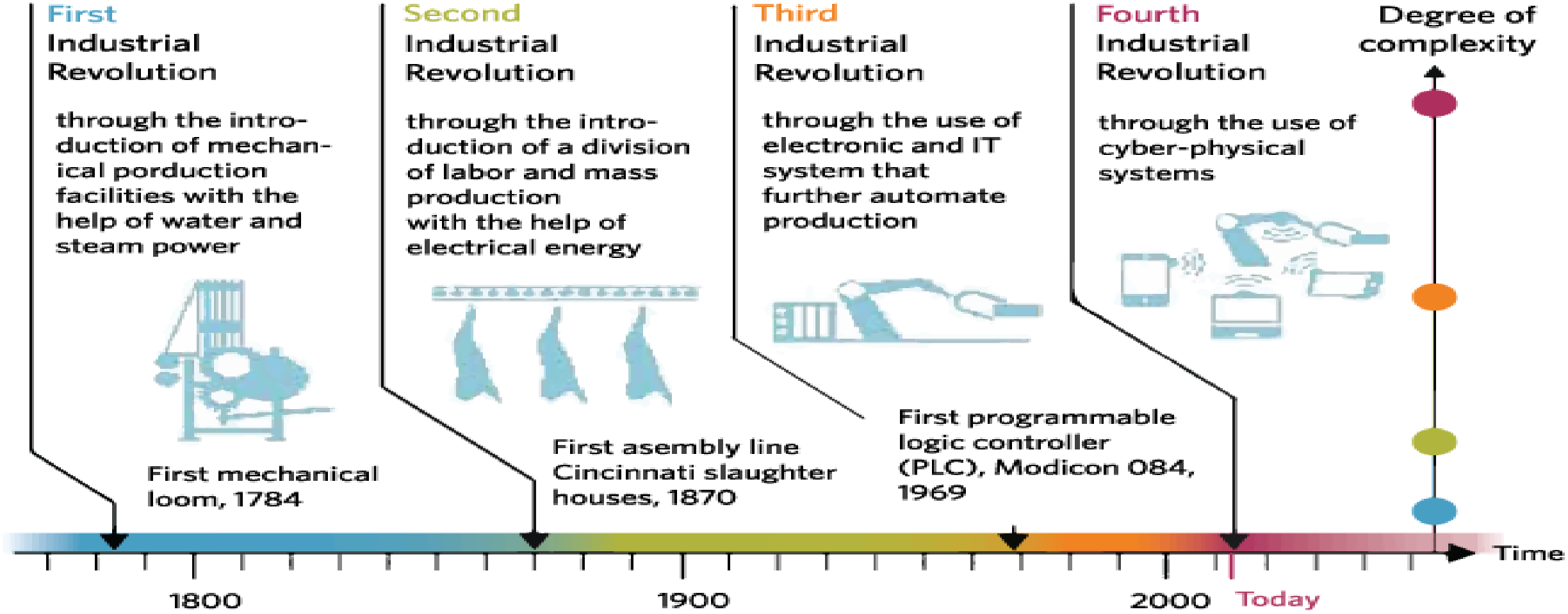
He proposed Efficiency Bonus Plan.

He also coined twelve principles of efficiency

LHC Tippett (1902-1985)

He developed the concept of work sampling & setting performance standards for long cycle, heterogeneous jobs involving team work.

From Industry 1.0 to 4.0



Source: https://theleadershipnetwork.com/article/future-manufacturing/industry-4-0

Challenges for Industries…

Customer demand will consistently be rising.

Product variance will become aggressively larger.

Product life cycle will be shorter.

Lead time must be shorter.

Delivery must be faster.

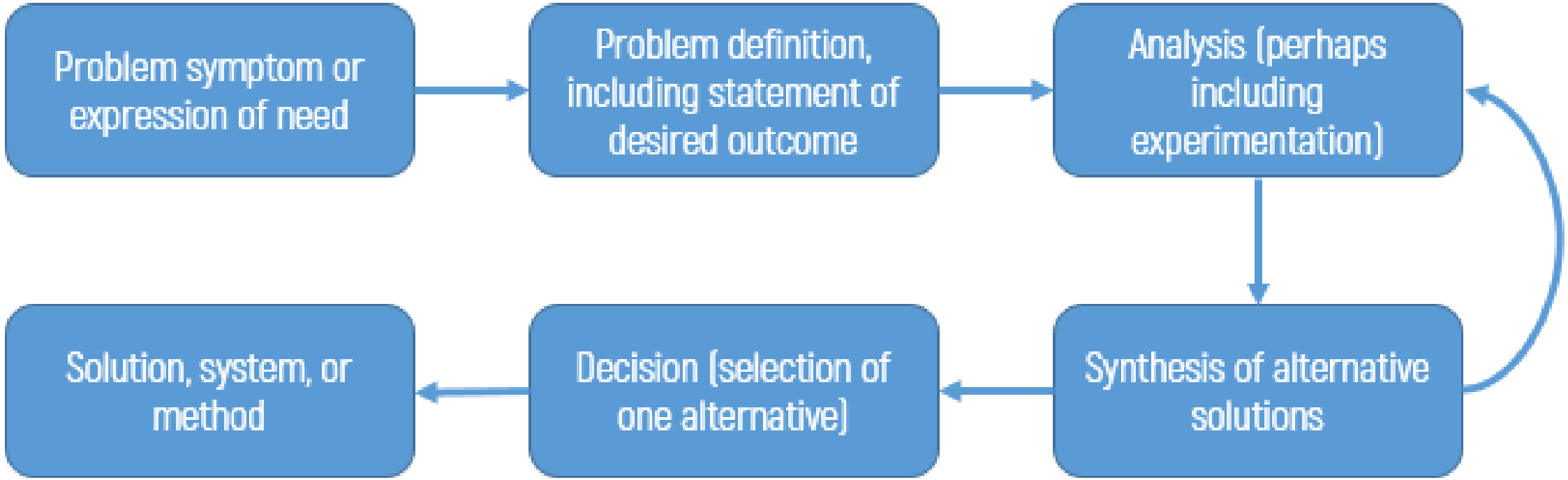
To produce quickly, flexibly, cost efficiently.

Production must be conducted economically.

Industrial Engineering

- ✓ plays a pivotal role in meeting the challenges.
- ✓ has various techniques to analyse & improve the work methods, to eliminate waste, proper allocation and utilization of resources.

Basic Engineering Process



What is IE?

"IE concerns with the design, installation, & improvement of integrated systems of people, material, information, equipment, & energy".

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

Reference:

Womack & Jones (1996)

American Institute of Industrial Engineers (AIIE)

Prime objectives of IE

To increase the productivity

Eliminating waste (i.e., non-value added activities)

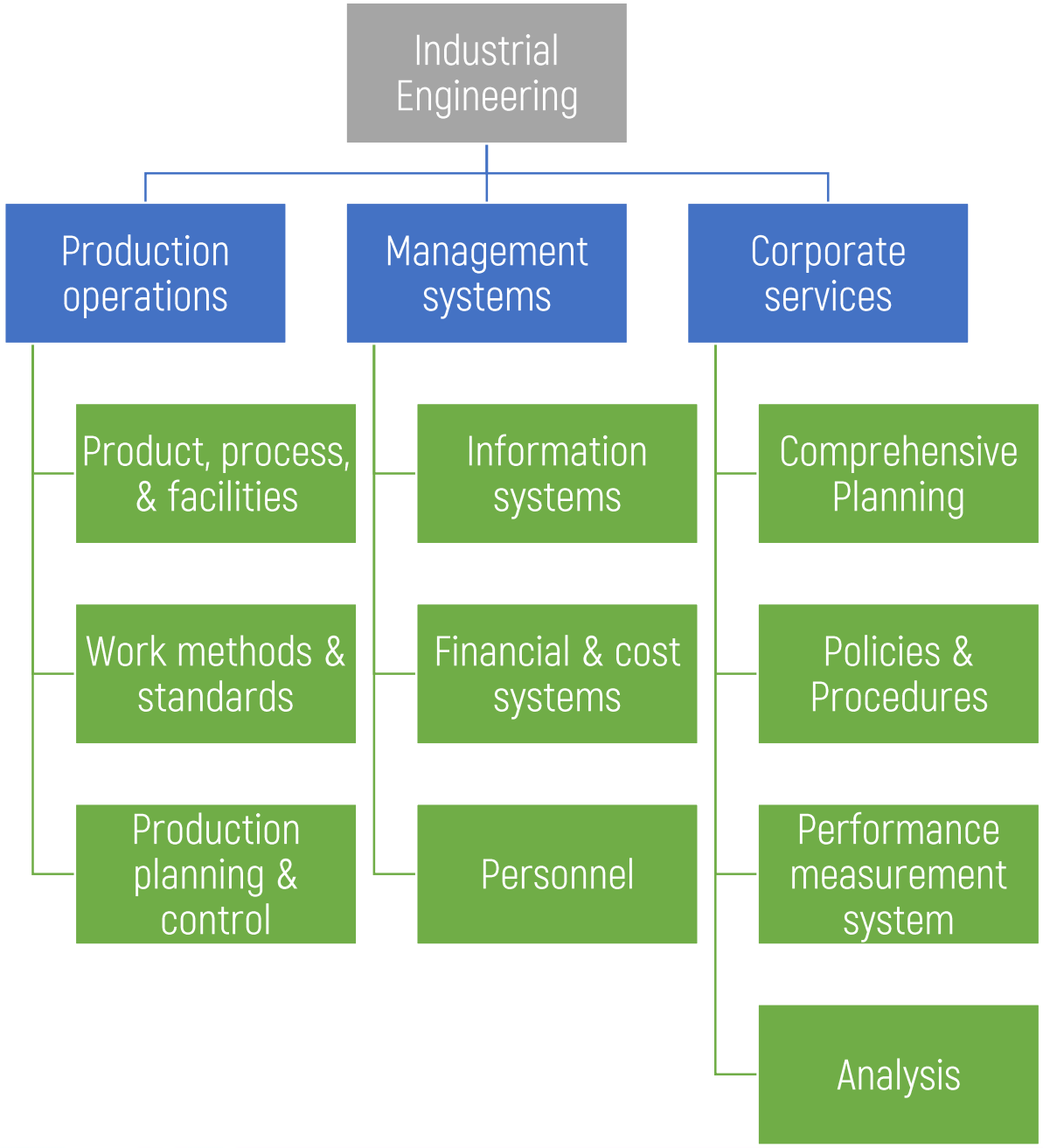
Improving the effective utilization of resources

How IEs Make Processes Better?

- More efficient & more profitable business practices
- Better customer service & product quality
- Improved efficiency
- Increased ability to do more with less

How IEs Make Processes Better?

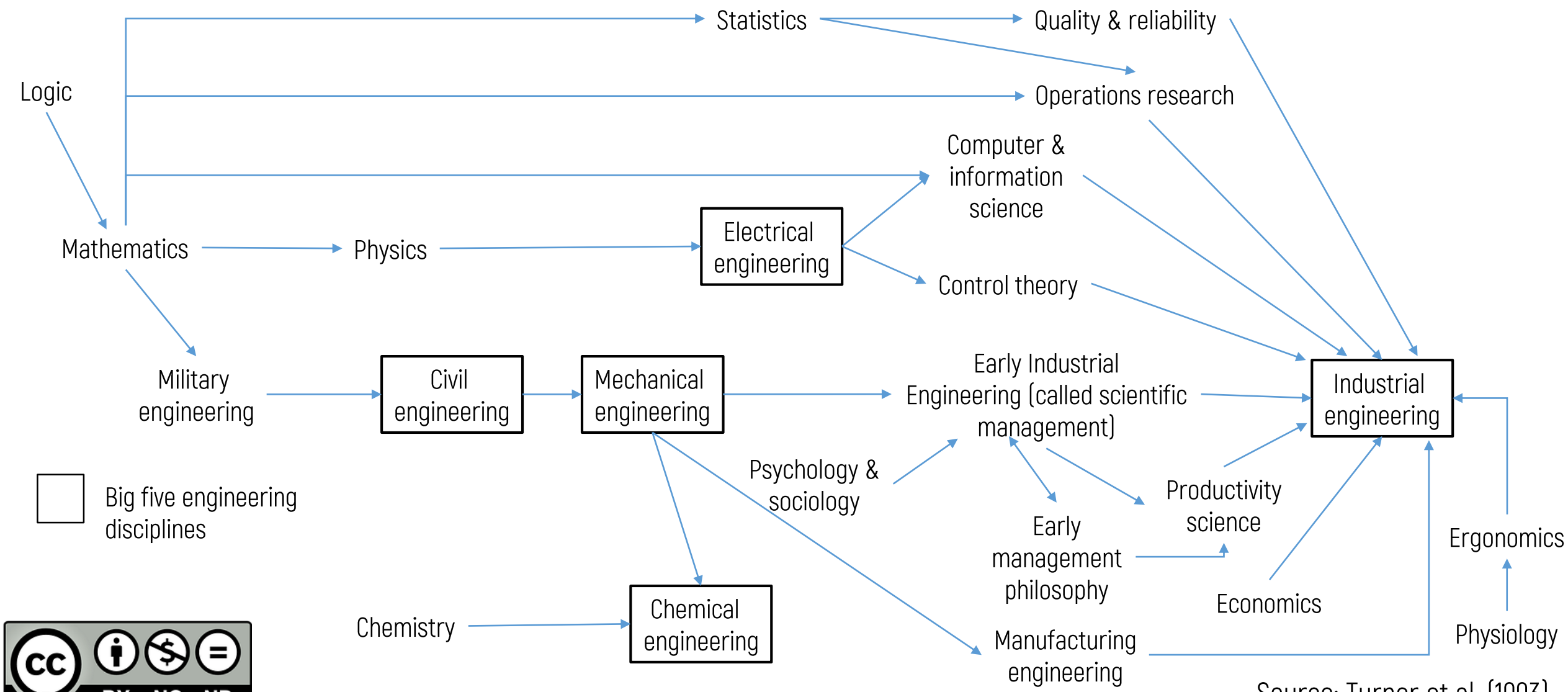
- Making work safer, faster, easier, & more rewarding
- Helping companies produce more products quickly
- Making the world safer through better designed products
- Reducing costs associated with new technologies



Typical Activities of IE

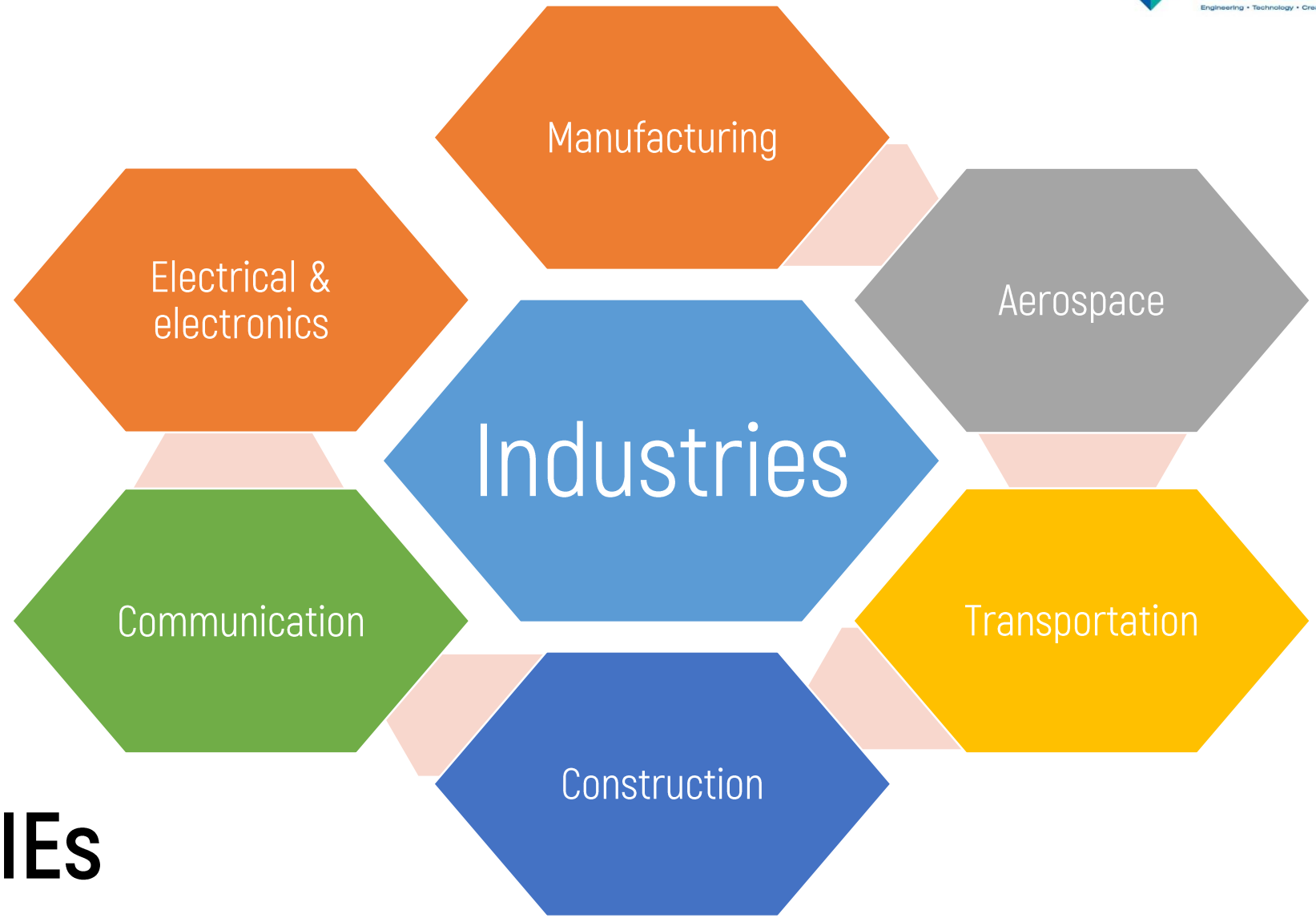
Source: Turner et al. (1993)

IE & other engineering disciplines



Source: Turner et al. (1993)

Employers of IEs



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Thank You