

A stylized, colorful illustration of a landscape. The foreground features rolling green hills with dark brown soil visible on some slopes. On the left, there are three stylized trees: a tall green one, a shorter purple one, and a small orange one. A red bird is flying in the sky above the trees. The background consists of light blue and white wavy lines representing a sky or distant hills.

A Glance of Ergonomics

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Objectives of study :

- Students understand the basic principles of ergonomics.
- Students consider the human factor in analyzing, evaluating, designing and improving work system.

References :

- Sritomo Wignjosoebroto, Studi Gerak dan Waktu.
- Christopher D. Wickens, et.al, An Introduction to Human Factors Engineering
- Mustafa B. Pulat, Fundamentals of Industrial Ergonomics
- Other ergonomics / human factor books.
- <http://www.yankodesign.com/>

Picture of life



Ergonomics (Human Factors)

ergon = work
nomos = laws

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among **humans** and **other elements of a system**, and the profession that applies theoretical principles, data and methods to design in order to **optimize human well being and overall system performance**. (International Ergonomics Association, www.iea.cc)

- ☑ The study of man's relationship with his or her workplace.
- ☑ Fitting the task to the person rather than forcing him/her to adapt to the work environment.
- ☑ Designing the workplace to prevent occupational injury and illness.
- ☑ Discovering the capabilities and limitations of the human body.
- ☑ The art and science that addresses workers' job performance and well-being in relation to their job tasks, tools, equipment and environment.
- ☑ The study of the relationship between people and machines or between employees and their environment.
- ☑ The study of the interaction between the worker and the process at the workplace.

Wojciech Jastrzębowski

RYS
ERGONOMJI
czyli
NAUKI O PRACY
opartej na prawdach poczerpniętych
z Nauki Przyrody

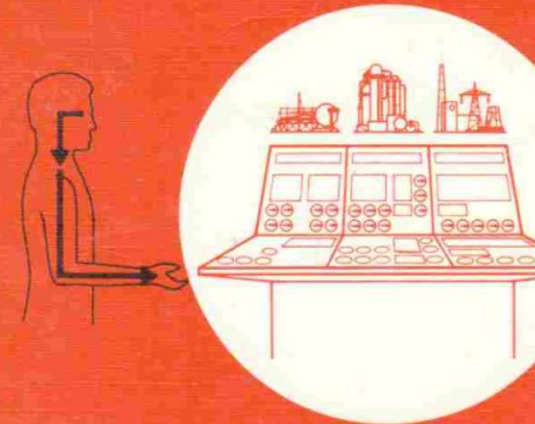
AN OUTLINE OF
ERGONOMICS,
Or
THE SCIENCE OF WORK
based upon the truths drawn
from the Science of Nature

1857

E. Grandjean

**Fitting the task
to the Man**

An ergonomic approach



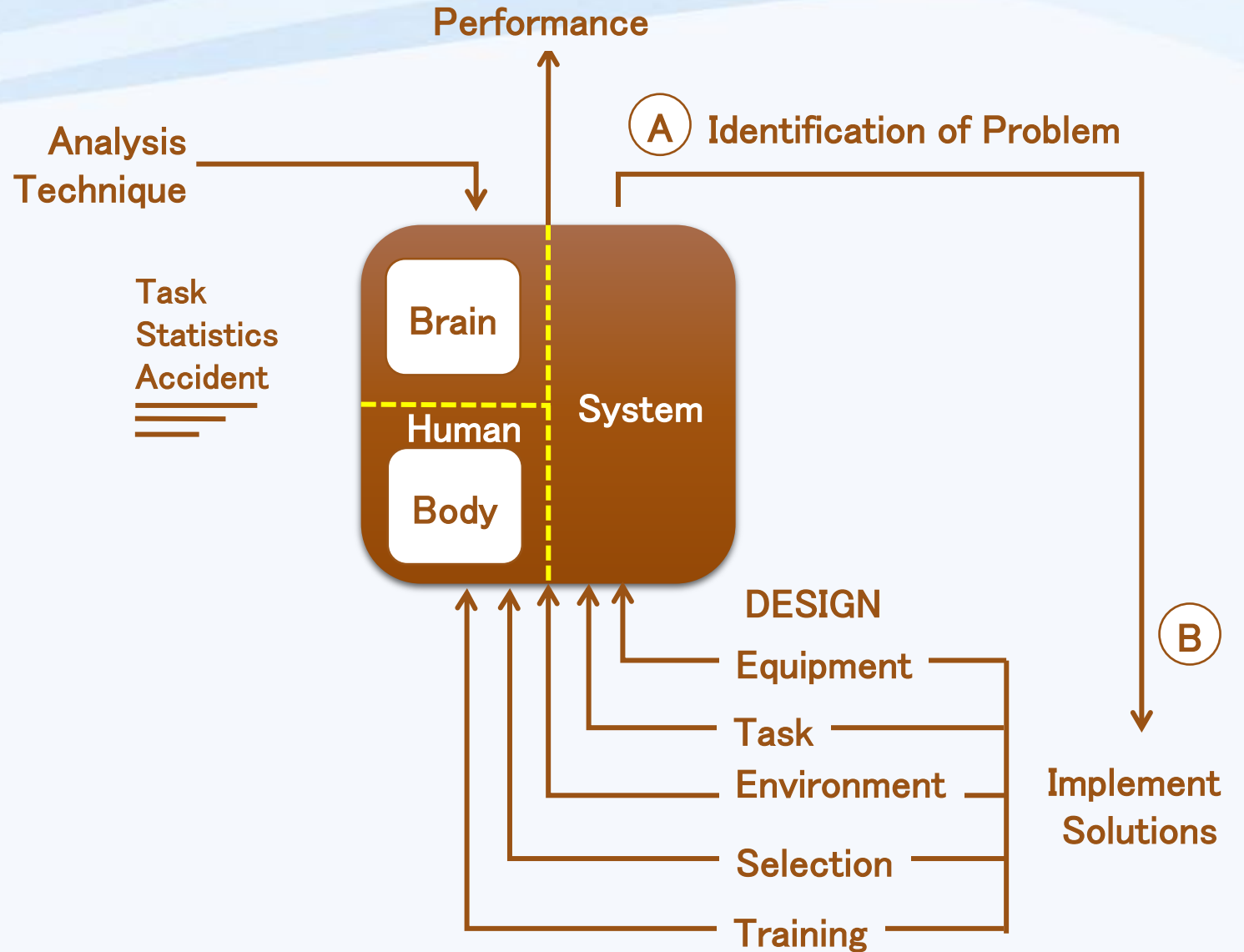


→ What is **ergo system** and its components ?

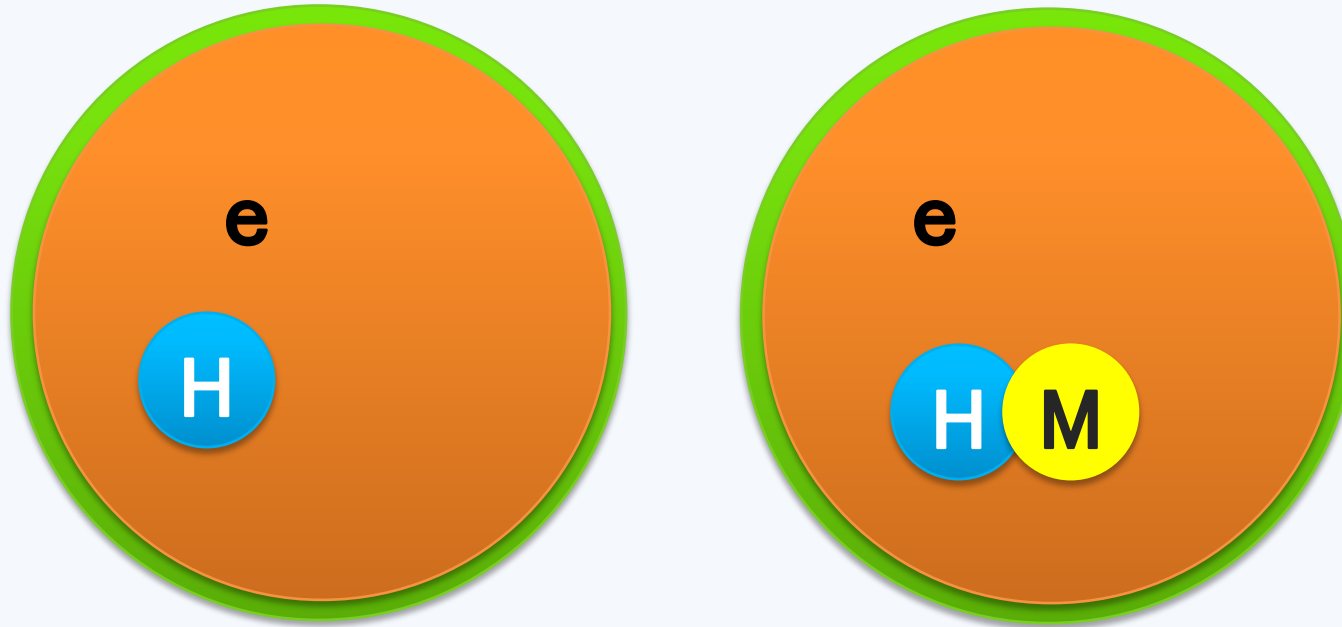
→ How **far** will we analyze the ergo system ?

The Cycle of Human Factors

- Point A identifies a cycle when human factors solutions are sought because a problem (e.g. accident or incident) has been observed in the human-system interaction.
- Point B identifies a point where good human factors are applied at the beginning of a design cycle.



Simple Ergo System

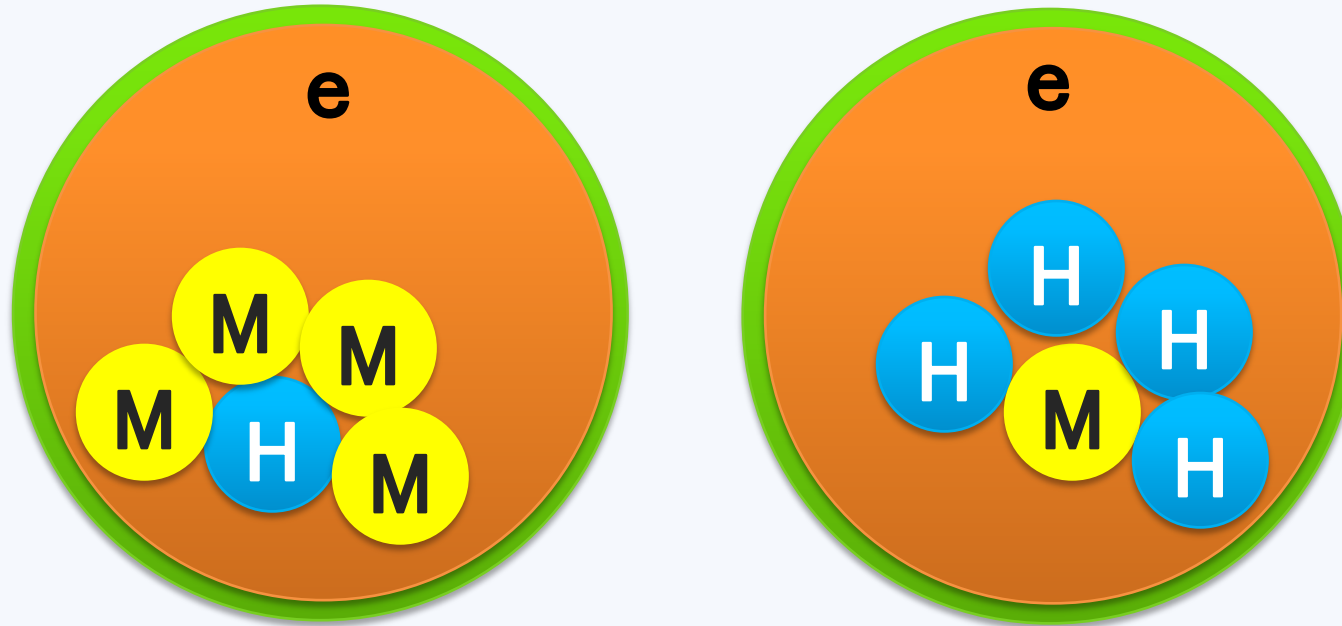


H = Human

M = Machine

e = Environment

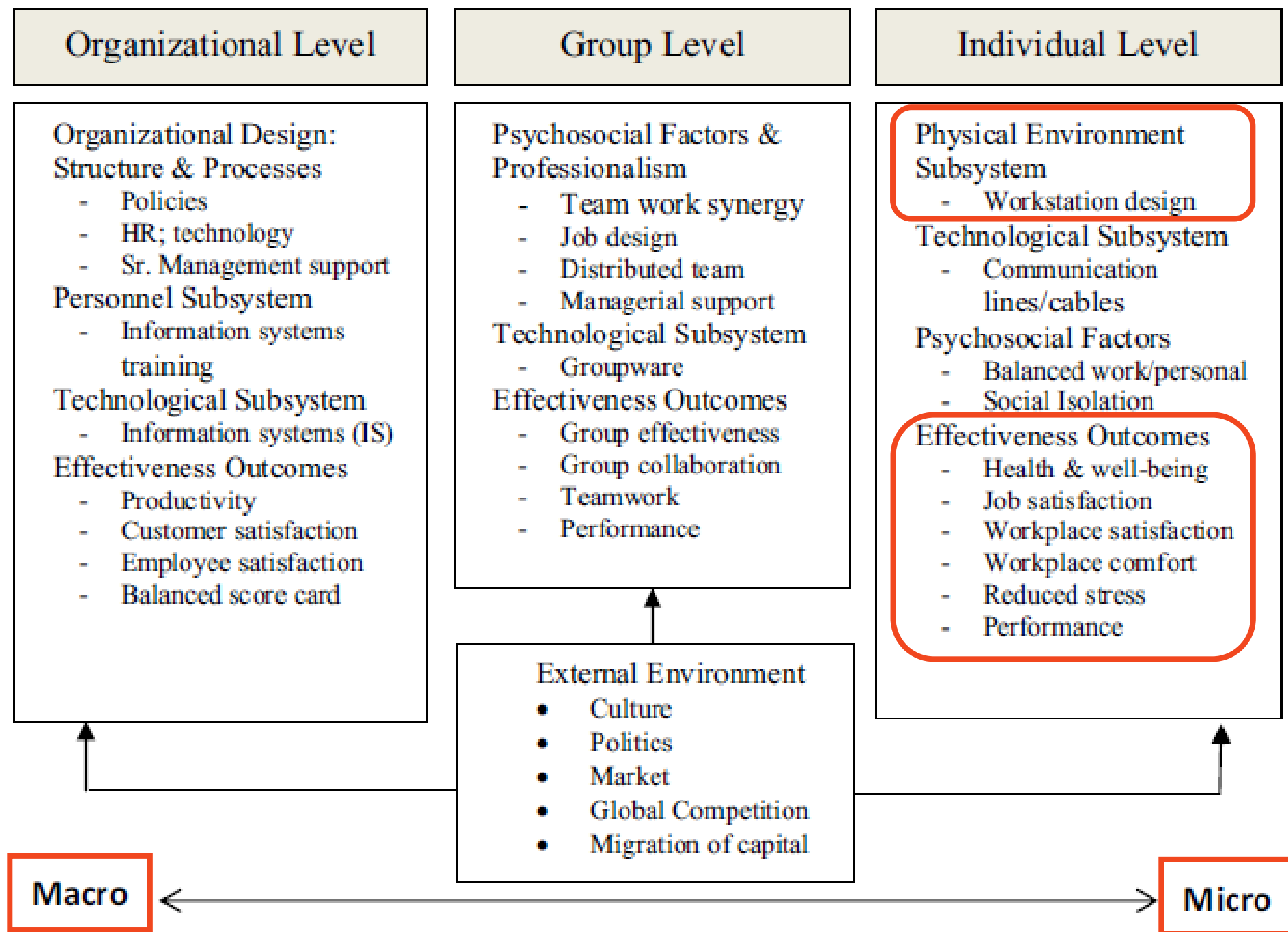
Complex Ergo System



H = Human

M = Machine

e = Environment



Analyze individual level (micro), implement to group level

ERGONOMICS IS IMPORTANT !!

ERGONOMICS PLAYS A ROLE IN APPROXIMATELY 50% OF ALL WORKPLACE INJURIES.

ERGONOMICS WILL HELP :

- ☒ Improve quality.
- ☒ Improve absenteeism.
- ☒ Maintain a healthier work force.
- ☒ Reduce injury and illness rates.
- ☒ Acceptance of high-turnover jobs.
- ☒ Workers feel good about their work.
- ☒ Reduce workers' compensation costs.
- ☒ Elevate OSHA compliance to a higher level of awareness.

ERGONOMICS, A MULTIDISCIPLINARY APPROACH

THE FOLLOWING DISCIPLINES HAVE
PLAYED A ROLE IN DEVELOPMENT OF
THE WORK STATION :

- ✓ Anatomy → body dimension, posture
- ✓ Physiology → O₂ consumption
- ✓ Psychology → stress reduction
- ✓ Biomechanics → static work
- ✓ Physical environment → lighting
- ✓ Industrial Design → layout for work table
- ✓ Safety & Health Engineering → electricity



Syllabus of Ergonomics

15% QUIZ 1
15% QUIZ 2
20% TUGAS
15% PRESENTASI
35% UAS

Week	Subject
1	A Glance of Ergonomics
2	Human Sensory System
3	Cognition and Learning Process
4	Work Physiology
5	Human Error and Basic Safety
6	Quiz 1 (wk 1–5)
7	Engineering Anthropometry
8	Display and Control Design

Week	Subject
9	Biomechanics of Work
10	Manual Material Handling
11	Work Environment / Mental Workload and Stress
12	Quiz 2 (wk 7–11)
13	Group Presentation
14	Group Presentation
15	The Impacts of Bad Ergonomics
16	Macro Ergonomics



Homework

1. What is visual sensory system? How does it works?
2. What is auditory and tactile sensory system? How much are noise limits allowed for human?
3. Read Chapter 4 and 5 Wickens et.al. !

A stylized landscape illustration featuring rolling green hills in the foreground, a small tree with a brown trunk and purple and pink foliage on the left, and light blue hills in the background under a blue sky.

There is **not** the **best** system,
but there is the **better** system.

(Work System Design Principle)