ESSENTIAL ERGONOMICS COURSE - Module 1

Par A: Element 1: Introduction

What is Ergonomics

Ergonomics is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimise human well-being and overall system performance (Source: International Ergonomics Association: https://www.iea.cc/

Ergonomics is a scientific discipline that brings together knowledge from other subjects such as anatomy and physiology, psychology, engineering, and statistics to ensure that designs complement the strengths and abilities of people and minimise the effects of their limitations

Ergonomists are involved in the design and evaluation of tasks, jobs, products, environments and systems to meet the needs, abilities and limitations of people.

The Association of Canadian Ergonomists (ACE) defines ergonomics as shown in Figure 1 below:

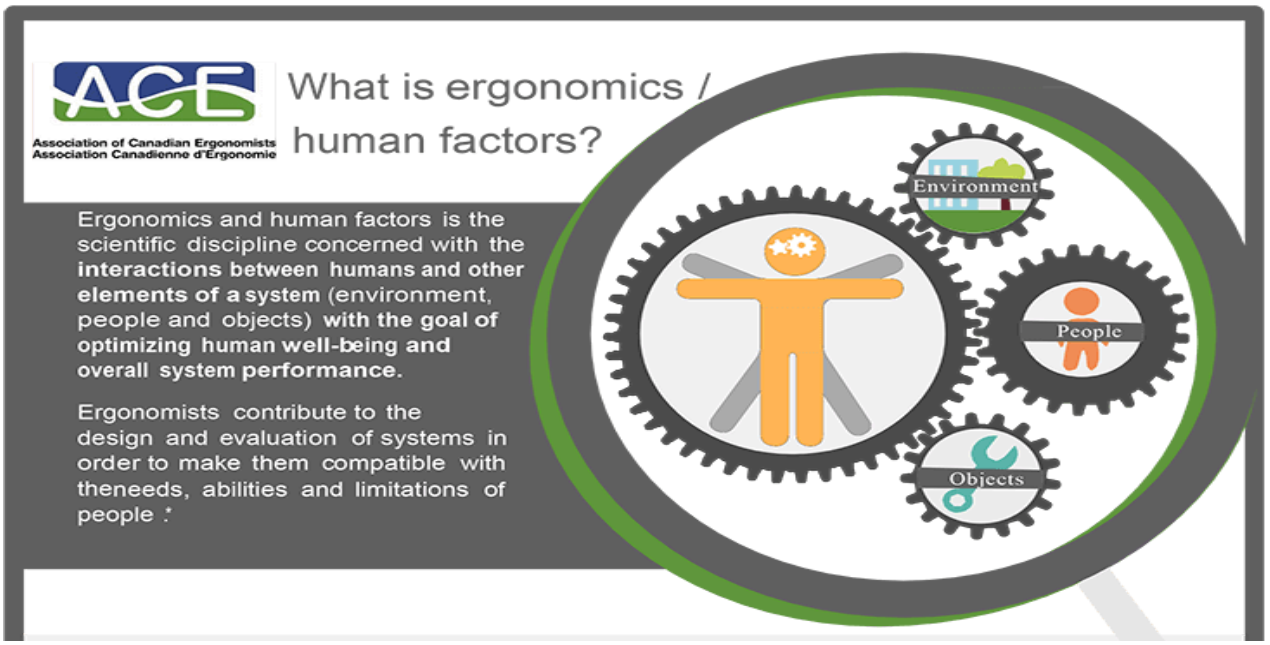

Figure 1: ACE ergonomic definition

The International Ergonomics Association (IEA) classified ergonomics into three areas: physical, cognitive, and organisational. The IEA classified ergonomics into three areas: physical, cognitive, and organisational:

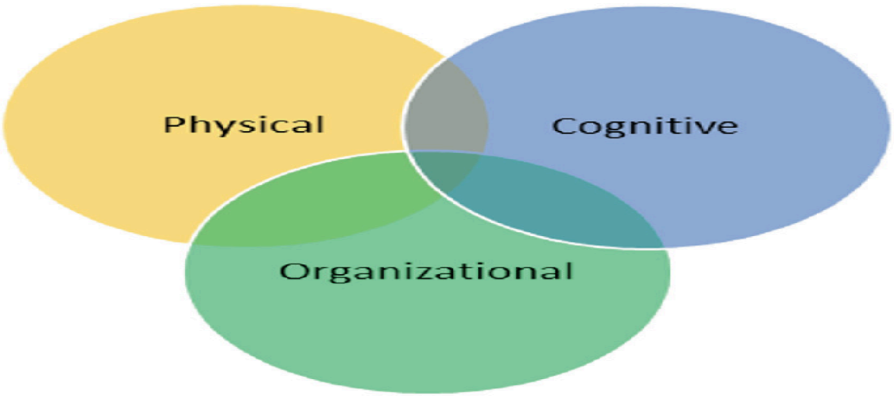

Figure 2: IEA ergonomics domains

Physical ergonomics is concerned with human anatomical, anthropometric, physiological, and biomechanical characteristics as they relate to physical activity. (Relevant topics include working postures, materials handling, repetitive movements, work related musculoskeletal disorders, workplace layout, safety, and health.)

Cognitive ergonomics is concerned with mental processes, such as perception, memory, reasoning, and motor response, as they affect interactions among humans and other elements of a system. (Relevant topics include mental workload, decision-making, skilled performance, human-computer interaction, human reliability, work stress and training as these may relate to human-system design.)

Organisational ergonomics is concerned with the optimization of sociotechnical systems, including organisational structures, policies, and processes. (Relevant topics include communication, crew resource management, work design, design of working times, teamwork, participatory design, community ergonomics, cooperative work, new work paradigms, virtual organisations, telework, and quality management.

What is Human Factors

Human Factors (HF) is concerned with the application of what we know about people, their abilities, characteristics, and limitations to the design of equipment they use, environments in which they function, and jobs they perform.

The five human factors to be considered are made up as follows:

- physical.
- cognitive.
- social.
- cultural.
- emotional.

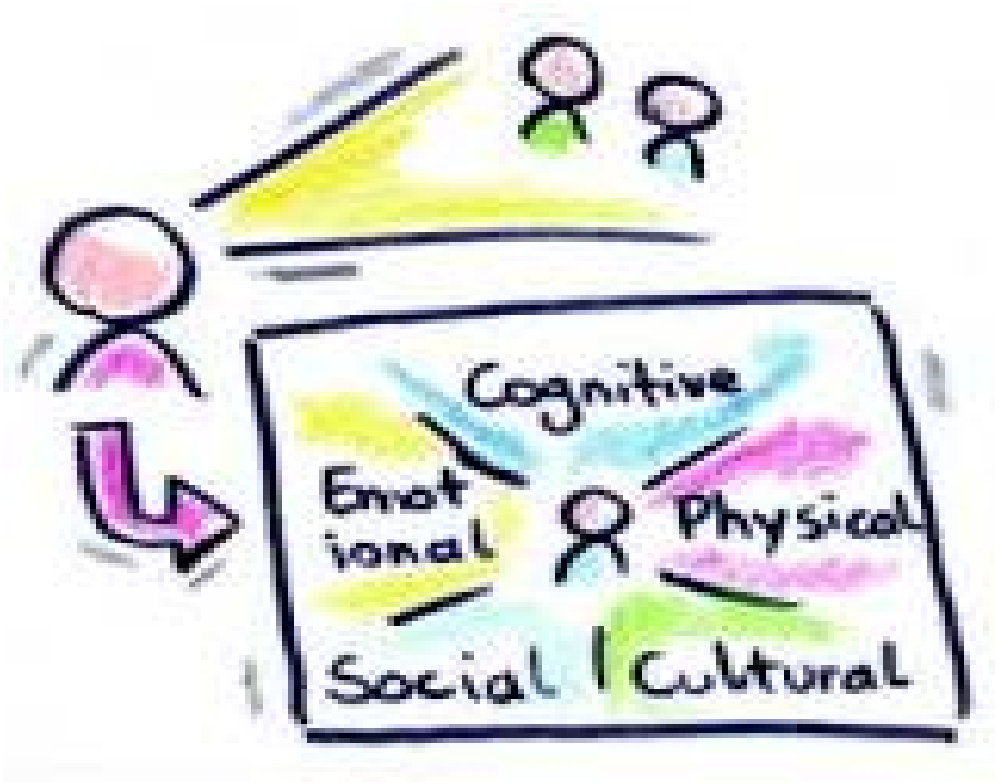

Figure 3: Human Factors elements

We can see that ergonomics and human factors (EHF) are interrelated disciplines. The HF specialist has a stronger depth of cognitive ergonomics. Although this course focuses mainly on ergonomics, it will incorporate important human factors elements.

Stakeholders of HFE

- System influencers – competent authorities such as governments, and regulators
- System decision makers – employers and managers
- System experts – HFE specialists, engineers psychologists who contribute to the design
- System actors – workers and product/service users

Benefits of EHF

- Reduce the potential for accidents
- Reduce the potential for injury and ill health
- Improve performance
- Improve productivity
- Better product quality
- Promote employee engaement and moral
- Improved mental health
- Support a positive safety culture

HFE simultaneously contributes to the economic growth and sustainability of organisations by enhancing worker well-being, capability and performance through the reduction of direct and indirect costs, and interacting positively with the environment

Activity

a) Define ergonomics and human factors
b) List 5 benefits of EHF

Further Reading

Association of Canadian Ergonomists (ACE): https://ergonomicscanada.ca/en

Health and Safety Executive (UK): EHF- https://www.hse.gov.uk/pubns/indg90.pdf

International Ergonomics Association: https://www.iea.cc/