Guy André Boy – 07/05/2021

Clarification of the term "ergonomics"

When we talk about ergonomics, several confusions can appear depending on various backgrounds, and on the evolution of the underlying approach, which is often very multidisciplinary. In other words, the term "ergonomics" can be understood very differently if one thinks in terms of medicine, neuroscience, psychology, socio-technical systems (involving sociological and organizational factors in particular) or user interface design. There are also differences depending on the country and the scientific and technical communities. In the United States, for example, we speak about Human Factors, ergonomics only concerning the material part of the construction of human-machine interaction means.

There are three main communities related to ergonomics:

- HFE (Human Factors & Ergonomics) which was created after the second world war by physicians;
- HCI (Human Computer Interaction) which was born in the early 1980s; and
- HSI (Human Systems Integration) which was born at the beginning of the 21st century in the context of complex systems engineering.

Chronologically, before the 1980s, HFE was developed for a long time to address physiological and biomechanical problems (anthropometry). Between the 1980s and the 2000s, HCI developed to address cognitive issues emerging from the development and use of software. Since the beginning of the 21st century, HSI has developed to answer systemic questions, and more specifically socio-technical questions, centered on humans and organizations.

In summary, this evolution has progressively relied on a range of basic disciplines from the life sciences (e.g., medicine, physiology, and neuroscience) to the humanities (e.g., clinical, experimental, and cognitive psychology) and more recently to the social sciences (e.g., sociology, anthropology, and ethnography).

In addition, Human-Centered Design (HCD), which leads to HSI, not only includes support for these communities, but also involves creativity, design thinking, complexity analysis, and engineering and systems science.

Today, HFE (commonly called ergonomics in France[1]) is dominated by physiological and psychological thinking, HCI[2] is grounded into computational and cognitivist thinking, and HSI[3] is turning more and more toward social sciences, while including HFE and HCI. That's why talking about ergonomics can bring a lot of confusion fi we don't know what kind of ergonomics we are talking about. Therefore, I prefer to speak of HSI that better supports FlexTech Chair's activities.

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[1] Represented by SELF (Société d'Ergonomie de Langue Française) in France, member of IEA (*International Ergonomics Association*) – I am the *Chair* of *IEA Aerospace Technical Committee*.

[2] Represented by ACM (*Association for Computing Machinery*) SIGCHI (*Special Interest Group on Computer Human Interaction*) – I was *Executive Vice Chair* from 1995 to 1999 worldwide.

[3] One of the most prominent theme of INCOSE (*International Council on Systems Engineering*) – I am Chair of *HSI Working Group* of INCOSE and ambassador of the INCOSE-IEA alliance.