Cognitive Ergonomics: A bit of History

As a science, Egonomics was founded in 1949 (some authors say '48) at Oxford, with the creation of Ergonomics Research Society.

Ergonomics is based on the contribution of different disciplines, as psychology, anthropology, physiology, engineering, medicine…

It has been shaped in a panel across two different areas of interest: the scientific community on the one side, and the practises of the labour market for better proficiency on the other side.

Cognitive Ergonomics

Classical ergonomics deals with interactions between human-machine-environment in a mechanical-physical perspective.

More recently, research and intervention in this field moved to psychological processes: that's how **cognitive ergonomics** was born.

Cognitive Ergonomics

Differently from classical ergonomics, the "cognitive" one puts at the center of its investigation all that properties that require the acquisition and use of a specific knowledge, studying the interaction between human-machine and the environment where cognitive and emotional factors take place.

The designing process should take into account all these processes: perception, learning, memory, problem solving and all the phenomena/effect associated to them.

Cognitive Ergonomics

The difficulty stands in the association between the words "cognitive" and"ergonomics" because of the assumption that, while psychology deals with people, ergonomics deals with things: we should remember that things do not exist independently on people who use them.

Cognitive Ergonomics and HCI

In last decades Cognitive Ergonomics became more and more popular, due to the fact that designers are increasingly dealing with a "mandatory" interaction (i.e. they are asked to design interactive system).

Even if we know that every object implies an interaction, in the case of digital devices the interaction between human and machine becomes more complicated and, meanwhile, crucial.

Cognitive Ergonomics and HCI

The distinction between Cognitive Ergonomics and HCI (Human Computer Interaction) is therefore becoming more subtle: in English speaking countries there is basically no difference (whereas they distinguish between HCI and NON-Cognitive Ergonomics), but in Italy there are two different societies: one for ergonomics and another one for HCI.

Cognitive Ergonomics and HCI

The Italian Society for Ergonomics is − at least in theory- more independent on "international" sisters (English and American ones), while Italian HCI is a "chapter of HCI international".

Società Italiana di Ergonomia (SIE)

- L'Ergonomia (o Fattore Umano) ha come oggetto l'attività umana in relazione alle condizioni ambientali, strumentali e organizzative in cui si svolge. Il fine è l'adattamento di tali condizioni alle esigenze dell'uomo, in rapporto alle sue caratteristiche e alle sue attività. Nata per studiare e far rispettare nella progettazione una serie di norme che tutelano la vita del lavoratore e accrescono l'efficienza e l'affidabilità dei sistemi uomo-macchina, l'ergonomia ha allargato il proprio campo di applicazione in funzione dei cambiamenti che sono sopravvenuti nella domanda di salute e di benessere. L'obiettivo attuale è quello di contribuire alla progettazione di oggetti, servizi, ambienti di vita e di lavoro, perché rispettino i limiti dell'uomo e ne potenzino le capacità operative. L'ergonomia si alimenta delle acquisizioni scientifiche e tecnologiche che permettono di migliorare la qualità delle condizioni di vita, in tutte le attività del quotidiano.

International Ergonomics Association (IEA):

- Ergonomics (or Human Factors) is the scientific discipline concerned with the understanding of the interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.
- Ergonomics Society (United Kingdom):
  Ergonomics, or Human Factors as it is known in North America, is a branch of science that aims to learn about human abilities and limitations and then apply that knowledge to improve people's interaction with products, systems and environments.

Questions to think about (food for thought)

- What do we mean when we talk about environment?
- Think about possible ergonomical interventions focused on an urban environment.
- What is it meant with "virtual environment" and "real environment"?
- How virtual is a virtual environment (and how real a real environment)?
- Levels of interaction between virtual and real.

HCI: designing the interaction

- The primary discipline contributing to being human centered in design is Human Computer Interaction (HCI).
- HCI arose during the early 1980s, evolving into a subject "concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them" (ACM SIGCHI, 1992, p.6)

HCI: designing the interaction

- HCI drew on cognitive psychology for its theoretical base and on software engineering for its design approach.
- During the 1990s the closely related area of Computer Supported Cooperative Work (CSCW) focused on technology support for cooperative activities and brought with it another theoretical base that included sociology and anthropological methods.

HCI: designing the interaction

- In 1989 the first computer- related design course was established at the Royal College of Art in London.
- In America the designers at Apple were putting their ideas together in a book called *The Art of Human-Computer Interface Design* (Laurel, 1990) and a meeting at Standford University in 1992 resulted in the book *Bringing Design to Software* (Winograd, 1996).
- All this has brought to HCI as a dynamic mix of ideas, approaches and philosophies applied to the design of interactive system and product

HCI in Italy

- It is hardly distinguishable from cognitive ergonomics: the only clear difference is that it leaves out some topics exclusively related with "work" in its classical (i.e. manual) acception
- The Italian Society defines itself as"the Italian chapter of ACM SIGCHI (Association for Computer Machinery - Special Interest Group on Computer-Human Interaction). You can find it on

www.sigchi.it

A little exercise

- Find 3 products or interactive systems.
- Let's discuss about the aspects that you like and those that you dislike.
- Think about the whole experiences (and not only to functions): is that what you want? It is funny?

- The interest towards human being becomes more crucial, because it is no more (or at least not only) considered as an abstract group of cognitive functions, but instead as a "person", part of a context made of other persons, activities, whishes, frustrations and so on.

Being human centered is about:

1) Thinking about what people want to do rather than what the technology can do
2) Designing new ways to connect people with people
3) Involving people in the design process (participatory design)
4) Designing for diversity (to leave behind the idea of "normality")

This is why the concept of USER EXPERIENCE (UX) became crucial (and often used as a catchphrase). It does not overcome the concept of usability, it complements that concept.

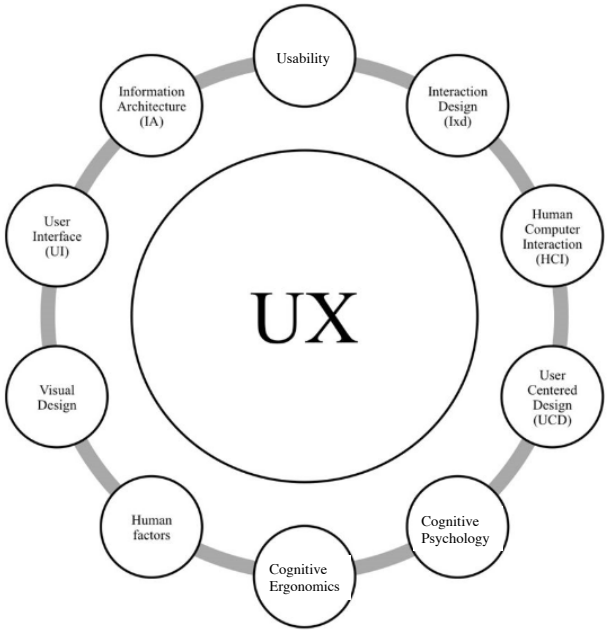
Experience is concerned with all the qualities of an activity that "really pull people in": it is concerned with all the qualities of the interactive experience that make it memorable, satisfyng, enjoable and rewarding.

Experience design is about recognizing that interactive products and services do not just exist in the world, they affect who we are.

They influence our culture and identity.

Several researchers are now convinced of the need to take a holistic approach to experience.

Experience, therefore, cannot really be designed. Designers can design *for* experience.



Obviously, nobody could become an expert of all the disciplines involved in UX.

The most important thing to learn is how to apply the methodologies that better fit YOUR STRENGTHS AND WEAKNESSES, so to become a good expert of at least some (important) aspects of UX and usability in general

Knowhing which methodologies should be used (and when to use them), following the correct path and knowing how to refer data are skills that ALL OF YOU should have by the end of the course, and that will allow you to efficiently evaluate UX without inventing skills that you COULD NOT have.

Some topics brought into design by the focus on UX are:

ENGAGEMENT
PLEASURE
AESTHETIC
ATTACHMENT
SENTIMENT (service design)
LIFE STYLE