

Cognitive Ergonomics: Usability Engineering and User Focused Design

You want to book a flight from Pune to Delhi on Friday 9th Sept. You want to find the flight times and the lowest fare. You go to the websites of Airlines 1 and 2. Your wife happens to do the same task from her workplace. Look at the Table to understand what happened. Note that both of you are smart, educated and intelligent people, not 'stupid users' as you may be led to believe by many computer programs in the market today. Also note that this was an actual study.

| | Airline | Clicks | Time in min. | Successful? |
|--------|----------|--------|--------------|-------------|
| User 1 | Airline1 | 10 | 2:30 | Yes |
| | Airline2 | 22 | 4:55 | Yes |
| User 2 | Airline1 | 16 | 2 | Yes |
| | Airline2 | Many | 17 | No |

Is it possible to predict and design for ease of use?

Or is it just a magical bye product of software creation? The answer is that it is possible but a different kind of approach and expertise is needed.

What is Human Factors Engineering?

Not many people are aware of the existence of this relatively new discipline with the broad based names of Human Factors Engineering or Ergonomics or Usability Engineering.

The field has its origins during World War II when many planes were crashing and the mishaps were loosely being attributed to 'human error'. Thereafter, the concepts of human psychology, capabilities and limitations emerged, acknowledging the real reason for the failures as faulty designs. They were designs that did not take into account the 'human element' and the persons for whom the product was being designed.

In more modern times, product liability created a need for such expert intervention and many manufacturers unfortunately saw the impact of their designs for the first time, in a court of law.

And today, difficulty in using products is impacting the bottom line of many software companies.

Yet, designs that exclude the end user continue, from the designs of lifts to microwaves to websites to many software products!!

What happens when a product is not easy to use?

According to The Economist, 2004, 66% of all IT projects either fail outright or take much longer to install than expected because of their complexity. So it costs the company.

Then why do products continue to be difficult to use?

Surely nobody intends it this way. They continue because user needs are typically not included in the design of software.

Secondly, it is (incorrectly) assumed that ease of use just happens, that it does not need any special effort and cannot be created. The reality however is the opposite. If left to chance, the design WILL be difficult to use. The user's needs, capabilities, limitations, likes, dislikes etc. must be completely understood and systematically integrated into a design to make it successful. And a different approach is needed to make this happen.

Thirdly, changing the way 'we have always done things' are often at odds with status quo or short term gains.

And fourthly, a typical misconception is that it costs too much and takes too long to include the user in the design.

Why is Human Factors Engineering so important today?

It's because difficulty or inability to use products costs a company lost customers, training costs, support costs, rework costs, lost productivity as well as their reputation. According to The Economist, October 2004, IT complexity will cost firms worldwide some \$750 billion'. Thus usability problems are always indicators of deeper business issues. Says Peter Denning, Chairman of George Mason University Computer Science department, "The old days when we could just go into the back room and develop technology are gone. Now we're developing technology for my mother, and that requires a whole new set of skills."

With computing in every facet of life, you're designing for someone

about whom you know very little upfront and that someone is NOT YOU. It's impossible to address this audience without specific (usability) efforts.

Usability statistics however are quite compelling. According to Bias & Mayhew, a major computer company spent \$20,700 on usability work to improve the sign-on procedure in a system used by several thousand people. The resulting productivity improvement saved the company \$41,700 the first day the system was used.

And according to The Usability Company, 'Call centre 'problem related' calls dropped by 50% overnight when a redesign was done with usability as a priority'.

There are a few visionary companies that are slowly recognizing this value. They are investing in this new product development approach in order to move up the value chain.

So what does this discipline entail?

Physical Ergonomics deals with the study and design of seating, workstations, automobiles etc. that impact the physical needs, comforts and physical characteristics of humans.

Cognitive Ergonomics deals with designs of software products that impact the psychological and intellectual characteristics of humans. While the role of the human (and Human Factors Engineer) is accounted for in product areas that touch Physical Ergonomics, the impact of ignoring the human element is not yet understood in the Software domain.

Usability Engineering is neither Web Design nor Graphic Design nor GUI development. And it is definitely not about making screens look pretty. 'Usability' has become a buzzword in the IT industry and a catchy marketing term, but it is yet to be recognized that true Usability Engineering is creative design with a scientific basis.

So what do Human Factors Engineers do?

They understand the intended audience of a product and ensure quick, successful and pleasant interaction between the two. They design for productivity and present the design so it is easy to understand. Note that 'quick', 'successful', 'easy to understand' etc. are all predefined and can be measured and guaranteed.

How is Human Factors Engineering practiced?

Through a 3 step process -

Step 1 - Understand and define user needs through systematic user studies and observations

Step 2 - Create Design, including user needs

Step 3 - Test the design repeatedly during the design process using actual users until it meets the defined criteria

Usability Testing is typically conducted in a 'Usability Laboratory' where users are tested using techniques of Cognitive and Experimental Psychology. Problems are detected, compared against acceptable benchmarks and the design revised to make it 'usable' by its users.

So how do you become a Human Factors Engineer?

Unfortunately there is no University in India yet that offers a degree. It is an interdisciplinary practice and professionals come from different backgrounds like Design, Engineering, Psychology, Computer Science etc. Design focused diploma courses have started, IIT is launching a course in Interaction Design and various companies are offering crash courses and certifications. But the scientific basis of Human Factors Engineering is still a long way from recognition or practice.

This profession essentially calls for sound analysis and research, creative design ability, and the ability to communicate your designs. As Indians, we have a unique advantage over other countries like China, with analytic, creative and communication capabilities. We just need to recognize this and deliver higher value in software products. People have been and continue to remain the same. Technology keeps changing. It must adapt to the human.

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