Notes - Design - HCI Intro

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A brief introduction to HCI considerations towards general application design and development.

Contents

Intro HCI is inherently a simple topic or concept.

For example, a user wants to perform a given task, such as send a message or play some music.

It becomes a HCI activity, or at least one that interests us, by the simple act of inserting a mediating computer.

Our user could have performed either task without a computer, such as using some paper and a pen or simply playing a musical instrument, but these are obviously not quite HCI.

They do, of course, still involve the use of intermediary tools, and the very process of their design and usage bears some resemblance to those of HCI. In essence, they actually fit into a related discipline of *human factors*.

However, it is the computer, and the process of potential interaction rendered by the computer, that makes HCI distinctive.

Adding a computer The computer offers the potential to transform the representation of a task, and effectively the required skills.

It can change a user's act of writing from a more traditional linear act to something akin to sculpture, allowing the user to draft a skeleton outline, and then add or subtract bits here and there to flesh out and refine the overall text.

Instead of a single musical instrument, a computer allows a musician to compile, contrast, splice, and manipulate their music in new and interesting ways.

Indeed, if we start to add users, to become a group or crowd, to add networks and more machines, from mobile to embedded, and instead of a simple task we have cultural or coordination considerations, then we start to get the disparate variants of computer mediation that forms our concept of HCI.

Components of HCI The many constituent components of a discipline such as HCI would also seem simple.

- there is an object, an artifact that needs engineering and implementing
- there is the process of design for the interaction, and the objects themselves
- and, of course, the principles, theories, abstractions, guidelines, facts, and so on surrounding HCI which we need to learn and understand

We can consider these as

- engineering interaction
- designing interaction

- and the actual science of interaction itself

For each of these, we have guidelines, examples, patterns that we may follow to help guide our way.

The hard part for HCI is, in fact, fitting these aspects together. Each of these areas is a topic in and of itself, distinct from the HCI umbrella.

A review of HCI needs to effectively bridge the gap between the science that has developed for the psychological components, and consider the HCI design problems where they may be applied.

HCI as technology HCI is, effectively, a technology. It's the very importance of linking engineering, design, and science together.

In 'The Nature of Technology", Brian Arthur notes that technologies are largely derived from other technologies, and not essentially science.

If we take this a step further, we can see that technologies are composed of disparate parts, themselves technologies as well.

For example, a laptop has a display for output, a keyboard and touchpad for input, several storage components, &c., each with their own inherent technologies.

However, each of these component technologies devolve to a point where they cease to be a technology and this is the point where science plays a role.

For example, some keyboards employ the natural phenomenon of electrical capacitance to sense a user's keystrokes. A user presses a key, which brings two D-shaped pads close to a printed circuit board that is covered with an insulating film, which changes the pattern of capacitance.

The keyboard has, therefore, used the natural occurrence of capacitance in a reliable way. This can be exploited to provide the HCI function of signaling a known, reliable interaction to the computer.

Role of science Science, therefore, should continue to play an important role in the development of HCI. This is important for a number of reasons.

For example, by developing and promoting theory we also enable further *explanatory evaluation*. This helps us expand upon rudimentary A-B testing, which is limited without an understanding of why there was a difference. If we have a theory that allows us to interpret the difference, we are naturally in a stronger position to fix it.

It is also important as it enables *generative design*. This allows us to modify design based upon an understanding of how an interaction is produced and applied. For example, if we understand the range and restrictions of pointing devices based upon the human motor group in question, we can adjust our design accordingly.

Disparate fields HCI, therefore, needs to carefully consider, and to some extent be influenced by, many disparate fields. It is, in essence, the amalgamation of influences from fields as diverse as engineering, branding, computer science, and psychology. We pick and choose from the options to create the whole.

For example, consider the following image detailing the many fields of HCI.

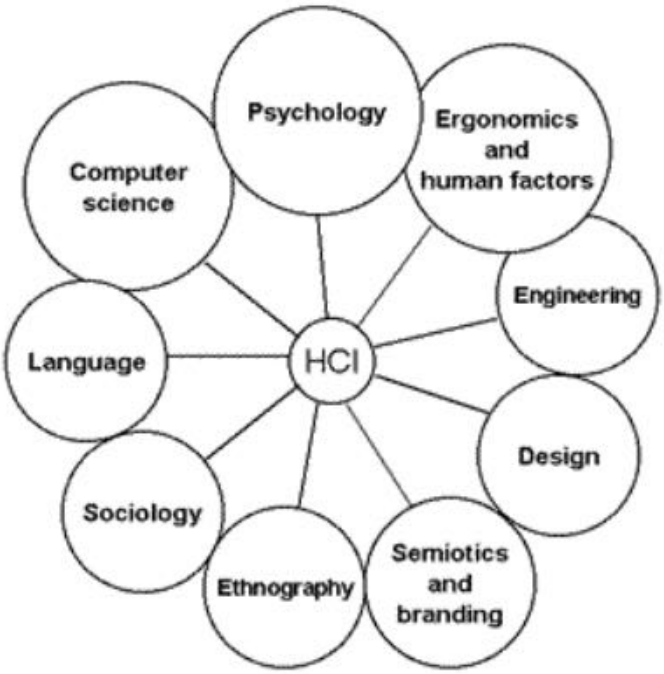

Figure 1: Field of HCI

Therefore, we can think of HCI as being broadly made up of the following components.

- guidelines to learn and use
- methods that need to be mastered and applied
- models that we can create and use
- principles to be understood and then applied
- techniques to master and use
- and theories to again learn and apply

HCI IS,

- understanding how people think, reason, understand, plan, react, and so on…
- understanding that people are embedded in social structures…
- aware of the tasks people want to do (work, rest, and play)
- technologically aware…

HCI is also,

- Creative
- Design aware
- Evaluative

Resources

- Arthur, B. 'The Nature of Technology'. Free Press. 2011.
- Norman, DA. 'Design principles for human-computer interfaces.' In Janda, A. ed.
- Proceedings of the CHI-83 conference on human factors in computing systems, Boston. ACM Press. 1983.