
Human Computer Interaction (HCI)

Sameer Chavan
Manager User Experience, Oracle India Pvt Ltd
sameerhere@yahoo.com

Key words: HCI, CHI, UI Design, User Interface, User Interaction, GUI, Usability.

What is HCI ?

HCI as the name suggest , is related to Humans and computers and the way both interact with each other. It is the Art and Science of making computer applications more usable for humans rather then making Humans adapted to computers.

Why HCI is needed ?

Consider you have to build a house. So as a owner you approach an architect and express your requirements. He designs the layout, colors & interiors making optimum use of space and your budget. Then you both approach the civil engineer or contractor who works on calculating stress, beam length, municipal laws and other engineering aspects to finally build this house. In the same way Product management/clients give requirements to Designer and they both work with Development to come up with software solution.

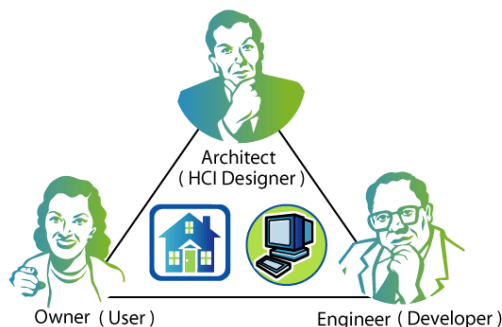


Figure 1: Mapping building a house to HCI

Take another example of automobile company. Imagine if all they have is only engineering department and they are asked to make a bike. What they will do? They will make a perfect technical design. But it cant be used.

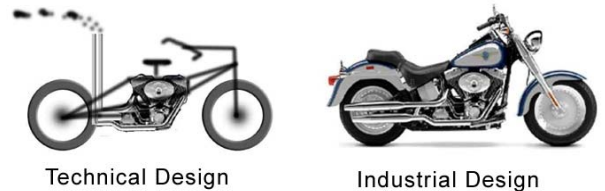


Figure 2: Comparison of design by pure technical team and by Industrial Designers.

So they do have Industrial Designers who work on human ergonomics, seating posture and aesthetic which finally makes a beautiful bike that is comfortable to ride.

Similarly in a software company if all you have is Developers, they will create a technically sound software application but that may not be intuitive, user friendly and attractive. So software companies do need to have a group of people called HCI designer, which will look into user needs and design a easy to use & aesthetic product. Here is what goes in the mind of users, Developers and HCI designers.

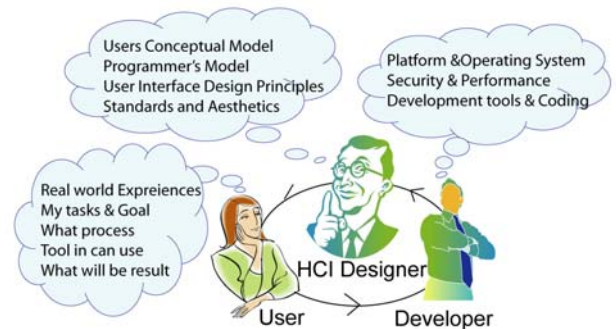


Figure 3: What goes in each mind of user, designer, developer.

Why to invest in HCI ?

For service company and in small companies its always been a question of cost justifying Usability / HCI. Definitely if you have dedicated HCI group associated with your product development or client projects, the quality and usability of your designs would be far superior then without them.

Some Facts -

- If people can't understand something they won't use it.
- If it makes their life difficult, they will be frustrated.
- If they are your customers they will not be buying (from you at any rate),
- If they are your employees they will be less productive"
- Technical developers are adept at understanding technical issues and, therefore, focus on what software should do rather than how the user will use it.
- You don't have programmers write the docs, do all the testing, perform the marketing.
- It's no longer expected (usually) that programmers design the user interface.



Figure 4: Frustrated user.

Benefits for actual Users –

- Users would be able to complete their task successfully & efficiently
- No or Reduced Training time
- Increased productivity

- There is satisfaction instead of frustration



Figure 5: Happy and satisfied user.

Benefits for Company –

- Decreased training and support costs
- Increased sales and revenues
- Reduced development time and costs
- Reduced maintenance costs
- Increased customer satisfaction
- Advantage over competitors
- Eliminate over design
- Increase accessibility
- Gain and retain happy loyal customers



Figure 5: Company sales improve

Developer is not Designer !!

Some companies try to put this HCI role on Developers and think that they will come up with designs and also do coding. This is not a good assumption. Developers are expert in solving bugs, defining technical architecture, and making things work. But they are not having education and experience in designing user interfaces.

HCI; Whose Job is it anyway ?

Because of a mistaken notion that GUI design is all about creating screen flows, buttons and colors everyone thinks they can do that. Companies think this can be done by either Developer or Business Analyst or Project Manager, etc. So literary everyone who know Alt+Clt+Del can do this. But check out these facts.

Myths of HCI

- Last minute enhancements
- Anyone can do it
- All Art and No science
- Just Colors, graphics, font, etc.
- Inconsequential while selling product
- Just any UI

Facts

- Early involvement
- Requires qualified people
- UCD (part of HCI) is a science
- Multidisciplinary activity
- One of the key elements to sell product
- Next competitive Edge.

In Western countries HCI designers were readily available as their universities have HCI education. They even have PhD programs since many years. Back at India, only institutes like Industrial Design Center, IIT Bombay or National Institute of Design, Ahmedabad were offering courses in Industrial Design and Visual communications. These course teach basic design which can be used in any industry. Eg –in advertisement, film, hardware design, consumer electronic products, etc. It was assumed that people in Industrial Design will take up HCI design in software companies. But as industries grew a need was felt to really start a special Masters course in HCI targeted at software industry. The courses started in year 2000.

Another group of people who started moving into HCI were people with Art education (BFA). They are very good at modern Art paintings, Print design, illustrations, cartoons, advertisements, posters, etc. They do have a very good aesthetic sense but lacked the knowledge of designing for Industrial products, users psychology & software Engineering. They initially started as Web designers and slowly moved towards HCI Design. They don't really fall under HCI designers unless they acquire other complementary skills. On the other hand they can be good graphic designers designing icons and images.

HCI has a wide interdisciplinary aspects in Aesthetics, Anthropology, Ethnography, Artificial Intelligence, Cognitive Science, Industrial Design, Ergonomics, Human Factors, Philosophy, Psychology, Sociology, etc. Now can you find a person who knows all this? Its difficult. But if you hire someone from Industrial Design or Masters in HCI, they may have covered most of these subjects in their academics. Ideally you need to build a team of people with expertise in each of these domain.

You need to have an Industrial Designer to design page flows & business processes, a Graphic designer to add good aesthetics, an HCI graduate or psychologist to do Usability testing.

What do HCI designers do ?

HCI designers can perform many activities like research, Analysis, design & testing depending on company, project requirements, schedule & cost. HCI designers normally don't do coding. But they are expected to know overall technology limitations and possibilities. Their deliverables are mostly in the form of document or a html/flash/ppt prototype. They interact with Product management or Clients/Marketing/Sales to understand requirements. Then talk with development to understand the building technology and

then they create User Interaction screens. They validate these user interfaces with actual users by way of usability testing.

Below chart maps HCI activities with Developer activities.

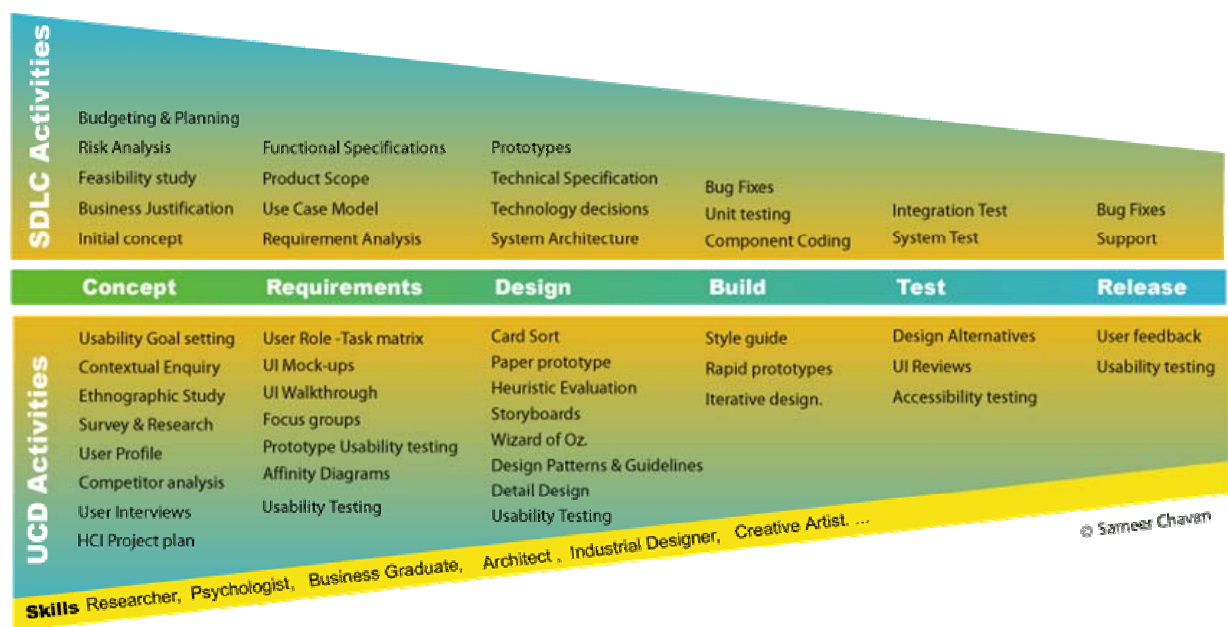


Figure 6: HCI mapped to SDLC

User Centered Design



© Sameer Chavan

Figure 7: UCD elements

In Human Computer Interaction a process called UCD (User centered Design) is very important. Earlier all the software products were technology driven but now just technology cannot make the product successful. The truth is Products are user

driven. So UCD reminds designers to consider user at every design stage. Since most of the competitors have almost same technology, the differentiating factors is how efficient & user friendly your product is. This has introduce one more aspect in HCI. Its called Usability Engineering.

Usability Engineering

Its easy to measure mathematical results but when it comes to measuring user friendliness it becomes tricky. Usability is a measure of How satisfying or how usable a products is. Usability is not limited to software products but to any man made products. Usability focuses but not limited to the following –

- **Effective**
 - Completeness - was the task fully completed? Were the user's goals met?
 - Accuracy - was the task completed successfully? Did the user get the right or correct result? How well was the work done?
- **Efficient**
 - Speed - was the user able to complete the task quickly?
 - Effort - was the user able to complete the task without undue cognitive effort?
- **Engaging**
 - Pleasant - did the user have a pleasant experience when working on the task?
 - Satisfying - was the user satisfied by the way in which the application supported her work?
- **Error tolerant**
 - Error prevention - did the user interface help users avoid making errors? Were errors minor rather than major?
 - Error recovery - if the user made an error, did the interface assist them in making a successful recovery?
- **Easy to learn**
 - Predictability - was the user able to work with some certainty because the user interface built on her previous knowledge?
 - Consistency - was the interface consistent, so that once a user learnt how to use part of the application, they were able to easily learn how to use another part?

I hope you may have got an overall view of HCI and its importance in Software Industry. Do let me know your comments and questions. – Sameer Chavan.

Reference:

Book – “Usability Engineering” by Jakob Nelson
 Site- “<http://www.sameerchavan.com>”