

DC2260 HCI Introduction to HCI

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introduction...

- ▶ what do we mean by **human-computer interaction, usability, and user interfaces?**
- ▶ “**human-computer interaction (HCI)** is the discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them” (Hewett et al., 1992)
- ▶ **user interface** is often shortened to “**UI**” – it refers to the user interface artefact (i.e., the “thing” that users interact with to engage the functionality of a software system)
- ▶ **usability** is the goal of HCI practitioners – for a UI to be usable, it has to be appropriate for the users and for the users’ tasks
 - ▶ don’t mistake with **user friendly** which is an ill-used term
 - ▶ *users don’t want to be friends with their computers!*
 - ▶ *“friendly” is a binary concept and usability is a lot more complex than that!*

Hewett, T.T., Baecker, R., Card, S., Carey, T., Gasen, J., Mantei, M., Perlman, G., Strong, G., and Verplank, W., (1992,1996), *ACM SigCHI Curricula for Human-Computer Interaction, Chapter 2: Human-Computer Interaction*, retrieved from <http://www.sigchi.org/cdg/cdg2.html>

what influences UI success?...

- ▶ success of a UI is usually determined by a broad range of issues:
 - ▶ type of user
 - ▶ type of task
 - ▶ hardware constraints
 - ▶ social and cultural limitations
- ▶ the above factors + user interface = user experience

who should participate in HCI?...

- ▶ broad, multidisciplinary field
 - ▶ computer scientists
 - ▶ ergonomicists
 - ▶ psychologists
 - ▶ social scientists – e.g., sociologists, anthropologists
 - ▶ cognitive scientists...
 - ▶ ...and let's not forget HCI practitioners (usability engineers)
- ▶ majority of the rest of your course emphasises programming...
- ▶ ...DC2260 will challenge you to widen your view of what computer science includes
 - ▶ lots of things besides programming are involved in the design of computer systems!
- ▶ *“if students don’t know about user interfaces, they will not serve industry needs. It seems that only through CS does HCI research disseminate to products”* (Myers, 1998)

Myers, D.G., (1998), *Psychology* (5th Ed.), New York: Worth Publishers

usability in more detail...

- ▶ **usability** is a quality attribute that measures how easy a user interface is to use
- ▶ **utility** is another important quality attribute which measures whether a system does what the user needs it to do
- ▶ usability and utility are equally important – one is no good without the other but don't confuse the two

usability in more detail...

- ▶ ISO 9241-11 defines **usability** as: “*the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use*”
- ▶ 4 points underpinning **usability**:
 - ▶ need to focus on the users during design to end up with a usable system
 - ▶ users use systems to be productive
 - ▶ users are typically task-oriented, busy, and often multi-tasking
 - ▶ users (not developers) decide if a product is usable or easy to use

usability in more detail...

- ▶ usability is generally accepted to be based on 5 components:
 - ▶ **learnability:** how easy is it for users to learn how to use the system? how easy is it for them to complete basic tasks the first time they use the system?
 - ▶ **efficiency:** once users are familiar with a system, how quickly can they accomplish their tasks?
 - ▶ **memorability:** when users return to the system after a period of not using it, how easily can they become proficient again?
 - ▶ **errors:** how many errors do users make? how severe are those errors? and how easily can they recover from the errors?
 - ▶ **satisfaction:** how pleasant is the system to use?
- ▶ aim for recognition rather than recall

haven't we got usability sorted already?...

- ▶ in the early years of computer science, usability wasn't given much consideration...
- ▶ ...today, hard to sell computing products that are not usable!
- ▶ 3 principal factors have increased the emphasis placed on usability:
 - ▶ changes in hardware environments
 - ▶ diversification of users
 - ▶ diversification of applications



changes in hardware environments...

- ▶ hardware has become much more powerful in terms of processing speed, storage capacity, and output characteristics
 - ▶ permitted development of more sophisticated UIs
- ▶ hardware that users interact with directly (peripherals) has become increasingly diverse
 - ▶ contributed to the development of different kinds of UI
- ▶ hardware has become increasingly accessible to a wider range of users due to decreasing costs
 - ▶ diversity of users are demanding increasing number of ways to interact with technology

diversification of users...

- ▶ users have changed from being predominantly computing professionals to discretionary users
- ▶ novice users have sophisticated expectations about computing systems they use
 - ▶ expectation that they are easy to use and are robust
 - ▶ non-computer professional users are technologically savvy and expect sophisticated UIs with low error rates and fast response times

diversification of applications...

- ▶ software use has moved from applications that support computation in the likes of banks, government organisations, and the military to personal computing
- ▶ when buying new computing technology, users now consider the software they want to run and select the hardware best suited to support it
- ▶ software applications that users interact *directly* with are now far more diverse than 40 years ago

usability engineering now has far more to consider – the concept of usability is much more complex now than it ever was before and so, far from being “sorted”, it is becoming increasingly difficult to achieve



what is usability engineering?...

- ▶ usable interfaces don't just happen by accident – they are the result of **usability engineering**
- ▶ to build a good UI, you have to follow an organised development cycle
- ▶ **product** = content of the UI (based on human factors issues, design guidelines, and interaction styles)
- ▶ **process** = strategy for developing the product and involves methods, techniques, and tools for development and assessment
- ▶ HCI practitioners are concerned with both product + process

why is usability engineering difficult?...

- ▶ UIs are hard to design because the detailed application knowledge required is often very hard to obtain
- ▶ **know your user because they are not you!**
 - ▶ really knowing users is time intensive and may require designers to change their views on issues
- ▶ good UI designs may have to deal with a number of conflicting requirements
- ▶ increasing need for UIs to guarantee accessibility to users with different skills, needs, and expectations

why invest the effort?...

- ▶ “*There is substantial empirical evidence that attention to usability dramatically decreases costs and increases productivity*” (Myers, 1994)
- ▶ “*It’s estimated that 80% of maintenance costs are spent on unforeseen user requirements, while only 20% are due to bugs*” (Chrusch, 2000)



Myers, B.A., (1994), Challenges of HCI Design and Implementation, *Interactions*, 1(1), 73-83

Chrusch, M., (2000), The Whiteboard: Seven Great Myths of Usability, *Interactions*, 7(5), 13-16

how do we guarantee usability?...

- ▶ no one formula works
- ▶ relying on designer's intuition is risky
- ▶ evaluation of UIs is critical
- ▶ **4 myths of usability:**
 - ▶ good UIs are just appealing graphics ✗
 - ▶ usability is the result of common sense ✗
 - ▶ application of guidelines to UIs will lead to usability ✗
 - ▶ usability problems can be resolved with help/training/documents ✗
- ▶ **buy into these myths and you are in trouble!**

Relevant Reading:

Leventhal, L., & Barnes, J., (2008), *Usability Engineering: Process, Products, and Examples*, Pearson-Prentice Hall:
Chapters 2-3