HUMAN - COMPUTER INTERACTION

CT273

Chapter 1: Overview of interactive system design

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The Variety of Interactive Systems

- Designing interactive systems is about designing
  - Software systems
  - Websites, games, interactive products (MP3 players, digital cameras…)
  - Interactive systems, interactive products and services for the home, for work or to support communities

What is Design

- It's where you stand with a foot in two worlds - the world of technology and the world of people and human purposes - and you try to bring the two together.

(Kapor, 1996)

What is Interaction Design

- Interaction Design (IxD) defines the structure and behaviour of interactive systems. Interaction Designers strive to create meaningful relationships between people and the products and services that they use, from computers to mobile devices to appliances and beyond.

  (Interaction Design Association – IxDA)

- Designing interactive products to support people in their everyday and working lives

  (Preece, Sharp and Rogers, 2002)

- The design of spaces for human communication and interaction

  (Winograd, 1997)

The Concerns of Interactive Systems Design

- Design
- Technologies
- People
- Activities and contexts

(Benyon, 2014)

The Process of Interaction Design

- The process of interaction design involves four basic activities:
  - Establishing requirements
  - Designing alternatives
  - Prototyping
  - Evaluating

(Preece, Sharp and Rogers, 2015)

What is User Experience Design

- User experience (UX) design is the process of creating products that provide meaningful and personally relevant experiences. This involves the careful design of both a product's usability and the pleasure consumers will derive from using it. It is also concerned with the entire process of acquiring and integrating the product, including aspects of branding, design, usability, and function.

(Interaction Design Association – IxDA)

Interaction Design and the User Experience

- Usability Goals
  - Effective To Use (Effectiveness)
  - Efficient To Use (Efficiency)
  - Safe To Use (Safety)
  - Having Good Utility (Utility)
  - Easy To Learn (Learnability)
  - Easy To Remember How To Use (Memorability)

(Preece, Sharp and Rogers, 2015)

Interaction Design and the User Experience

- User Experience Goals
  - ***Desirable aspects***

- Satisfying
- Enjoyable
- Engaging
- Pleasurable
- Exciting
- Entertaining
- Helpful
- Motivating
- Challenging
- Enhancing sociability
- Supporting creativity
- Cognitively stimulating
- Fun
- Provocative
- Surprising
- Rewarding
- Emotionally fulfilling

(Preece, Sharp and Rogers, 2015)

Interaction Design and the User Experience

- User Experience Goals
  - ***Undesirable aspects***

- Boring
- Frustrating
- Making one feel guilty
- Annoying
- Childish
- Unpleasant
- Patronizing
- Making one feel stupid
- Cutesy
- Gimmicky

(Preece, Sharp and Rogers, 2015)

Interaction Design and the User Experience

- Not all usability and user experience goals will be relevant to the design and evaluation of an interactive product being developed.
- Some combinations will also be incompatible.
- Recognizing and understanding the nature of the relationship between usability and other user experience goals is central to interaction design, which enables designers to become aware of the consequences of pursuing different combinations when designing products and highlight potential trade-offs and conflicts.

(Preece, Sharp and Rogers, 2015)

Design Principles

- Over the years many principles of good interactive system design have been developed.
  - *The Design of Everyday Things* (Norman, 1998)
  - *Usability Engineering* (Nielsen, 1993)

Design Principles

- However, the level of abstraction provided by different people at different times:
  - Inconsistent
  - Confusing
- There are also good design principles that derive from psychology.

Design Principles

- Design principles:
  - Can guide the designer during the design process
  - Can be used to evaluate and critique prototype design ideas
  - Help to orientate the designer to key features of good design
  - Sensitize the designer to important issues

(Benyon, 2014)

Design Principles

- 3 main categories of design principles:
  - **Learnability:**
    - Principles 1 - 4 are concerned with access, ease of learning and remembering
  - **Effectiveness:**
    - Principles 5-7 are concerned with ease of use
    - Principles 8 and 9 with safety
  - **Accommodation:**
    - Principles 10-12 are concerned with accommodating differences between people and respecting those differences

(Benyon, 2014)

Design Principles

Learnability:

1. Visibility
2. Consistency
3. Familiarity
4. Affordance

Effectiveness :

5. Navigation
6. Control
7. Feedback
8. Recovery
9. Constraints

Accommodation:

10. Flexibility
11. Style
12. Conviviality

(Benyon, 2014)

Visibility

- Try to ensure that things are visible so that the people can see what functions are available and what the system is currently doing
- Psychological principle: It is easier to recognize things than to have to recall them.
- If it is not possible to make it visible, make it observable.

Consistency

- Be consistent in the use of design features
- Be consistent with similar systems and standard ways of working
- Types of consistency
  - Conceptual consistency
  - Physical consistency

Familiarity

- Use language and symbols that the intended audience will be familiar with
- Provide a suitable metaphor to help people transfer similar and related knowledge from a more familiar domain

Affordance

- Design things so it is clear what they are for
- Affordance refers to
  - the properties that things have (or are perceived to have)
  - how these relate to how the things could be used
- Example: Buttons afford pressing.

Navigation

- Provide support to enable people to move around the parts of the system:
  - Maps
  - Directional signs
  - Information signs

Control

- Make clear who or what is in control
- Allow people to take control
- Is enhanced if there is a clear, logical mapping between:
  - controls
  - the effects they have
- Make clear the relationship between:
  - What the system does
  - What will happens in the world outside the system

Feedback

- Rapidly feed back information from the system to people so that they know what effect their actions have had
- Constant and consistent feedback will enhance the feeling of control

Recovery

- Enable recovery from actions, particularly mistakes and errors, quickly and effectively

Constraints

- Provide constraints so that people do not try to do inappropriate things
- In particular, people should be prevented from making serious errors through properly:
  - Constraining allowable actions
  - Seeking confirmation of dangerous operations

Flexibility

- Allow multiply ways of doing things so as to accommodate users with different levels of experience and interest in the system
- Provide people with the opportunity to change the way things look or behave so that they can personalize the system

Style

- Designs should be stylish and attractive.

Conviviality

- Interactive systems should be polite, friendly, and generally pleasant.
- They should not have:
  - an aggressive message
  - an abrupt interruption
- Conviviality also suggests joining in and using interactive technologies to connect and support people.

Characteristics of Information Appliances

- Appliances should be everyday things requiring only everyday skills to use.
- Appliances have a clear, focused function that can be used in a variety of circumstances.
- Peer-to-peer interaction: Appliances work together without the need for central control or uploading and downloading.
- Direct user interface: Appliances need to be simple and intuitive to use.

Characteristics of Information Appliances

- Successful appliances are those which support the notion of the swift and simple completion of a task.
- Appliances represent the ability to do something on impulse without having to think hard about how to do it.
- Appliances are personal and portable.

(Benyon, 2014)

The Skills of the Interactive Systems Designer

- Study and understand the activities and aspirations of people and the contexts within which some technology might prove useful and hence generate requirements for technologies
- Know the possibilities offered by technologies
- Research and design technological solutions that fit in with
  - people
  - the activities they want to undertake
  - the contexts in which those activities occur
- Evaluate alternative designs and iterate (do more research and more design) until a solution is arrived at

(Benyon, 2014)

Summary

- Interaction design is concerned with designing interactive products to support the way people communicate and interact in their everyday and working lives.
- Identifying and specifying relevant usability and user experience goals can help lead to the design of good interactive products.
- Design principles can guide the designer during the design process and can be used to evaluate and critique prototype design ideas.

Additional resources

- Designing Interactive Systems: A comprehensive guide to HCI, UX and interaction design, 3rd Edition (David Benyon, 2014)
- Interaction Design: Beyond Human-Computer Interaction, 4th Edition (Jennifer Preece, Helen Sharp, Yvonne Rogers, 2015)