Interaction Design

Chapter 2 (May 04th, 2017, 9am-12pm):
Process Models, Elements and Usability
Recap Session Day 1:
Gillian Crampton Smith

- established the first Interaction Design MA program at the Royal College of Art (RCA)
- was the founder and academic director of the Interaction Design Institute Ivrea (IDII)
Looking back...

- shaping our lives through digital artefacts...
- good IxD refers to a “mental model”
- good IxD provides a “map” of where you are in a system, how you can move around and how you get back to the point where you started
- languages of interaction design
- elements of interaction design
- the part of the interaction designer is to design

the **quality** on how the interaction is performed, how the system behaves

source: [3]
Douglas Engelbart

Douglas C. Engelbart: **Augmenting human intellect: A Conceptual Framework**  
1. **Artefacts**—physical objects designed to provide for human comfort, the manipulation of things or materials, and the manipulation of symbols.

2. **Language**—the way in which the individual classifies the picture of his world into the concepts that his mind uses to model that world, and the symbols that he attaches to those concepts and uses in consciously manipulating the concepts (“thinking”).

3. **Methodology**—the methods, procedures, and strategies with which an individual organises his goal-centred (problem-solving) activity.

4. **Training**—the conditioning needed by the individual to bring his skills in using augmentation means 1, 2, and 3 to the point where they are operationally effective.

source: [3]
Palo Alto Research Center

founded 1970 by Xerox
The Computer for the 21st Century

Specialized elements of hardware and software, connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence.

by Mark Weiser

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

Consider writing, perhaps the first information technology. The ability to represent spoken language symbolically for long-term storage freed information from the limits of individual memory. Today this technology is ubiquitous in institutionalized situations. Not only do books, magazines and newspapers convey written information, but so do street signs, billboards, school signs and even graffiti. Candy wrappers are covered in writing. The constant background presence of these products of "legacy technology" does not require active attention, but the information to be transmitted is readily available on a glance. It is difficult to imagine modern life otherwise.

Silicon-based information technology, in contrast, is far from having become part of the environment. More than 50 trillion personal computers have been sold, and the computer nonetheless remains largely in a world of its own. It is approachable only through complex jargon that has nothing to do with the tasks for which people use computers. The state of the art is perhaps analogous to the period when scripts had to know as much about making ink or baking dough as they did about writing.

The scenario that surrounds personal computers is not just a "user interface" problem. My colleagues and I at the Xerox Palo Alto Research Center think that the idea of a "personal" computer itself is misplaced and that the vision of laptop machines, desktops and "knowledge navigators" is only a transitional step toward achieving the real potential of information technology. Such machines cannot truly make computing an integral, invisible part of people's lives. We are therefore trying to conceive a new way of thinking about computers, one that takes into account the human world and allows the computer itself to become part of the background.

Such a disappearance is a fundamental consequence not of technology but of human psychology. Whenever people learn something sufficiently well, they cease to be aware of it. When you look at a street sign, for example, you absorb its information without consciously performing the act of reading. Computer scientists, economists and sociologists have long been aware of this phenomenon: "computing," philosopher Michael Polanyi calls it the "tactile dimension"; sociologist J. J. Gibson calls it "habitualization"; philosophers Hans Geiger and Martin Heidegger call it the "world" and the "ready-to-hand"; John Selye Brown of PARC calls it the "periphery." All say in essence that only when things disappear in this way are we freed to use them without thinking and so to focus beyond them on new goals.

The idea of integrating computers seamlessly into the world at large runs counter to a number of present-day trends. "Ubiquitous computing" in this context does not mean just computers that can be carried to the beach, Jani-gle or airport. Even the most powerful notebook computer, with access to a worldwide information network, still focuses attention on a single box, by analogy with writing, carrying a supercomputer in your pocket is just one very important book. Customizing this book, even writing millions of other books, does not begin to capture the real power of literacy.

Furthermore, although ubiquitous computers may use sound and video in addition to text and graphics, that does not make them "multimedia computers." Today's multimedia machine makes the computer screen into a demanding focus of attention rather than allowing it to fade into the background. Perhaps most dramatically opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. There is a special appeal to project an artificial scene onto your own, to wear gloves or even body suits that sense your motions and gestures so that they can move about and manipulate virtual objects. Although it may have its purpose in allowing people to explore realms otherwise inaccessible—the insides of cells, the surfaces of distant planets, the information web of data bases—virtual reality is only a map, not a territory. It excludes desks, offices, other people not wearing gloves and body suits, weather, trees, walls, choice-makers and, in general, the infinite richness of the universe. Virtual reality fails most cases an enormous opportunity to simulate the world rather than on literally enhancing the world that already exists.

Indeed, the opposition between the


Xerox Alto 1973

http://dl.maximumpc.com/galleries/oldpcs/xerox_alto_front_full.jpg
Now you can create documents with words and pictures

1981 Xerox Star Workstation
Interaction Design

Chapter 2 (May 04th, 2017, 9am-12pm):
Process Models, Elements and Usability
Process Models, Elements and Technology

• Definition and Paradigms of Interaction Design
  • Process Models
  • Elements of Interaction Design
  • Adapting Technology
INTERACTION

How do you...

...feel?

...do?

I handle a button

cool

hot
Bill Verplank says that the interaction designer has three questions to answer; they are all “How do you . . . ?” questions.
1. “How do you do?”

How do you affect the world?
You can grab hold of a handle and manipulate it, keeping control as you do it.

2. “How do you feel?”

How do you get feedback?
That’s where a lot of feelings come from; a lot of our emotions about the world come from the sensory qualities of those media that we present things with.

3 “How do you know?”

The map shows the user an overview of how everything works, and the path shows them what to do, what they need to know moment by moment
"Any hot medium allows of less participation than a cool one, as a lecture makes for less participation than a seminar, and a book for less than a dialogue."
Interaction Design Paradigms

A paradigm is an example that serves as a pattern for the way people think about something.

It is the set of questions that a particular community has decided are important. For interaction design there is often some confusion about what paradigm you are working with. The basic question is, What is a computer?

source: [3]
Intelligence

In the early days, designers thought of computers as people and tried to develop them to become smart, intelligent, and autonomous.

The word “smart” is one that we associate with this paradigm, expecting the machine or product to be smart and to know how to do things for the person who uses it.

http://www.clker.com/clipart-4348.html

source: [3]
Tool

Doug Engelbart, the inventor of the computer mouse, thought of the computer as a tool.

Styles of interaction changed from dialogs, where we talk to a computer and a computer will talk back to us, to direct manipulation, where we grab the tool and use it directly. The ideas of efficiency and empowerment are related to this tool metaphor.

source: [3]
Media

In the nineties, designers thought of computers as media, raising a new set of questions.

How expressive is the medium? How compelling is the medium? Here we are not thinking so much about a user interacting with or manipulating the computer, but more about them looking at and browsing in the medium.

source: [3]
Life

Starting in the mid nineties, people have been talking about computer viruses or computer evolution; they are thinking of artificial life.

When the program has been written, it is capable of evolving over time—getting better and adapting. The programmer is in a way giving up responsibility, saying that the program is on its own.
Vehicle

Another metaphor is the computer as vehicle, and we have to agree on the rules of the road.

There has to be some kind of infrastructure that underlies all computer systems. People spend their careers determining the standards that will define the infrastructures, and hence the limitations and opportunities for design.

source: [3]
Fashion

The media metaphor plays out to computers as fashion.

A lot of products are fashion products. People want to be seen with the right computer on. They want to belong to the right in-crowd. Aesthetics can dominate in this world of fashion, as people move from one fashion to another, from one style of interaction to another style.

source: [3]
Process Models, Elements and Technology

• Definition and Paradigms of Interaction Design
• Process Models
• Elements of Interaction Design
• Adapting Technology
User Experience Design

Technology

UX

Business

Design
User Experience Design
Front Stage

Double Diamond

source: [8]
Double Diamond

Why? and How?

source: [2]
Getting the right Design and the Design right...

Bill Buxton - Sketching User Experiences

source: [1]
Double Diamond

What?

source: [2]
**DISCOVER STAGE**

- Consumer behaviour and preferences in relation to the product or service offered by the company
- New modes of communication
- New service needs that may emerge on the basis of social, economic or environmental changes

source: [2]
Double Diamond

DEFINE STAGE

- The generation of initial ideas and project development
- Ongoing project management
- Corporate objectives agreed and project sign-off

source: [2]
DESIGN STAGE

- Multi-disciplinary working and dependencies with other departments
- Visual management
- Development methods
- Testing
Double Diamond

DELIVER STAGE

• Final testing, approval and launch
• Targets, evaluation and feedback loops.

source: [2]
Double Diamond DESIGN PROCESS

GERERAL PROBLEM STATEMENT

RESEARCH
USER-CENTERED
EMPATHETIC

NEEDS/VALUES
TOUCH-POINTS
INSIGHTS

SPECIFIC PROBLEMS

IDEATION
BRAINSTORM

SPECIFIC SOLUTIONS

PROTOTYPES

_ITERATIVE PROCESS

DISCOVER
DEFINE
DEVELOP
DELIVER

Specific Solutions

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UCD Design Process Model

- Key Data Collection
- User Research
- Data Analysis
- Design Concepts
- Experience Prototypes

Evaluation Cycle

source: [4]
Process Models, Elements and Technology

- Definition and Paradigms of Interaction Design
- Process Models
- Elements of Interaction Design
- Adapting Technology
User Experience Design

- useful
- usable
- valuable
- findable
- desirable
- accessible
- credible
Elements in Interaction Design

Within interaction design, products and services can be purely digital, physical and/or hybrid.

Therefore considerations on the different elements are necessary.


source: [5]
http://www.oldcomputers.net/pics/next-logo.png
NextStation

https://upload.wikimedia.org/wikipedia/commons/0/0a/NeXTstation.jpg

https://upload.wikimedia.org/wikipedia/en/1/1d/NeXTSTEP_desktop.png
Motion, Space, Time, Appearance, Texture and Sound: Cordell Ratzlaff: Developing OSX
Cordell Ratzlaff

- managed the human interface group at Apple for 5 years
- led the design team of OSX
- founded the company GetThere.com
- creative director at Frog Design SF, USA

http://www.designinginteractions.com/interviews/CordellRatzlaff

source: [3]
Looking back...
Motion

http://www.ipadforums.net/wallpapers/data/500/hand_touch.jpg
Motion

Motion is often a trigger for action.

The triggered action (or at least the feedback for that action) is often about motion as well.

Without motion, there can be no interaction.
Space

Space

Space provides a context for motion.

Where is the action taking place?

How are the constraints of the space?

All interactions take place in a space.

source: [5]
Time

http://www.flickr.com/photos/devaspillergy/3200031899/sizes/l/
**GRAPHIC DESIGN**

- **2D**

**PRODUCT DESIGN**

- **3D**
  + Z-axis (spatial depth)

**INTERACTION DESIGN**

- **4D**
  + T-axis (temporal dimension)

**SERVICE DESIGN**

- **5D**
  + W-axis (multi-local simultaneity)

Model: Benjamin N.N. Schulz; Icons: Dima Yagnyuk, Daphne Espinosa, George Agpoon / The Noun Project
Time

Movement through space takes time to accomplish.

Interaction designers need an awareness of time. Some tasks are complicated and take a long time to complete.

Time creates rhythm.

All interactions take place over time.

source: [5]
Appearance/Affordances
Appearance

Appearance is the major source (texture is the other) of what cognitive psychologist James Gibson, in 1966, called affordances.


An affordance is a property, or multiple properties, of an object that provides some indication of how to interact with that object or with a feature on that object.

source: [2&5]
Appearance/Affordance has many variables for interaction designers to alter:

1. proportion
2. structure
3. size
4. shape
5. weight
6. color (hue, value, saturation)

All of these characteristics (and more) add up to appearance, and nearly every design has some sort of appearance, even if that appearance is a simple command line.

source: [5]
Process Models, Elements and Technology

• Definition and Paradigms of Interaction Design
• Process Models
• Elements of Interaction Design
• Adapting Technology
• Usability
"The Chasm"
We interviewed some people with beautiful and very elaborate new media systems who were quite discouraged and quite unhappy with them.

The solution from the manufacturers of consumer products was to produce the most dumbfounding, enormous remote controls. Thirty buttons was not a large number for those controls. There was a period of suppression of the adoption of the best of this technology simply because it was too complicated to use.

David Liddle, 2003

source: [3]
Three Phases of Product Adaptation
David Liddle

-worked at PARC
-was one of the lead designers creating the STAR workstation
-founded a company named *Metaphor Computers*
-set up a research laboratory, *Interval Research*, focused on interdisciplinary interaction design

source: [3]

http://www.designinginteractions.com/interviews/Jeff-Hawkins
Looking back...
Looking back...

-different phases of adoption have different impacts on their usability
-controls become automated in the final (consumer) phase
Hobby

ENTHUSIAST PHASE
“Exploit me!”

Work

PROFESSIONAL PHASE
“Help me work!”

Life

CONSUMER PHASE
“Enjoy me!”

source: [3]
Inventors are often good at coming up with the first version of a technology and can find the “enthusiasts” to adopt the technology by creating nothing more than an innovative solution.

The inventor, even when supported by a band of technicians, cannot develop the technology once it enters the “professional” phase.

Usability at this stage is perceived of low value.
New design values apply when people adopt the technology for practical purposes. Now the design must be **reliable**, it must **perform consistently**, it must be **priced** to offer reasonable value, and above all it must be both **useful** and **usable**.
A design for the professional phase does not need necessarily to be easy to use, as people take pride in acquiring skill in their work; their learned skill separates them from the unskilled and allows them to feel expert.

The design does not have to be enjoyable, as people tend to take their work seriously and are willing to try hard to be productive, even if the experience is unpleasant.

Usability at this stage is perceived of mid value.
Nikon F2AS

Usability is of very high value at this stage and can result as a crucial advantage in competition.

Designs at this level should be: Enjoyable, robust and easy to use.
Process Models, Elements and Technology

- Definition and Paradigms of Interaction Design
- Process Models
- Elements of Interaction Design
- Adapting Technology
- Usability
Usability

User-experience design

Information architecture

Communication design

User Interface engineering

Interaction design

Usability engineering

Human-computer interaction

Industrial design

Human factors
Usability is a term used to denote the ease with which people can employ a particular tool or other human-made object in order to achieve a particular goal.
Benefits of usability testings

- Higher revenues through increased sales
- Increased user efficiency
- Reduced development costs
- Reduced support costs
Parking Machine

http://www.flickr.com/photos/rdolishny/2760207306/
Microwave

http://www.flickr.com/photos/geek-boy/25226182/in/photostream/
Remote Control
Remote Control

source: [3]
StepMlfaM
usabilityMtestMandMevaluation

User Environment
Hierarchy of Design Needs
Functionality needs have to do with meeting the most basic design requirements.

For example, a HDD recorder must, at minimum, provide the capability to record play, and review recorded programs. Designs at this level are perceived to be of little or no value.
Reliability needs have to do with establishing stable and consistent performance.

For example a HDD recorder should perform consistently and play back recorded programs at an acceptable level of quality. If the design performs erratically, or is subject to frequent failure, reliability needs are not satisfied. Designs at this level are perceived to be of low value.

source: [7]
Maslow’s Hierarchy of Needs

Design Hierarchy of Needs

- Usability
- Functionality
- Reliability
- Proficiency
- Creativity
- Safety
- Love
- Self-Esteem
- Self-Actualization

source: [7]
Usability needs have to do with how easy and forgiving a design is to use.

For example, configuring a HDD recorder to record programs at a later time should be easily accomplished, and the recorder should be tolerant of mistakes. If the difficulty is too great, or the consequences of simple errors too severe, usability needs are not satisfied. Designs at this level are perceived of moderate value.
Maslow’s Hierarchy of Needs

- Self-Actualization
- Self-Esteem
- Love
- Safety
- Physiological

Design Hierarchy of Needs

- Creativity
- Proficiency
- Usability
- Reliability
- Functionality

source: [7]
Proficiency needs have to do with empowering people to do things better than they could previously.

For example, a HDD recorder that can seek out and record programs based on keywords is a significant advance in recording capability, enabling people to do things not previously possible. Designs at this level are perceived to be of high value.

source: [7]
Maslow’s Hierarchy of Needs

Design Hierarchy of Needs

- Creativity
- Proficiency
- Usability
- Reliability
- Functionality
Creativity is the level in the hierarchy where all needs have been satisfied and people begin interacting with the design in innovative ways.

The design, having satisfied all other needs, is now used to create and explore areas that extend both the design and the person using the design. Designs at this level are perceived to be of the highest value, and often achieve cult-like loyalty among users.
Aesthetic-Usability Effect

Aesthetic designs are perceived as easier to use than less-aesthetic designs. Aesthetic designs look easier to use and have a higher probability of being used, whether or not they actually are easier to use.

source: [7]
Flexibility-Usability Tradeoff

source: [7]
The flexibility-usability tradeoff is exemplified in the well known maxim “jack of all trades, master of none”. Flexible designs can perform more functions than specialised designs, but they perform the functions less efficiently.
Flexibility-Usability Tradeoff

source: [7]
Navigation
Navigation
How did I get here.....?
How did I get here.....?
Navigation gives us something “to hold on”

It tells us what we’ll find and establishes a level of trust between the user and the people who build the system.
USABILITY IN EVERYDAY LIFE!
Audi A4 Series Cockpit

Audi R15 Racing Cockpit

http://2.bp.blogspot.com/_SM9A_sqV/GgM18XQNXI8/AAAAAAAADww/HcrQgfpuhgw/s1600/Audi+R15+Plus+Cockpit.jpg
Usability Inspection Methods...
Specifically constructed testing room
...instrumented with data collection devices

Separate observation room
...usually connected to the testing room by one-way mirror and audio system / data recording and analysis

Test users perform prepared scenarios
...and use the "Think aloud" technique

Problem
...very artificial setting
→ bias in test results
- Heuristic evaluation
- Heuristic estimation
- Cognitive walkthrough
- Pluralistic walkthrough
- Feature inspection
- Consistency inspection
- Standards inspection
- Formal usability
• Heuristic evaluation
• Heuristic estimation
• Cognitive walkthrough
• Pluralistic walkthrough
• Feature inspection
• Consistency inspection
• Standards inspection
• Formal usability
Usability Lab @ Sun Microsystems
Heuristic (hyü-'ris-tik) is a method to help solve a problem, commonly an informal method. It is particularly used to rapidly come to a solution that is reasonably close to the best possible answer, or 'optimal solution'.
Visibility of system status

Match between system and the real world

User control and freedom

Consistency and standards

Error prevention

Recognition rather than recall

Flexibility and efficiency of use

Aesthetic and minimalist design

Help users recognize, diagnose, and recover from errors

Help and documentation
Visibility of system status

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Help users recognize, diagnose, and recover from errors

Help and documentation

Example: “Web Design, Filling the Blanks”
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**Flexibility and efficiency of use**

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Help users recognize, diagnose, and recover from errors

Help and documentation

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Quelle: [3,7]
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Help users recognize, diagnose, and recover from errors

Help and documentation
Example: Speed Testing
Speed Usability Testing
Example: Eye tracking
Eye-tracker

video credits © kent state university
References (Books):