User Experience Design I
(Interaction Design)

Day 2 (April 19th, 2018, 9am-12pm):
Process Models, Elements and Usability
Recap Session Day 1:
Stu Card

- joined Xerox Palo Alto Research Center (PARC) in 1974
- aimed at perfecting scientific methods to integrate with creative design
- developed a process to predict the behaviour of a proposed design, using task analysis, approximation, and calculation
- proposed a partnership between designers and scientists, by providing a science that supports design.

http://www.designinginteractions.com/interviews/StuCard
Looking back...

- exploration of the design space through the integration of industrial design
- designers and engineers had to work together (interdisciplinary approach)
- science served to constrain the design space
MINIMUM Viable Product

Crappy Products    Minimum

Minimum          Viable

Best Products to Startups

Douglas Engelbart

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]
founded 1970 by Xerox
Marc Weiser

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 technology is ubiquitous in institutionalized contexts. Not only do books, magazines and newspapers convey written information, but so do street signs, billboards, signs and even graffiti. Candy wrappers are covered in writing. The constant background presence of these products of "writing technology" does not require active attention, but the information to be transmitted is ready for use at 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 million personal computers have been sold, and the computer nonetheless remains largely in the world of its own.

The idea of integrating computers seamlessly into the world at large runs counter to a number of premises. "Ubiquitous computing" in this context does not mean just computers that can be carried to the beach, airline 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 super-laptop is like owning 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 more dramatically opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. There are special goggles that project an artificial scene onto their own; they wear goggles or even bodysuits that sense their motions and gestures so that they can move about and manipulate virtual objects. Although it may have its purpose in allowing people to explore otherwise inaccessible--the inside of cells, the surfaces of distant planets, the information web of data--virtual reality is only a map, not a territory. It excludes doors, offices, other people not wearing goggles and bodysuits, weather, trees, soils, clothes, mattresses and, in general, the infinite richness of the universe. Virtual reality poses an enormous opportunity in stimulating the world rather than on literally enhancing the world that already exists.

Indeed, the opposition between the...
Xerox Alto 1973

http://dl.maxumpc.com/galleries/30oldpcs/xerox_alto_front_full.jpg
Now you can create documents with words and pictures

1981 Xerox Star Workstation
User Experience Design I (Interaction Design)

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Process Models, Elements and Usability
Process Models, Elements and Usability

- Definition and Paradigms of Interaction Design
  - Process Models
  - Elements of UX/Interaction Design
  - Usability Basics
INTERACTION

How do you...

- feel?

- do?

- handle a button

- hot

- cool

map

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

source: [3]
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.

source: [3]
“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.”

Marshall McLuhan
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]
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.
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.

source: [3]
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.
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.
Process Models, Elements and Usability

- Definition and Paradigms of UX/Interaction Design
- Process Models
- Elements of UX/Interaction Design
- Usability Basics
User Experience Design
Front Stage

Back Stage

User Interface

Visible

Behind the Scenes

Capturing

Connecting

Combining

Transferring

Coordinating

Storing

Contextualizing
Double Diamond

source: [8]
Double Diamond

DISCOVER | DEFINE

DESIGN | DELIVER

Why? and How?

source: [8]
Getting the right Design and the Design right...

Bill Buxton - Sketching User Experiences

source: [1]
Double Diamond

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: [8]
**Double Diamond**

**DEFINE STAGE**

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

source: [8]
DESIGN STAGE

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

source: [8]
DELIVER STAGE

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

source: [8]
Double Diamond DESIGN PROCESS

- **Research**: User-Centered Empathetic
- **Insights**: Needs/Values Touchpoints
- **Ideation**: Brainstorm
- **Prototypes**: Specific Solutions

**Iterative Process**

**General Problem Statement**

**Specific Solutions**

Source: [8]

UCD Design Process Model

source: [4]
Process Models, Elements and Usability

• Definition and Paradigms of UX/Interaction Design
• Process Models
• Elements of UX/Interaction Design
• Usability Basics
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]
One could describe Design as a plan for arranging elements to accomplish a particular purpose.

Charles Eames
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]
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/davesquillery/3200031698/sizes/o/in/photostream/
**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/UX designers need an awareness of time. Some tasks are complicated and take a long time to complete.

Time creates rhythm. (e.g. wait time, intended delays, unintended delays, battery, etc.)

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.
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 Usability

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Usability Basics
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
Microwave

http://www.flickr.com/photos/geek-boy/25226102/in/photostream/
Remote Control
Remote Control
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.
Maslow’s Hierarchy of Needs

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

Design Hierarchy of Needs

- Functionality
- Usability
- Proficiency
- Creativity
- Reliability

source: [7]
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.
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.
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.
Maslow’s Hierarchy of Needs

Design Hierarchy of Needs

- Creativity
- Proficiency
- Usability
- Reliability
- Functionality

source: [7]
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.

source: [7]
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
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.

source: [7]
Flexibility-Usability Tradeoff

source: [7]
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/gAfW8XCNm5I/AAAAAAAAADw/wHcrQgflpshlgI/s1600/Audi%20R15%20Plus%20Cockpit.jpg
It is relatively easy to design for the perfect cases, when everything goes right, or when all the information required is available in proper format.

Don Norman
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
Heuristic (hyū-'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

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

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Help users recognize, diagnose, and recover from errors

Help and documentation

Example: “Web Design, Filling the Blanks”
Visibility of system status

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Quelle: [3,7]
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USABILITY Testing Applied
Mobile Usability Lab

The mobile laboratory setting consisted of two different elements:

1. The user-testing environment, with the eye-tracking Tobii Pro Glasses 2 for recording the field of view and the eye movement of the user in full HD, as well as an iPhone 6 to record the interviews.

2. The observation was captured with an IBM laptop and the Tobii pro eye-tracking software.

The user testing was conducted with a prototype of the new Frymaster controller, with a 7” touchscreen monitor to display the provided test software; this prototype was equipped with two large buttons for start/stop to enable the users to execute the given tasks and judge the applicability of our UI concept.

Figure 6. UX mobile laboratory setting
Eye-Tracking Glasses

- Full HD wide angle scene camera
- Gyro and accelerometer
- 2 cameras per eye
- Removable protective lens
- Exchangeable nose pad
- Microphone
Usability Testing in the Field
Usability Testing in the Field
Video Overview: Usability Testing in the Field
Usability Testing

Report contains:

• Study Design
• User Profiles
• Questionnaire Results
• Interview Quotes
• Summarised Findings
• Design Recommendations
References (Books):