User Experience Design I
(Interaction Design)

Part II:
Process Models, Elements and Usability
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]
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 this technology is ubiquitous in industrialized countries. Not only do books, magazines and newspapers convey written information, but so do signs, billboards, street signs and even graffiti. Candy wrappers are covered in writing. The contrast background presence of these products of "literacy technology" does not require overt 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 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 writers had to know as much about making ink or boiling clay as they did about writing.

The arena cars that surround 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 "personally" computer itself is misplaced and that the vision of laptop machines, desktops, and "knowledge workspaces" 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 of a new kind of thinking about computers, one that takes into account the human world and allows the computers to remain in the background.

Such a disappearance is a fundamental consequence of technology on human psychology. Whenever people have something unnecessarily well, they come 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 Nobel laureate Herbert A. Simon calls this phenomenon "competing". philosopher Michael Polanyi calls it the "tactile dimension"; psychologist J. J. Gibson calls it "visual immanence"; philosophers Hans Geiger and Martin Heidegger call it the "instanz" and the "ready-to-hand". Jody Scheck of Xerox calls it the "periphery." All say, in essence, that only when things disappear in this way are we forced 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, jungle 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-jogging in a tiny pocket is a very important book. Customizing this book, even writing columns of other books, does not begin to capture the real power of literacy.

Furthmore, although ubiquitous computers may use sound and video in addition to text and graphics, that does not make them "multimedia computers." Today's multimedia makes the computer screen into a de-facto focus of attention rather than allowing it to fade into the background. Perhaps most dismally opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. Users don special goggles that project an artificial scene onto their eyes, they wear gloves or even body suits 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 reality otherwise inaccessible—the inside of cells, the surfaces of distant planets, the information web of data bases—virtual reality is only a map, not a territory. It excludes doors, offices, other people, not wearing goggles and body suits, weather, trees, walls, choice, conversations and, in general, the infinite richness of the universe. Virtual reality also creates new types of virtual reality, the world rather than improving it, the world that already exists. Indeed, the opposition between the


Xerox Alto 1973

http://dl.maximumpc.com/galleries/25oldpcs/xerox_alto_front_full.jpg
1981 Xerox Star Workstation

Now you can create documents with words and pictures
User Experience Design I
(Interaction Design)

Day 2 (May 2nd, 2019, 9am-12pm):
Process Models, Elements and Usability
Process Models, Elements and Usability

• Definition and Paradigms of UX/Interaction Design

• Process Models

• Elements of UX/Interaction Design

• Usability I
INTERACTION

How do you...

...feel?

-cool
-hot

..do?

-know?

-what

-I handle

E button
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
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?*
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.
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 Usability

- Definition and Paradigms of UX/Interaction Design
- Process Models
- Elements of UX/Interaction Design
- Usability I
User Experience Design

usable

useful
desirable

valuable

findable

accessible

credible
Back Stage

Double Diamond

DISCOVER | DEFINE
---------|---------
DESIGN   | DELIVER

source: [8]
Double Diamond

Why? and How?

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

Bill Buxton - Sketching User Experiences
Double Diamond

DISCOVER  DEFINE  DESIGN  DELIVER

What?

source: [8]
**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

The Discover stage helps to identify the problem, opportunity or user need that should be addressed, and introduces the space within which design can provide a solution – the playing field for design. It is important that the design process used in the company allows for ideas to be captured and developed in this way, and fosters this type of creative environment among designers and other staff.

source: [8]
**DEFINE STAGE**

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

At the Define stage, a combination of the ideas or directions identified during the Discover stage are analysed and synthesised into a brief with actionable tasks related to new and existing product or service development. The Define stage ends with a clear definition of the problem(s) and a plan for how to address this through a design-led product or service. In practice, the Define stage ends in a project go-ahead through corporate level sign-off.

(source: [8])
DESIGN STAGE

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

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

It will result in a product or service that successfully addresses the problem identified during the Discover stage. It will also include processes for feeding back lessons from the full design process to inform future projects, including methods, ways of working and relevant information.
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 I
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

source: [3]
GRAPHIC DESIGN

PRODUCT DESIGN

INTERACTION DESIGN

SERVICE DESIGN

2D

3D
+Z-axis
(spatial depth)

4D
+T-axis
(temporal dimension)

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

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

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.

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 Usability

- Definition and Paradigms of UX/Interaction Design
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- Usability I
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
Parking Machine

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

http://www.flickr.com/photos/geek-boy/25226137/sizes/l/in/photostream/
Copier

http://29.media.tumblr.com/tumblr_if9keO1FR1qf9o1_500.jpg
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.
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.
The diagram illustrates the Design Hierarchy of Needs, which is a modified version of Maslow's Hierarchy of Needs. The design hierarchy includes the following needs from bottom to top:

1. Functionality
2. Reliability
3. Usability
4. Proficiency
5. Creativity
6. Love
7. Self-Esteem
8. Self-Actualization

These needs are arranged in a pyramid, with the most fundamental needs at the bottom and the most complex needs at the top. The source of the diagram is [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

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.

source: [7]
Flexibility-Usability Tradeoff

source: [7]
Navigation
Navigation
How did I get here.....?
How did I get here.....?
iPhone
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!
frequent users

novice users

infrequent users

expert users
Audi R15 Racing Cockpit

http://2.bp.blogspot.com/_SM9A_sqV/GgWIS8XOnRI/W9s/AAAAAAAAADww/HcrQgfpwUHI/s1600/Audi%2BR15%2BPlus%2BCockpit.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
• 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

https://c1.staticflickr.com/1/230/489963693_22221f92f1_b.jpg
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

Quelle: [3,7]
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Yammer

Example: “Web Design, Filling the Blanks”
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USABILITY Testing Applied
Mobile Usability Lab

TEST SET-UP

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 Studio 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.
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
User Experience Design

usable

useful

desirable

valuable

findable

accessible

credible

source: [3]
Eric Schaffer

- CEO of Human Factors International, Inc. (HFI)
- In the UX field since 1977
- Global evangelist for UX and has been the core driver for work on institutionalisation of UX

https://www.linkedin.com/in/eric-schaffer-3a57aa/detail/photo/
References (Books):