

A.A. 2020-21



ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

# Introduction to UUX

## *History and terminology*

Fabio Vitali

# Codes for this course

Check your codes!

90720 - USABILITY & USER EXPERIENCE DESIGN - 6 cfu

- ◆ Laurea Magistrale in Informatica – 36 hours

85573 - USABILITY AND USER EXPERIENCE (1) (LM) - 6 cfu

- ◆ Laurea Magistrale in Digital humanities and digital knowledge – 36 hours

91264 - USER EXPERIENCE DESIGN - 6 cfu

- ◆ Laurea Magistrale in Artificial intelligence – 44 hours

91285 - PROJECT WORK IN USER EXPERIENCE DESIGN - 3 cfu

- ◆ Laurea Magistrale in Artificial intelligence – individual project
- ◆ You can choose this course **only** if you also chose 91264, not as an alternative





ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

# User Experience Design

**What is it**

**How was it born**

**How does it work**

# A call for usable software

Despite generations of marketing and sales pitches about ease of use of software tools and of "user friendliness", people still have problems in using simple software tools.

Yet, designers and programmers are users themselves. Why can't they see what works and what does not?

Unfortunately designing and programming reasonable and intuitive interfaces is hard and error-prone.

It is furthermore an activity receiving minor attention and lesser budget than support for functional requirements.



# Justifications for usability and UX (1)

## Authority

- ◆ European directive 90/270/EEC requires software companies to adopt concrete precautions in designing, choosing, commission, and implement software tools:
- ◆ According to such directive:
  - a) software must be suitable for the task;
  - b) software must be easy to use and, where appropriate, adaptable to the operator's level of knowledge or experience;
  - c) systems must provide feedback to workers on their performance;
  - d) systems must display information in a format and at a pace which are adapted to operators;
  - e) the principles of software ergonomics must be applied, in particular to human data processing.



# Justifications for usability and UX (2)

## Business

- ◆ Human costs are much higher than software and hardware costs
- ◆ Good software lets us obtain much more value from humans, who are the most expensive assets of any business.
- ◆ Human errors are costly in terms of wasted time, wasted money, wasted customer satisfaction, wasted morale, wasted human lives.

## Market

- ◆ People have started expecting easy to use software tools and are less and less tolerant towards unexpected shortcomings in the design and implementation of software tools.



# Justifications for usability and UX (3)

## Individuals

- ◆ Computers are no more strange machines to be respected and adapted to, but as a household appliance, that needs to adapt to us.
- ◆ We expect the same level of reliability, usefulness and usability of a washing machine.

## Ethics and society

- ◆ Computer are more and more a critical part of our society, and are used in socially relevant ways, including children education, personal data management, critical operations.

## Design challenges

- ◆ Humans are complex, systems are complex, interfacing the two is an interesting challenge





ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

# Some vocabulary



# Terms (1)

## Human performance

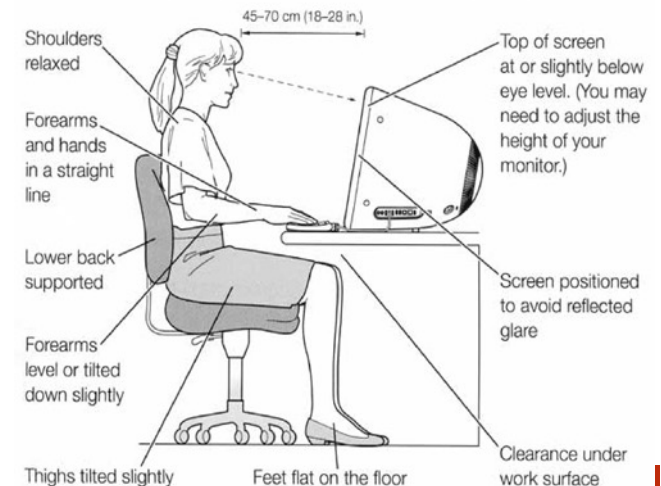
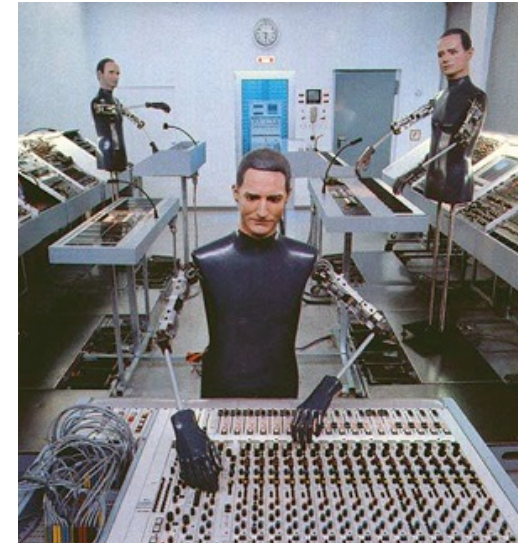
- ◆ Start of XX century. Direct application of *taylorism*: the man – the worker - is like a machine and it is necessary to maximize his performances by understanding his characteristics.

## Ergonomics

- ◆ II World War, esp. in UK. Trying to create machines (esp. Weapons) that use the physical characteristics of men at their best.
- ◆ Birth of Murphy's law.

## Human factors

- ◆ Term used in USA in the sixties (*ergonomics* is European) for the same topic, but with an added cognitive slant to it.



# Terms (2)

## Man-machine interaction

- ◆ In the seventies, ergonomics splits in two: the applications to the design of everyday objects (chairs, etc.) keep on being called this, and studies about the usability of computational devices (machines, computers, etc.) start being called Man-machine Interaction.
- ◆ I vecchi Informatici italiani chiamano questa disciplina ancora *Interazione Uomo-Macchina*

## Human-computer interaction

- ◆ In the eighties, political correctness and growing awareness that the role of computers, among all machines, was overwhelming, made the term turn to Human-Computer Interaction.
- ◆ Il termine *interazione persona-elaboratore* è stato proposto anche in Italia.



# Terms (3)

## User interface

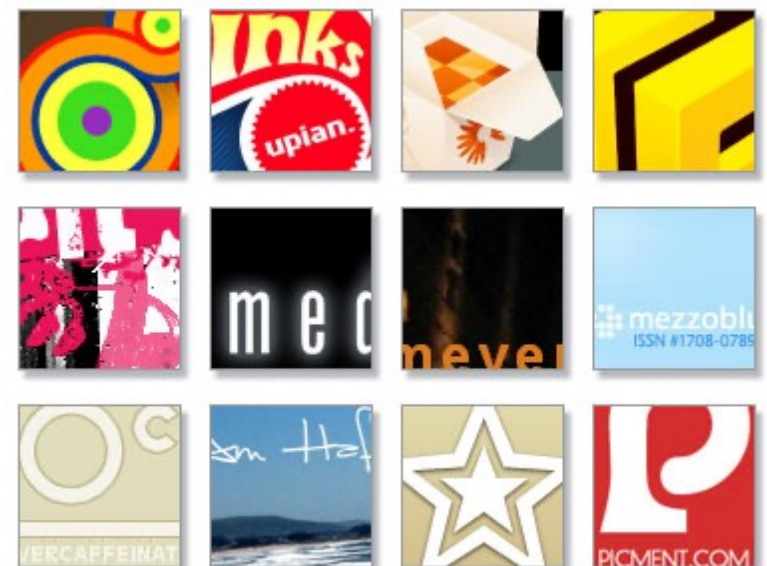
- ◆ A more specific point of view, relevant to the moment in which users are in contact with the applications.
- ◆ See also “user friendliness”

## Web design

- ◆ The success of the World Wide Web, and the number of ugly sites that were created in the first years caused the creation of a discipline specifically dedicated to producing "good" web sites.
- ◆ Mostly interested in "good" graphics and content, little on usability.

## Web usability

- ◆ Some authors (Siegel, Veen, but mostly Jakob Nielsen) applied usability theories to web design and created a specific subfield for web sites.



# Terms (4)

## Interaction Design (IXD)

- ◆ Multidisciplinary interest in the design of the interaction of people with computers.

## User Experience Design (UXD)

- ◆ Emphasis is on user's satisfaction, more than simple usability, with large influxes from marketing, too.

## Design Thinking (DT)

- ◆ Generic term (not only for software) to analyze and structure the design process and the mindset of a successful designer.
- ◆ Originally not particularly user-centric, nowadays the terms are almost synonymous.



# Terms (5)

## System functionalities

- ◆ The tasks the system is able to carry out

## User interface

- ◆ The set of commands, displays, widgets and outputs the system use to interact with the direct user

## User experience

- ◆ The overall (positive or negative) impression and memories held by the direct user while using the system and after having used it.

## Services

- ◆ The resources and tools made available to users of a system in addition to the system itself and that provide further positive or negative impressions onto them.





ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

# From the functions to the services

# Functionality design



# User Interface design





# User experience design





# Service Design

The overall design of the full experience connected to a service:  
people, processes, products, systems, spaces, transactions,  
devices

Tries to drive curiosity, feed positive expectations, make a  
service pleasurable, facilitate customers to come back again

The keyword is orchestration of many different factors most of  
which are NOT computational

Focus is on needs and expectation of the users

Based on integrated, global, olistic, long term design





ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

# Some definitions

# User Experience (UX) - 1

**ISO 9241-210:** "a person's perceptions and responses that result from the use or anticipated use of a product, system or service"

**Jacob Nielsen:** ""User experience" encompasses all aspects of the end-user's interaction with the company, its services, and its products"

**Interaction-design.org:** "User experience design focuses on the overall experience between a user and a product. It is not just concerned with the interactive elements but also the way that certain elements look, feel or contrive to deliver certain outputs"

**Hassenzahl & Tractinsky:** "UX is a consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc.)."



# User Experience (UX) - 2

Many different definitions (more than 25) with few common elements:

Emphasis is now on the product, rather than the service, and on the subjective impression of the user.

Usability is one of the parameters, not the most important one. The product is compared against users' expectations and interaction context.

Important is also the users' attitude and the meaningfulness and voluntariness of the interaction.



# Usability

**Webster Dictionary:** Usability is the ease of use and learnability of a human-made object such as a tool or device.

**Usabilitynet.org:** Usability means making products and systems easier to use, and matching them more closely to user needs and requirements.

**ISO 9241-110:** "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".



# More about ISO 9241-110

## *6 key aspects*

Design is based on explicit analysis of users, tasks and context of use

Users are involved in all the phases of design and development (*participatory design*)

Process is guided and refined by user-centred evaluations

Process is iterative

Process deals with the whole experience

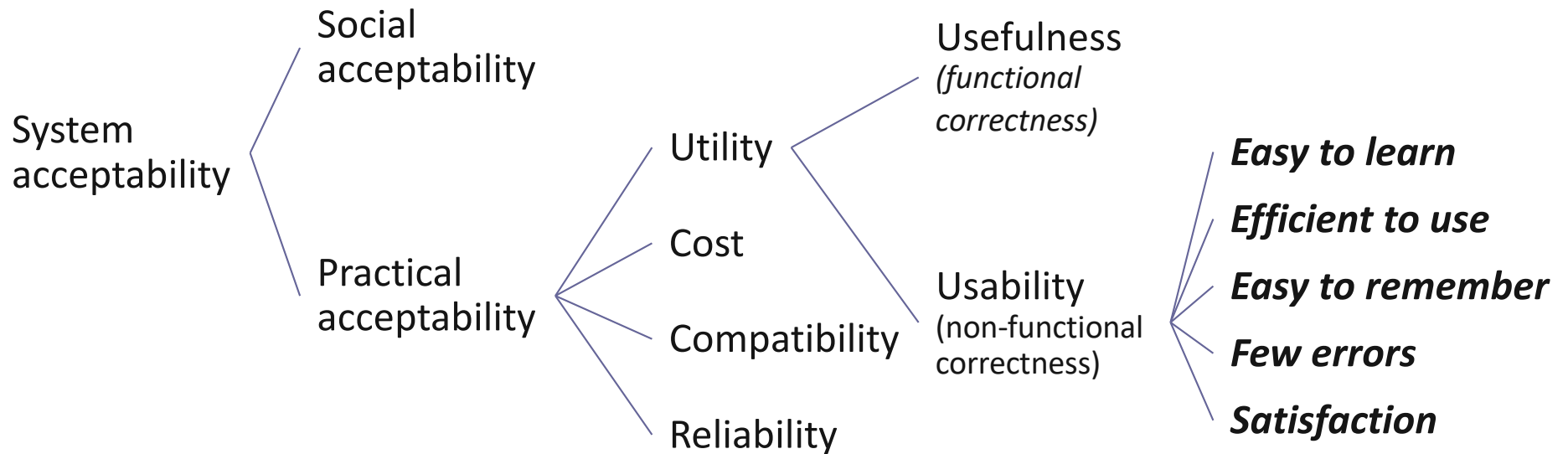
The design team includes multidisciplinary competencies and perspectives.





# Usability in Jacob Nielsen

Usability in the design of a system lies within the concept of utility and complementary to usefulness (Nielsen, 1993)



# Key words in usability

## **ISO 9241-110**

**Effectiveness:** *can users complete tasks, achieve goals with the product, i.e. do what they want to do?*

**Efficiency:** how much effort do users require to do this? (Often measured in time)

**Satisfaction:** what do users think about the products ease of use?

## **Jacob Nielsen**

**Learnability:** How easy is it for users to accomplish basic tasks the first time they encounter the design? (*beginners*)

**Efficiency:** Once users have learned the design, how quickly can they perform tasks? (*expert users*)

**Memorability:** When users return to the design after a period of not using it, how easily can they reestablish proficiency? (*Intermittent users*)

**Errors:** How many errors do users make, how severe are these errors, and how easily can they recover from the errors?

**Satisfaction:** How pleasant is it to use the design?



# Frequently used terms

## User

- ◆ An individual, a group of people acting together, a group of people acting together within an organization. ***Always a specific concept, never generic.***

## Device

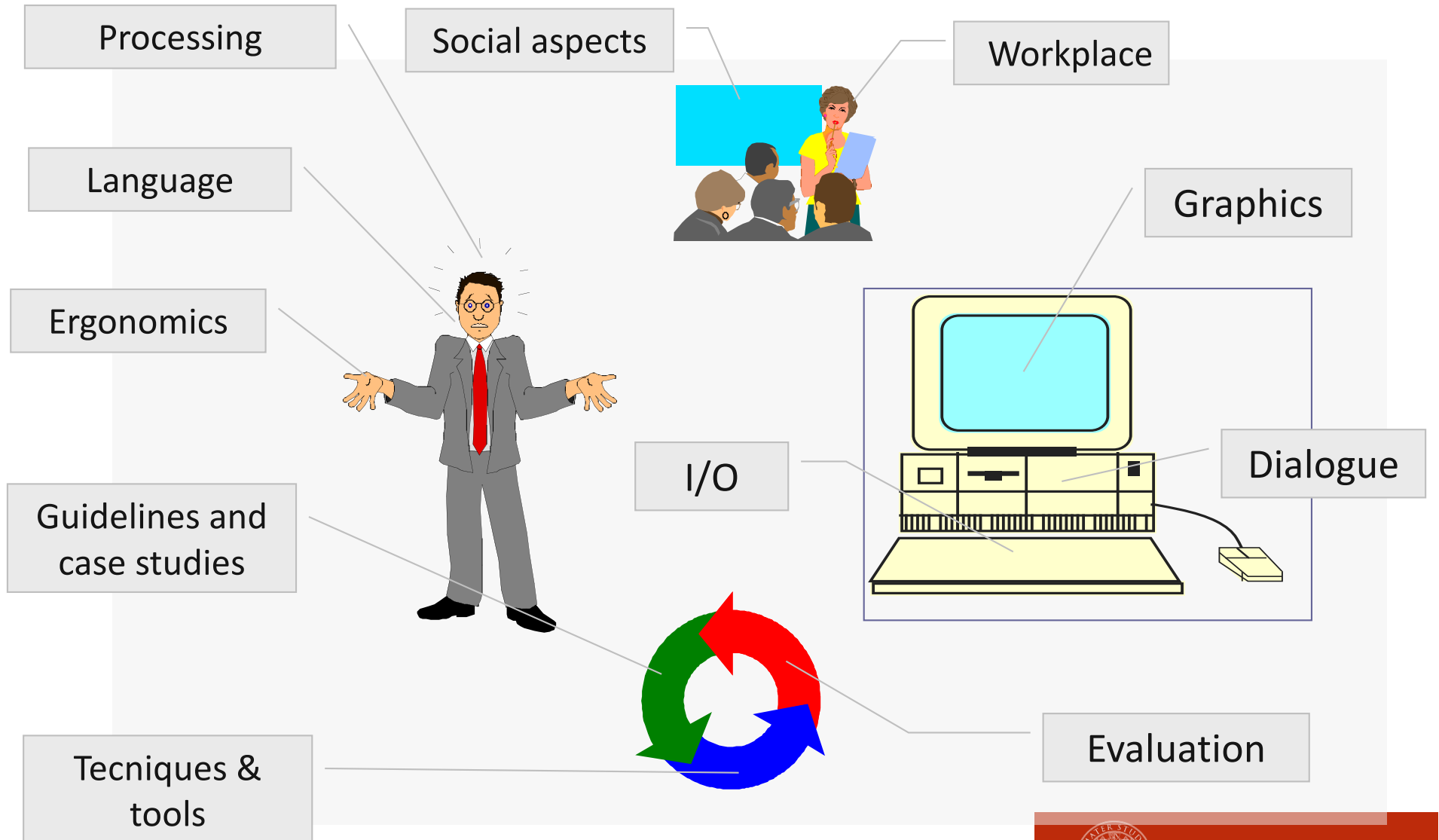
- ◆ Any computational device, from a smartwatch to a smartphone, to a laptop or large scale systems, embedded systems, systems including non-digital entities (e.g., human beings)

## Interaction

- ◆ Any communication between user and computer, direct or indirect. A direct, repeated interaction is called dialogue, with feedback and dialogue control.
- ◆ Establishing the goal of the interaction is fundamental to determine the style and tools to use.



# A map of the topics (1)



# A map of the topics (2)

## Human beings

- ◆ Information processing
- ◆ Language, communication
- ◆ Ergonomics, physical characteristics of human beings

## The computers

- ◆ I/O devices
- ◆ Dialogue techniques
- ◆ Dialogue types
- ◆ Computer graphics

## Design

- ◆ Design modes
- ◆ Design and programming techniques & tools
- ◆ Guidelines & case studies
- ◆ Evaluation techniques

## Social setting

- ◆ Social organization
- ◆ Computer & workplace



# Similar but different meanings

## Usefulness (**utilità**)

- ◆ To serve a purpose

## Efficiency (**efficienza**)

- ◆ Ability to accomplish a task with a minimum expenditure of time and effort.

## Complexity (**complessità**)

- ◆ Of something not simple; made up of many parts and/or connected together in a non-trivial way. Complexity is intrinsic. It involves many parts even when ideal.

## Usability (**usabilità**)

- ◆ Easy to use and learn.

## Effectiveness (**efficacia**)

- ◆ Capable of producing the desired result in the desired quality

## Complication (**complicazione**)

- ◆ Introduction of a, usually unexpected, difficulty, problem, change. Difficult to use. Complication is extrinsic. Something is complicated by external influences, or because of external influences.



# Art, profession or science?

There is no unifying theory in UUX.  
Probably none can actually exist.

There is a parallel with architecture:

- ◆ The science provides the numerical techniques to prevent a building to collapse
- ◆ The profession provides the structure, the building techniques, the day-to-day methods for delivering a building in the right time and under the right costs.
- ◆ Art is grace, inspiration, genius.



# Methods, theories or testing? (1)

User Experience has no codified methods. There are dozens of theories and models and approaches with many overlapping aspects, some alternatives and some contrasting.

Ten year-old theories are now completely abandoned, theories going strong now may be discredited in five years.

Exposure to these themes guarantees that some golden rules exist in our collective minds, but some of them are well past their due date.

How can we understand if a rule is based on solid foundations or comes from a temporarily fashionable approach?





# Methods, theories or testing? (2)

Scientific progress is based on testing: scientists generate hypothesis and proceed to test them to evaluate their correctness.

A **theory** is the conceptual schema within which a specific hypothesis is generated and that can help evaluate which ones have a chance of being correct before actually testing them.

A **test**, on its own, does NOT give guarantees of providing useful and reasonable responses.

A **method** is instead fundamental in invention: it provides concepts, schemes and tricks that are useful in getting useful results in reasonable times.

**Guidelines** are the formalization of the steps of a method. They detail in practice those concepts and schemas and tricks that are justified by a theory.



# Methods, theories or testing? (3)

## Theories

- ◆ Permanent rules, not depending on trends, fashions, technological evolutions, and that probably will still be valid any time in the future
- ◆ For instance: "Minimize the cognitive level of the interface, maximize the cognitive potential left for the user"

## Paradigms

- ◆ Global framework for the change
- ◆ Changes not because of trends
- ◆ For instance: metaphores in the '00.

## Rules

- ◆ Single, specific norms, often valid only within a paradigm. Fairly dependent on the paradigm
- ◆ For instance: use a sans-serif font on the home page.

## *Paradigm*

"Universally recognized achievements that provide model problems and solutions for a community"

-- Thomas Kuhn, *The Structure of Scientific Revolutions*, 1962

"A distinct set of concepts or thought patterns, including theories, research methods, postulates, and standards for what constitutes legitimate contributions to a field"

-- Wikipedia



# 4 golden rules

## Think of users

- ◆ 90% of the task of a usability expert is to remember the designer that he/she will NOT be the one to use the system.

## Field test the system

- ◆ A system that is easy to use and pleasant in a laboratory could be a nightmare in real life settings: car stereos and remote controls must be used in the dark, alarm clock are used by sleeping people, etc.

## Involve users

- ◆ Particularly in specialized settings, users have important and unformalized competencies.
- ◆ A mockup interface can solve problems that two hundred theories cannot.

## Iterate (& iterate & iterate & iterate & iterate & iterate & iterate & iterate...)

- ◆ No usability design comes right at the first try. Many small prototypes, cheap and expendable, are better than one well funded effort.
- ◆ There are many techniques to create fake interfaces for little money.

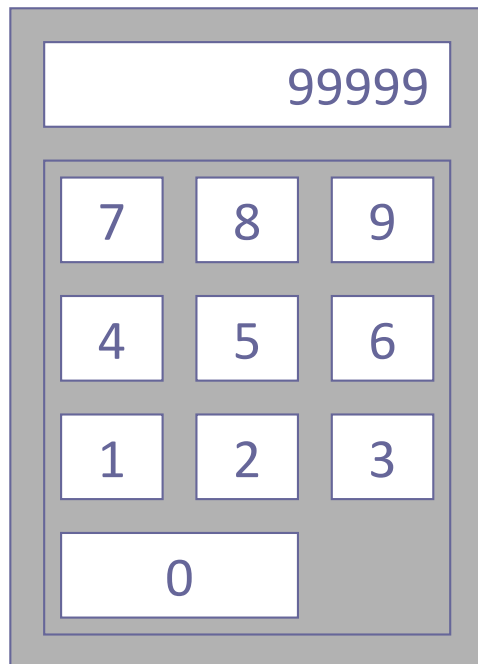


# The automatic syringe

## *(without participatory design)*

In the early nineties a firm was tasked with the design of an automatic syringe: the nurse would control the quantity of the liquid to inject (ml/h) and actiate the syringe.

Designers see the numerical keyboards in their computers and design the following interface:



After an internal review (without actual nurses) and a little common sense the designers add a few missing functionality, obtaining the following:



# The automatic syringe

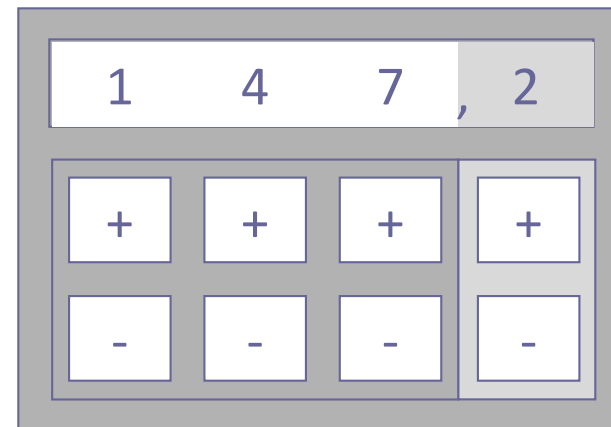
*(with participatory design)*

Next they asked some nurses for their opinion, who were not amused:

Designers had not thought about a real life application of their interfaces. For instance, what is the effect of pressing too many buttons on this interface when you have to specify, say, 137,2? Suppose a nurse is tired and presses the second button in a wrong way (too long, twice, ecc.).



This is what was proposed by real nurses:



# Additional terms I will use frequently

- Domain-specific vs. domain-independent methods (tools, etc.)
- Dramaturgical or narrative approach (fiction or design fiction)
- Goals, needs, motivations



# First assignment: spectacularly bad design (1)

*Find and submit examples of clearly catastrophic bad design you see in the world around you*

1. Submissions can be both applications or real-life objects
2. They must be DESIGNED wrongly or ineffectually, not just wrong by chance or implementation.
3. Errors must be in the usability, not the engineering of the product. This excludes things too heavy, too light, too fragile, made with the wrong material, assembled badly, or used for something they were not designed for.
4. They must be created by **recognizable** and **professional** sources, companies.
5. They can be present or past, but if non-accessible, they must be documented.
6. No Apple pencil, no Apple mouse, they were already discussed at length in the past.

Submissions belong to two categories:

- *Static disasters*: the design is by itself wrong, unusable, and the simple vision of it is sufficient to establish what is wrong.
- *Dynamic disasters*: the perceivable design, by itself, is unnoticeable or even good, but its use in a specific task (for which it was designed) or in a specific situation (for which it was designed) breaks down spectacularly.



# First assignment: spectacularly bad design (2)

*Find and submit examples of clearly catastrophic bad design you see in the world around you*

## Submissions must include:

- A. A short title (can be humorous), and the category of the submission. No names.
- B. A photograph of the object, or a screen shot of the screen, etc., showing the problem. For dynamic disasters, you can use a sequence of photographs/screen shots.
- C. A dry, short and to the point text description of the nature and purpose of the object/application, its availability, and, if necessary, its location, its technical requirements, etc. No humorous text.
- D. For dynamic disasters: a dry, short and to the point description of the sequence of steps (before and during the documented disaster) that have to be carried out to reproduce the disaster. The sequence should be natural, intuitive and not stretched. No humorous text.



# First assignment: spectacularly bad design (3)

*Find and submit examples of clearly catastrophic bad design you see in the world around you*

- I. One submission per student. Individuals only, no groups.
- II. Deadline is September 26<sup>th</sup> 2023, 23:59. Submit it as a single PDF file on [virtuale.unibo.it](https://virtuale.unibo.it) (you will find an assignment due on today's class).
- III. Submissions MUST be anonymized (virtuale associates submissions to students, so no name inside the files).
- IV. I will remove submissions that do not follow requirements 1-5, A-D, and I-V, and I will subject to your evaluation the remaining ones.
- V. All surviving submissions will receive some credit, the best submission will receive a *large* credit.

# Conclusions

We introduced here:

- ◆ Practical details about the UUX course
- ◆ Context of UUX
- ◆ A history of UUX
- ◆ A meta-theory of UUX
- ◆ Some keywords of UUX
  
- ◆ An assignment for you



# References

- A. Dix et alii, HCI, Prentice Hall, 2004, chp. 1
- S. Greenberg, Map of Human Computer Interaction, <http://www.cpsc.ucalgary.ca/~saul/481/index.html>
- Keith Andrews, *Human-Computer Interaction Lecture Notes*, Graz University of Technology, <http://www.iicm.edu/hci/>
- R. Scalisi, *Users*, Guerini e associati, 2001.

