User Interface design

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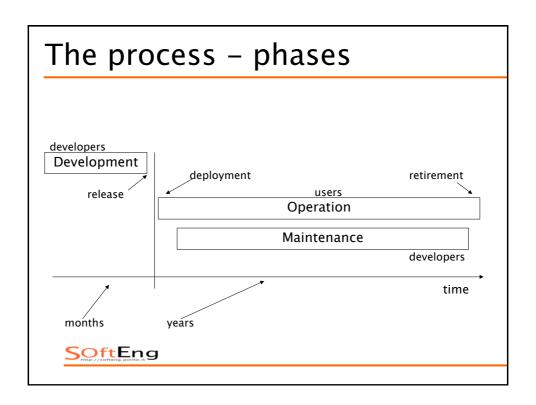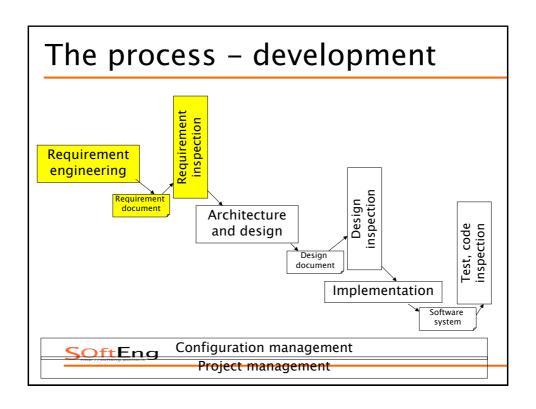http://softeng.polito.it

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- When human actors are involved, designing the User Interface (often Graphical User Interface) is a key design choice
- We assume that RE activity has been completed
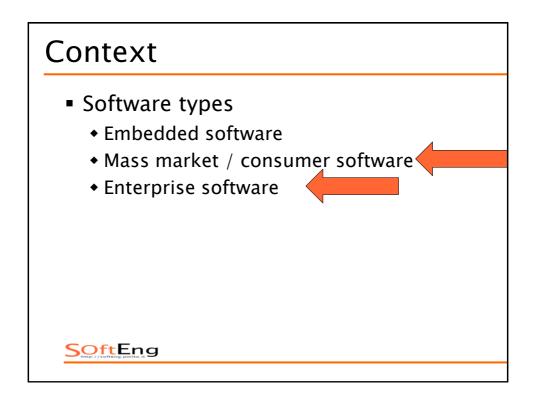 - (in practice RE and UI design may overlap)
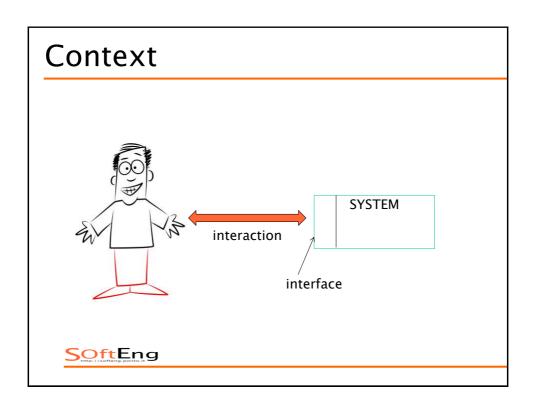
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- Starting points are
  - Context diagrams, actors
  - Functional requirements
  - Use cases

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The process – phases

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The process – development

Requirement engineering → Requirement document → Requirement inspection → Architecture and design → Design document → Design inspection → Implementation → Software system → Test, code inspection

Configuration management

Project management

Context

- Software types
  - Embedded software
  - Mass market / consumer software
  - Enterprise software

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Context

interaction

SYSTEM

interface

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Context

Complexity of usage

Complexity of functions

Complexity of structure

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Interaction

Input from user

interface

SYSTEM

Output from system

Interaction means

User		System
Sight		Screen, printer, glasses, .
Hearing		Noise, music, voice synthesis
Touch		Glove
Hands		Keyboard, mouse, touchscreen, touchpad, glove
Voice		Voice recognition
Eyes		Eye tracking
Position, gesture		Gesture recognition

Context

- 3 possible user interfaces

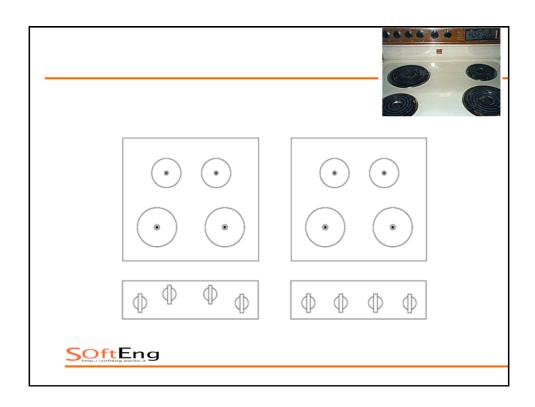| Web | Desktop | Mobile |

Principles and ideas

- Ergonomy
  - Safety, adaptability, comfort, <u>usability</u>,...
- Emotional design
  - Beyond ergonomy, the interaction (object) should cause positive emotions in the user
- User eXperience (UX)
  - Usability + feelings + emotions + values
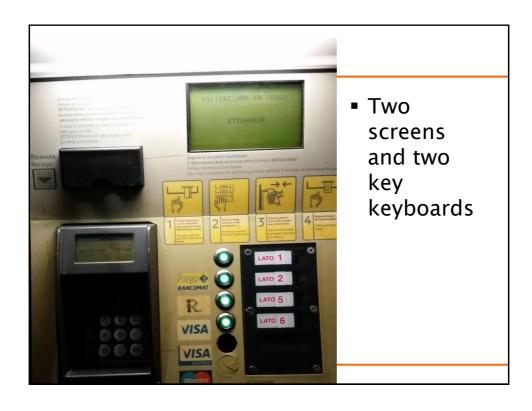
Principles and ideas

- Transparent technology
  - No emphasis on technology
- Feedback, user centered design
  - No decision based on personal opinions, but feedback from real users

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And, for turning the TV on?

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User experience

Design

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- Two screens and two key keyboards

- One screen
- Keyboard + touchscreen

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User centered design

- Context: mass market product

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UCD process - techniques

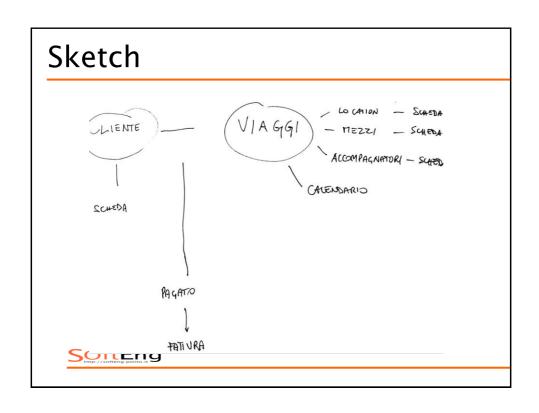| Activity#	Activity	Techniques
1	Identify the users	Context diagram, personas / actors
2	Define requirements	Use cases, scenarios, functional requirements
3	Define system and interactions	Prototypes
4	In lab tests	Ethnographics, Interviews
5	In field tests	A/B testing Measurements

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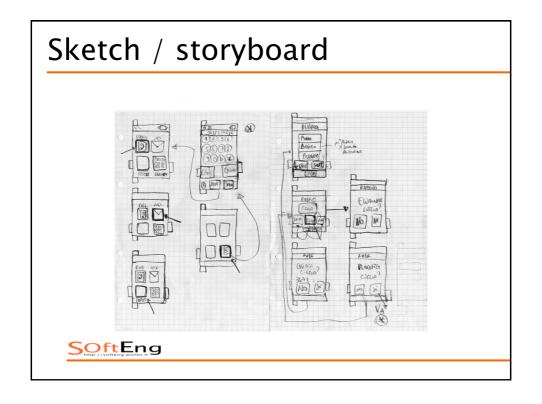http://softeng.polito.it

Prototypes

- Low fidelity
  - Paper / pencil, sketches, post its

- High fidelity
  - Computer executable mock ups
    - Aka Powerpoint
    - Aka Balsamiq
  - Actual GUIS
    - GUI Builders:
      - WindowBuilder (Eclipse, Java)
      - NetBeans Gui Builder (Net Beans)

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Sketch

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Sketch / storyboard

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Sketch

Feedback – low fi prototype

- Cognitive / ergonomy experts apply checklists / experience to identify possible issues

Feed back – hi fi prototype

- Selected users use the prototype in a lab
- Feedback via
  - Ethnographics
  - Interviews
  - Focus group

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Feedback, final system

- Define and collect measures about
  - Usage of system (time spent on different pages / part of pages, errors)
  - Effect of system, conversion rate (ex rate from browse to purchase)

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Feedback

- A/B test

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Designing the GUI

- Technical elements
- Usability guidelines

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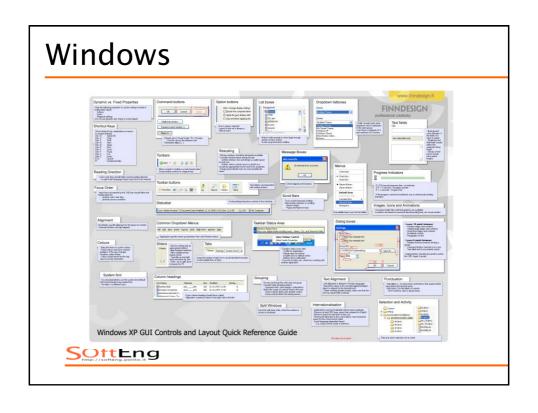
Technical elements

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Java

Android

IOS

Windows

Issue

- Portability of the GUI

  - Redevelop GUI for each environment
  - Cross platform compilers
    - Ex Xamarin, Cordova, Flutter, ..
  - Cross platform GUI
    - Browser

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Usability guidelines

- Have same style and format in all pages
- Do not ask same info twice
- Give feedback
  - When button clicked, when text inserted, when processing
- Make interactive objects obvious
  - Large buttons, blinking, ..

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Usability guidelines

- Consider default values in input fields
- Clear success / error messages
- Show clearly navigation hierarchy
  - Use breadcrump trails

Usability guidelines

- Simplicity /readability
  - Min number of pages
  - Min number of colors / fonts
  - Font min size
  - N elements in page
  - N pages

- Use conventions
  - Logo at top left
  - Click on logo brings to home
  - Links change color when mouse hovers

Summary

- In mass market products User interaction is key
- User centered design
  - Focuses on user feedback
  - Using several techniques in a defined process

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