

Designing the User eXperience



<https://bit.ly/PolitoSIA>



SoftEng
<http://softeng.polito.it>

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Acknowledgments

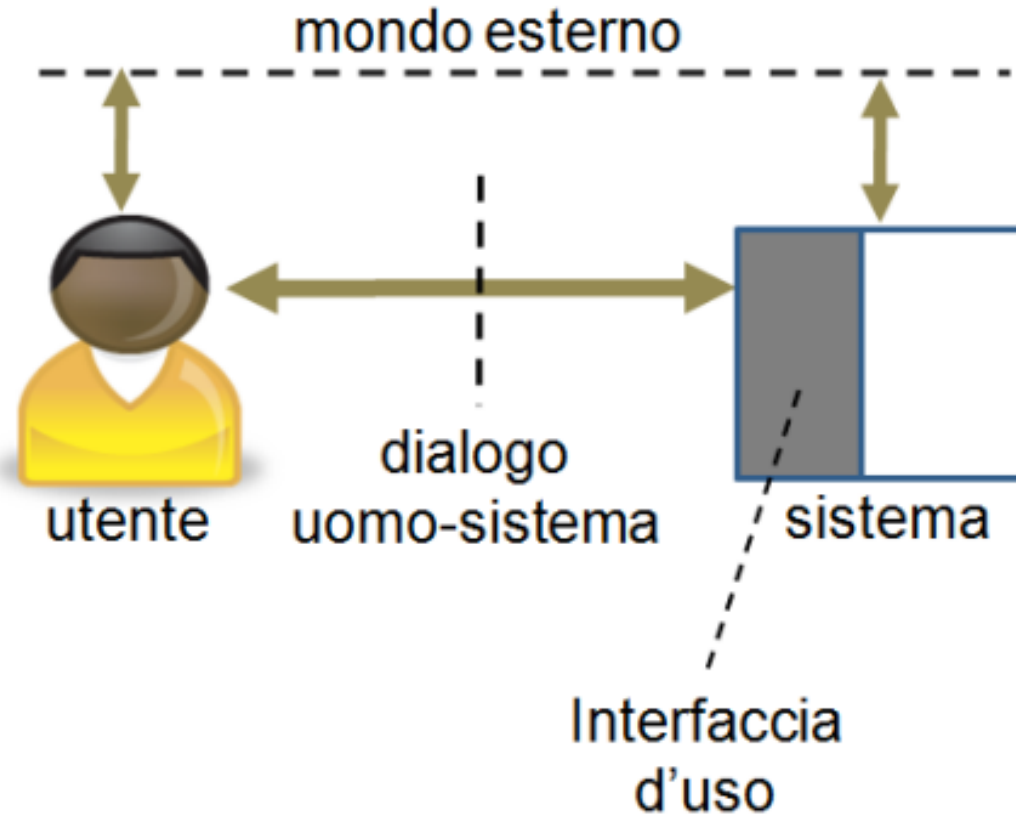
- This set of slides are derived from those authored by Prof. Fulvio Corno for previous issues of the course “Sistemi Informativi Aziendali” at Politecnico di Torino
- Many thanks to Fulvio for kindly sharing his materials

THE USER EXPERIENCE

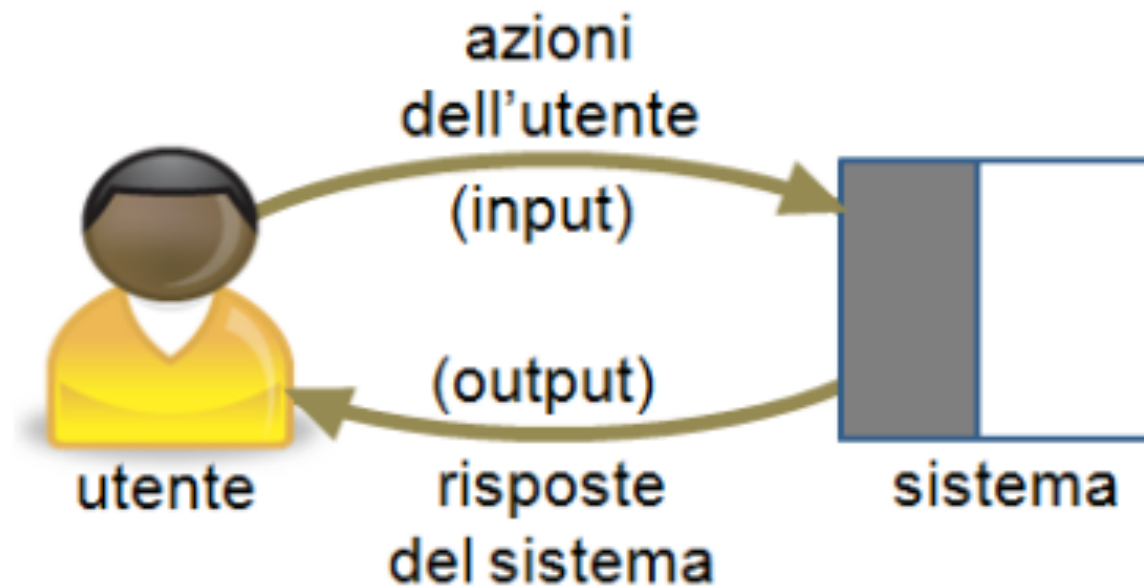
Goals

- Develop a user-centered design
- Define rules for the design development
- Integrate those rules into the Information System development cycle

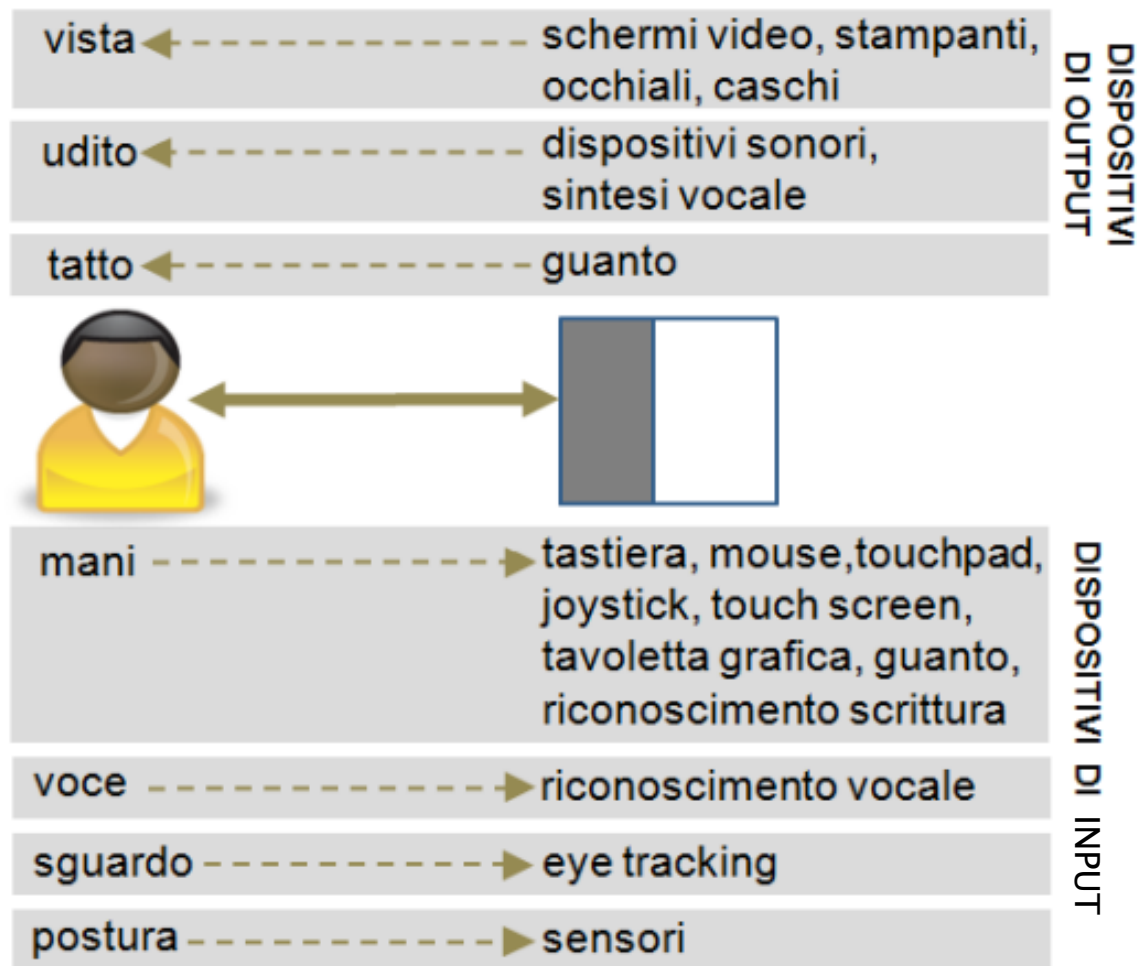
The UI Role



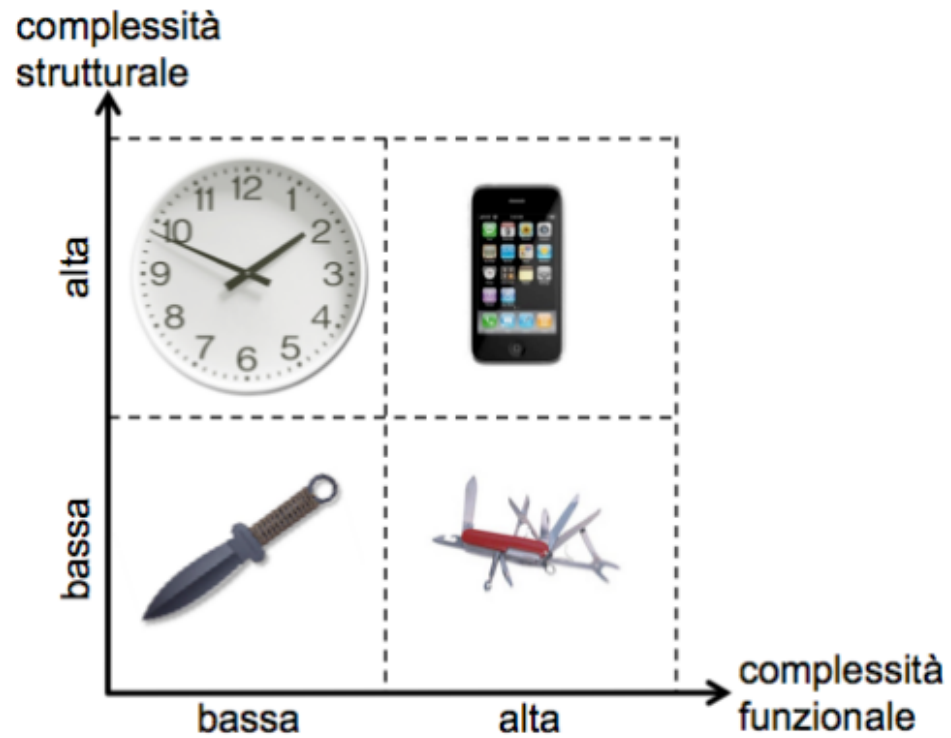
How



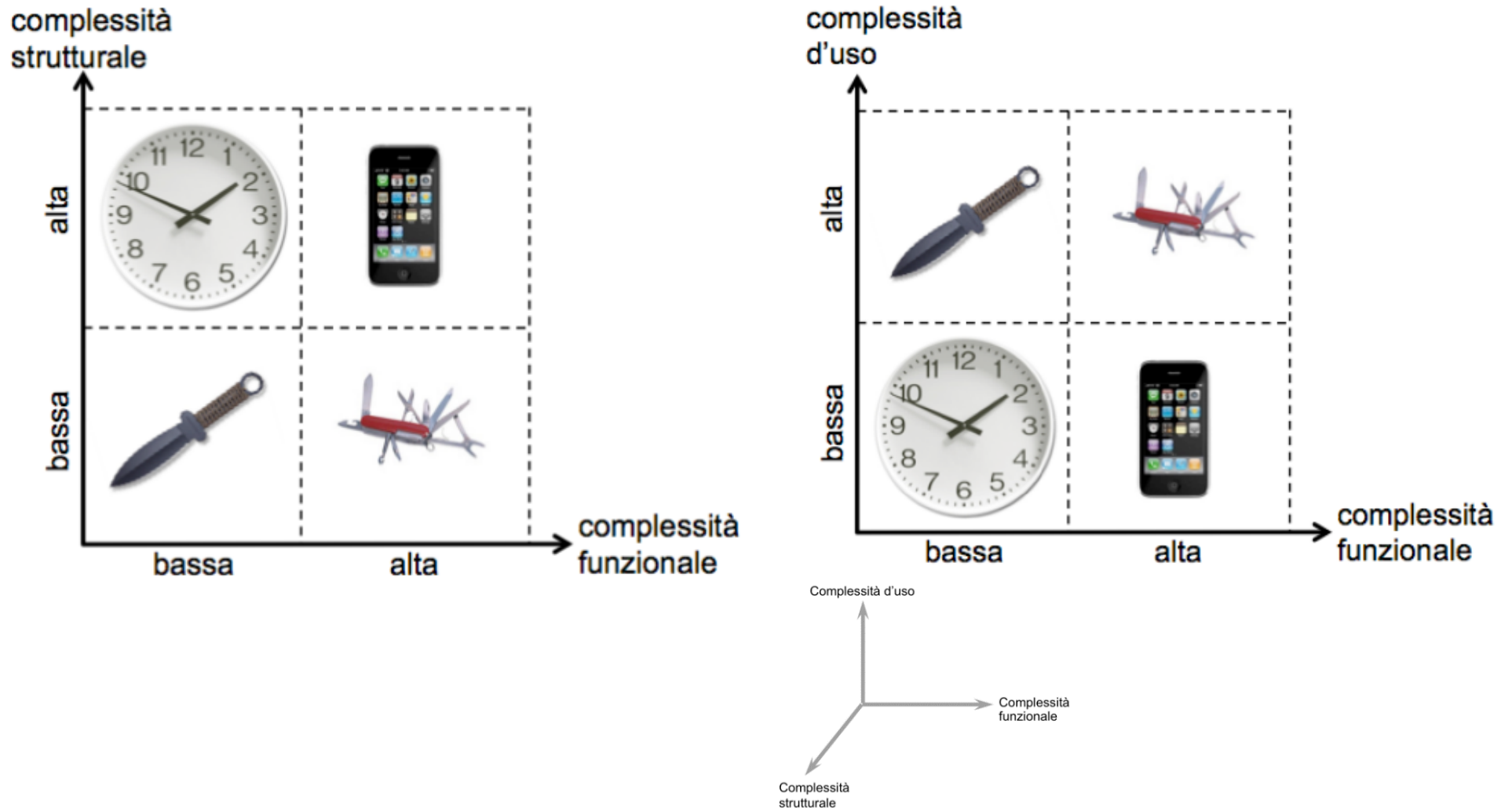
Senses and Tools



Levels of complexity



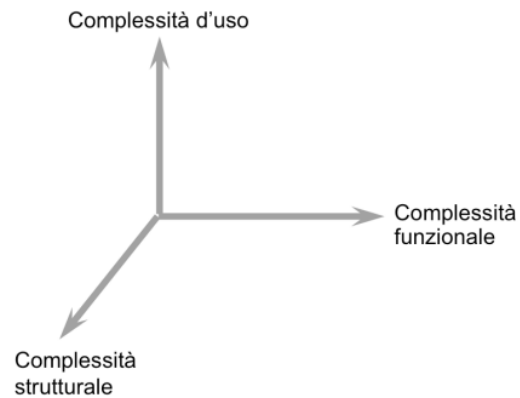
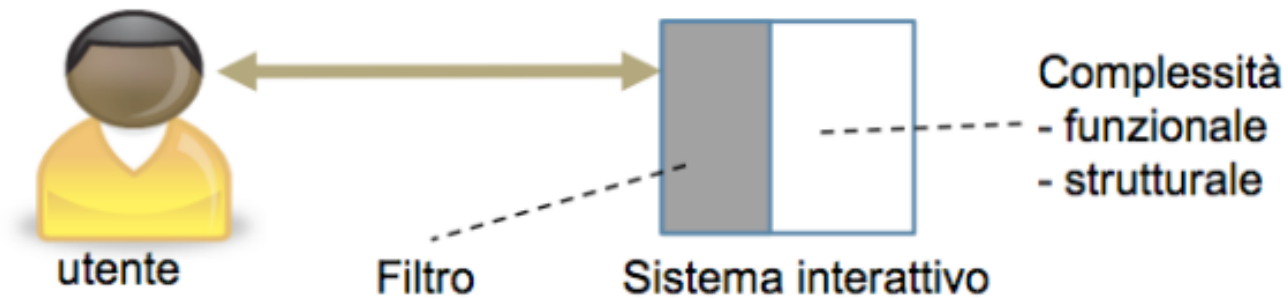
Levels of complexity



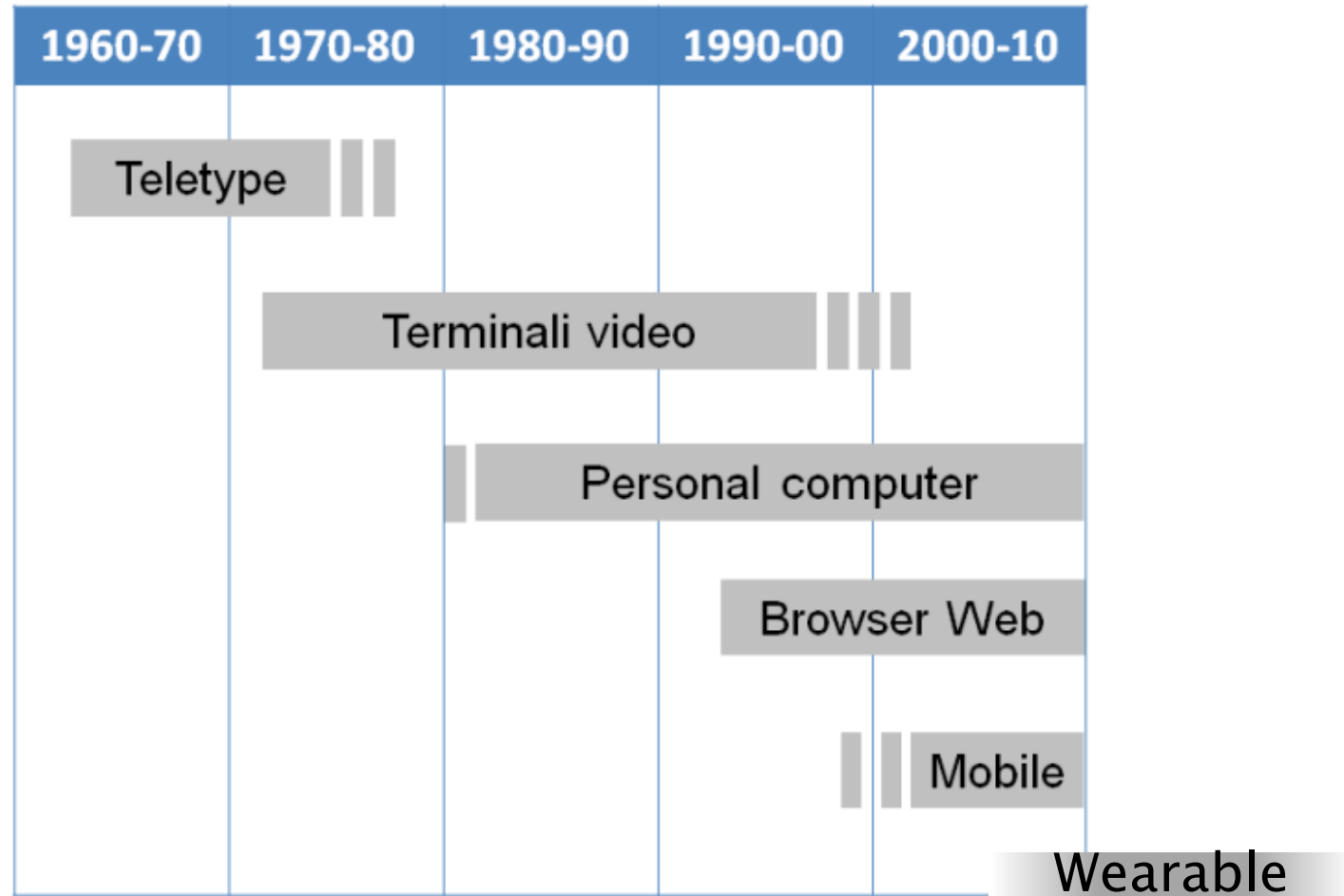
Complexity



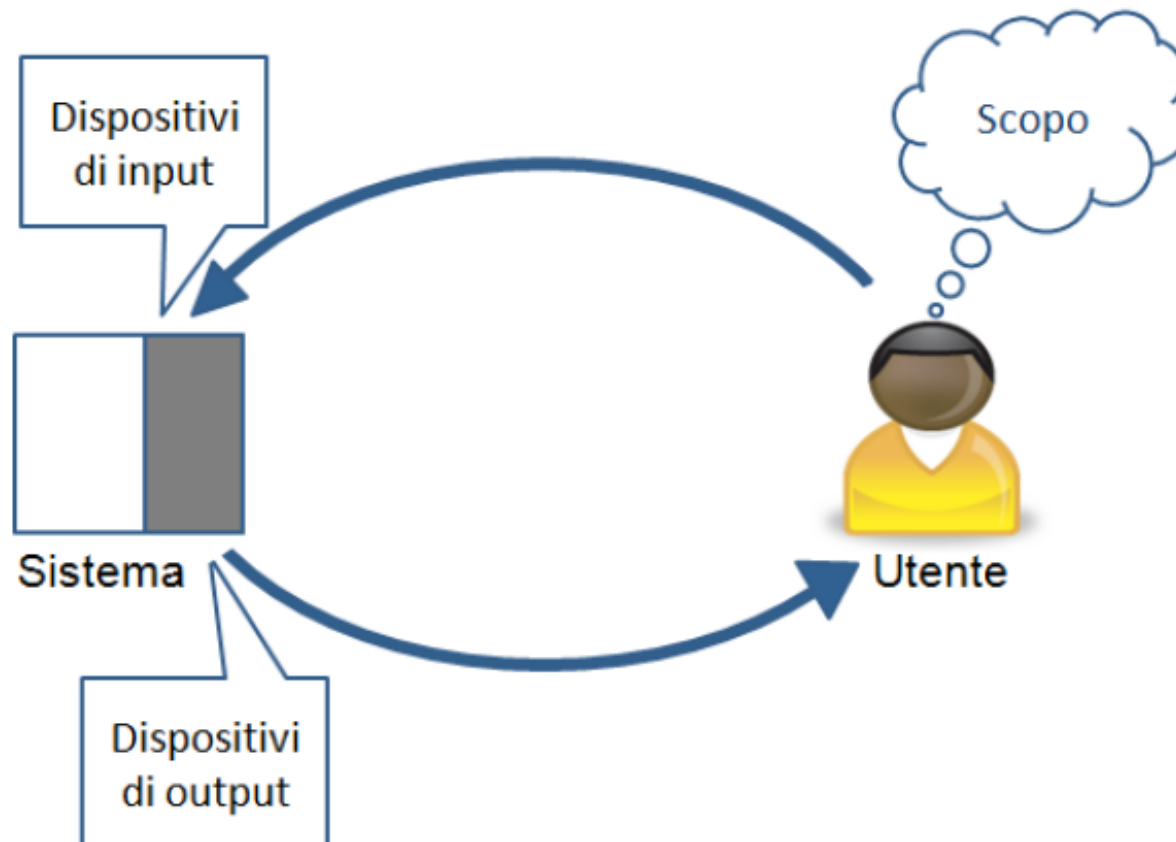
Usability Design



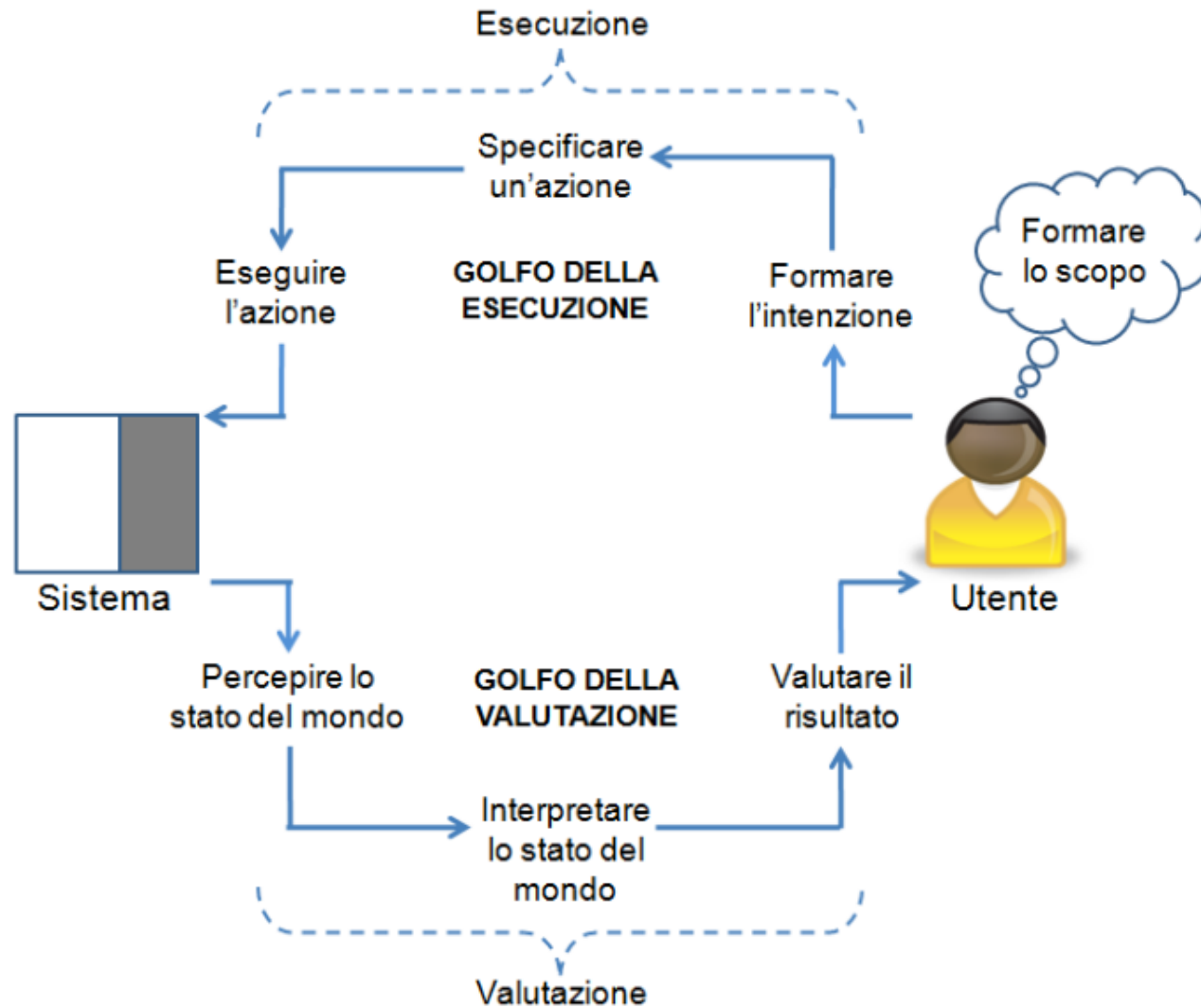
Interaction Technologies



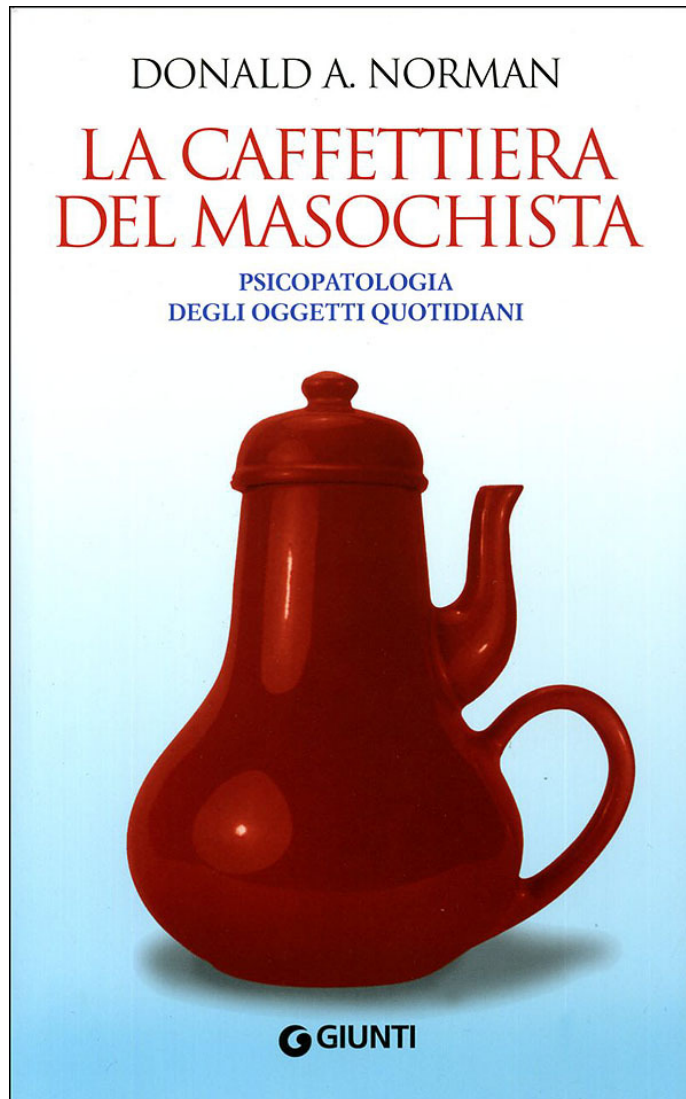
User goals



Norman's Model



Donald Norman



http://it.wikipedia.org/wiki/Donald_Norman

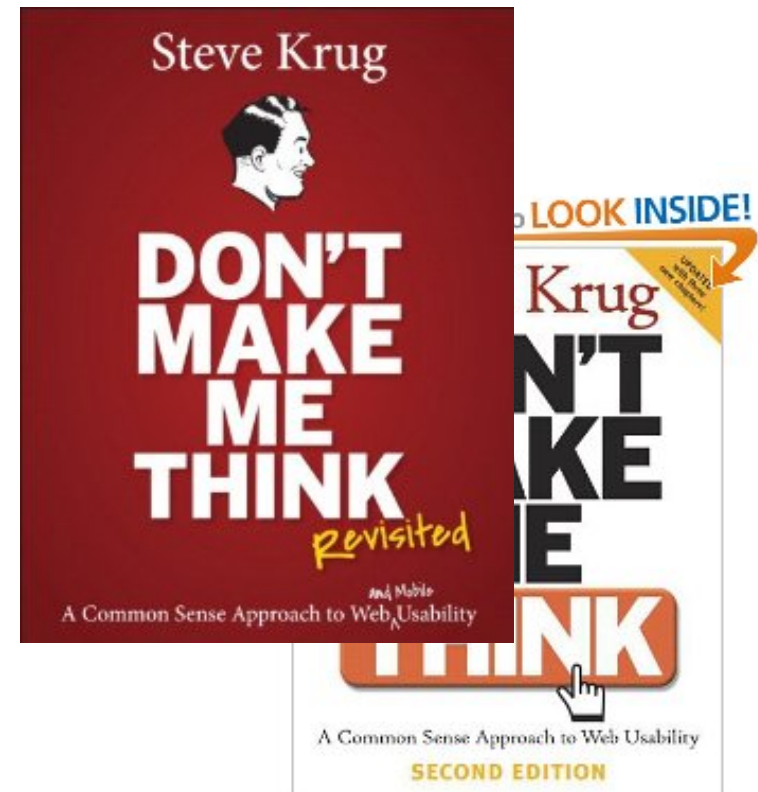
Nielsen Norman Group



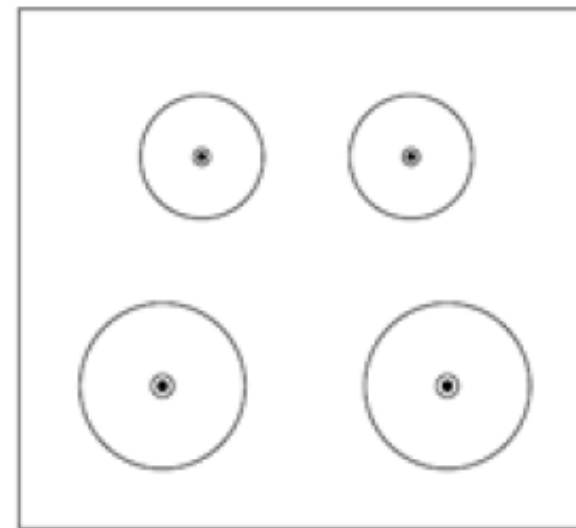
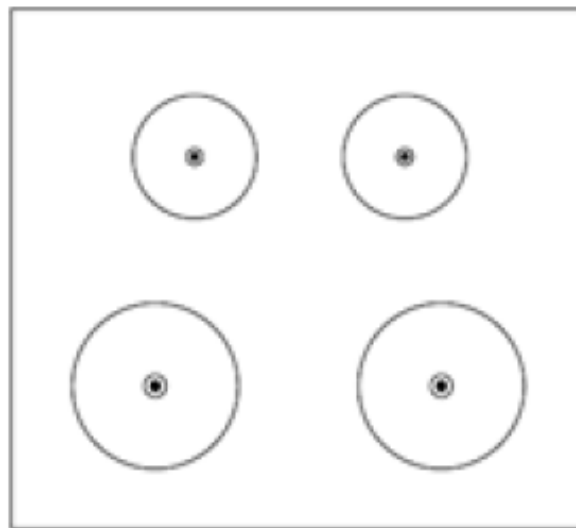
- Jakob Nielsen
- Co-founded with Don Norman
- <http://www.nngroup.com/articles/>

Don't make me think

- The “motto” of usability
- Steve Krug,
<http://www.sensible.com/>



Affordance: stoves

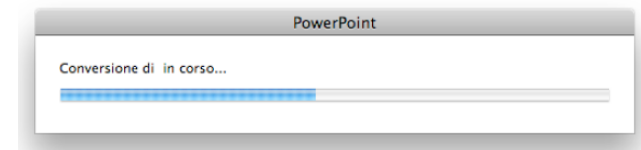
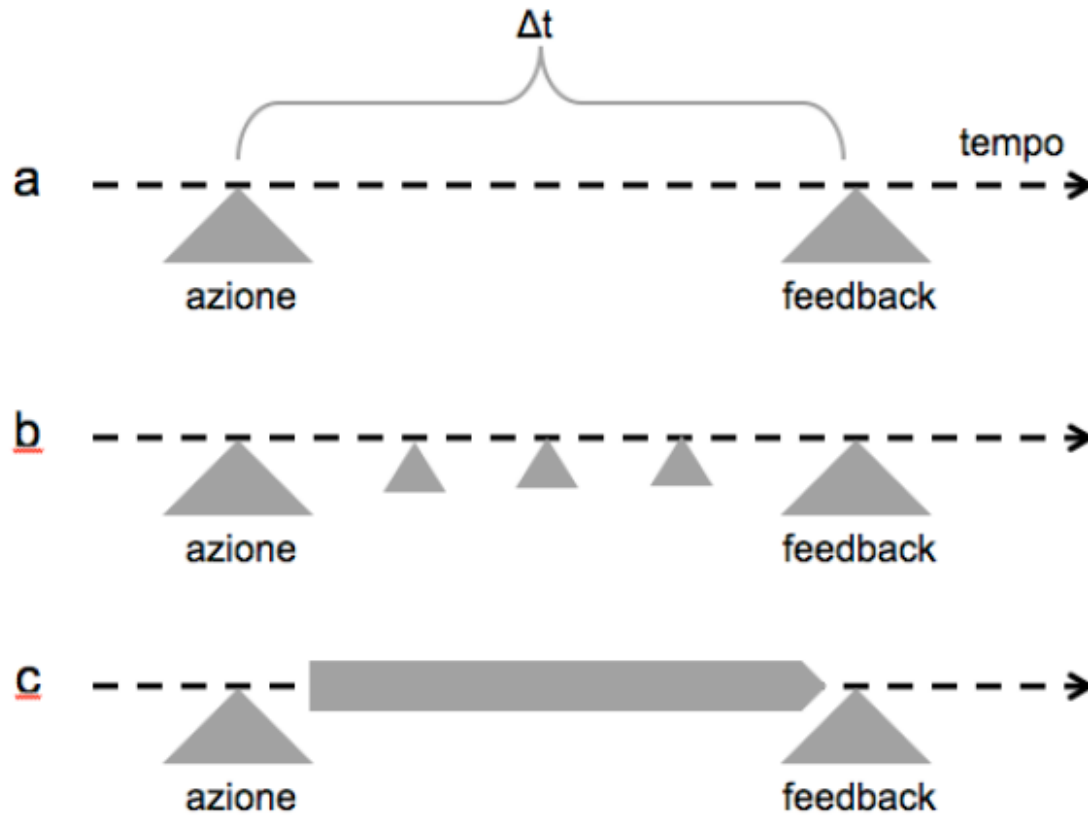


Affordance





Feedback



UX Honeycomb



Involved Disciplines

User Experience Design (UXd)

how the user thinks and feels

Information Architecture (IA)

how the system is organized

User Interface Design (UI)

how the content is organized

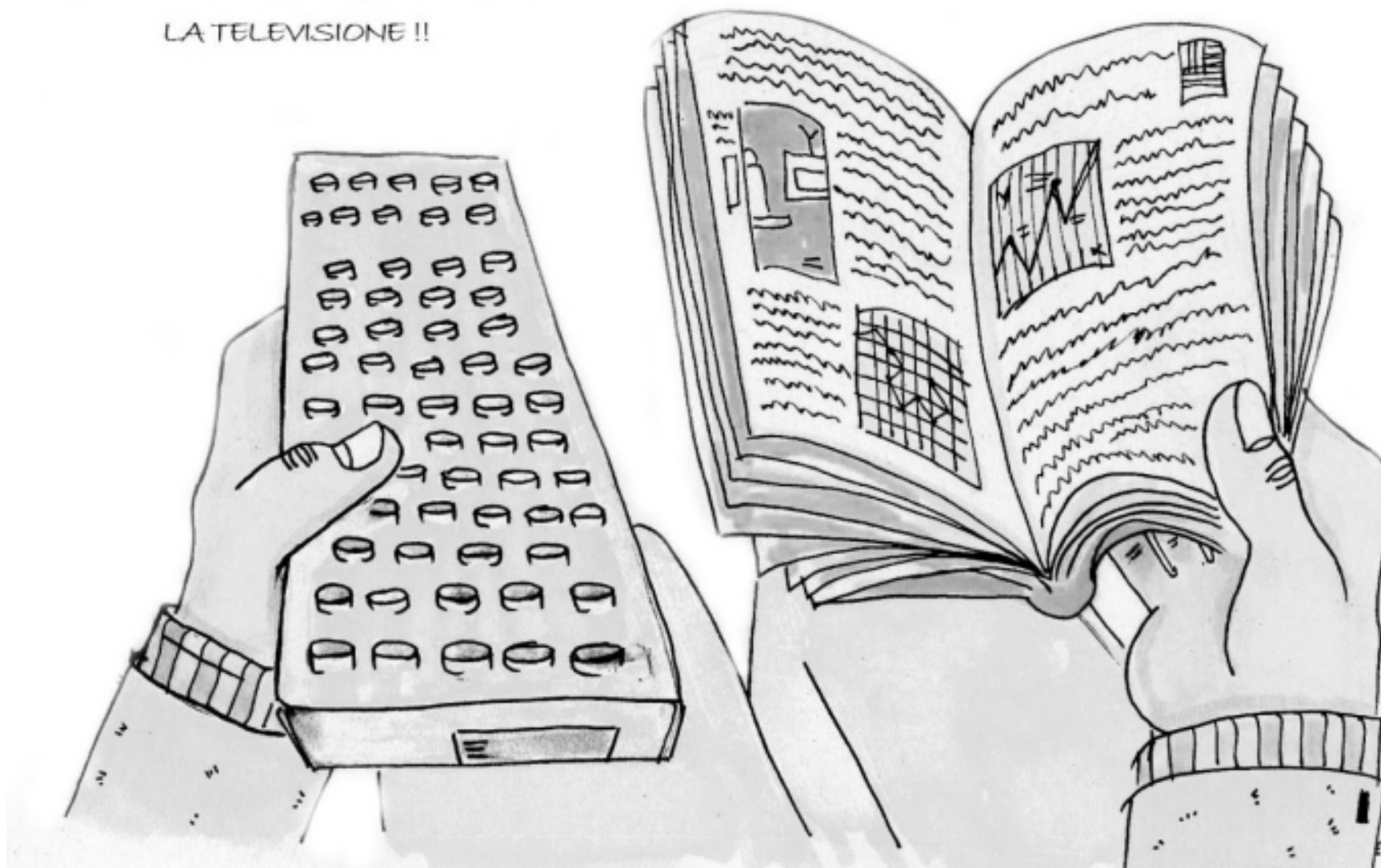
Interaction Design (IXd)

how the user and device act and react



<http://userflow.tumblr.com/post/3877937295/uxd-ia-ui-ixd>

MA IO VOLEVO SOLO ACCENDERE
LA TELEVISIONE !!



The Traditional Approach



The Traditional Approach

Es.: Lift

- Go to floor n
- Open / Close door
- Stop
- Trigger the Alarm



What **features** the system must provide to the user?
We design and implement them
(System-oriented design)

The New Approach

Es.: Lift

- Go to floor n
- Open / Close door
- Stop
- Trigger the Alarm

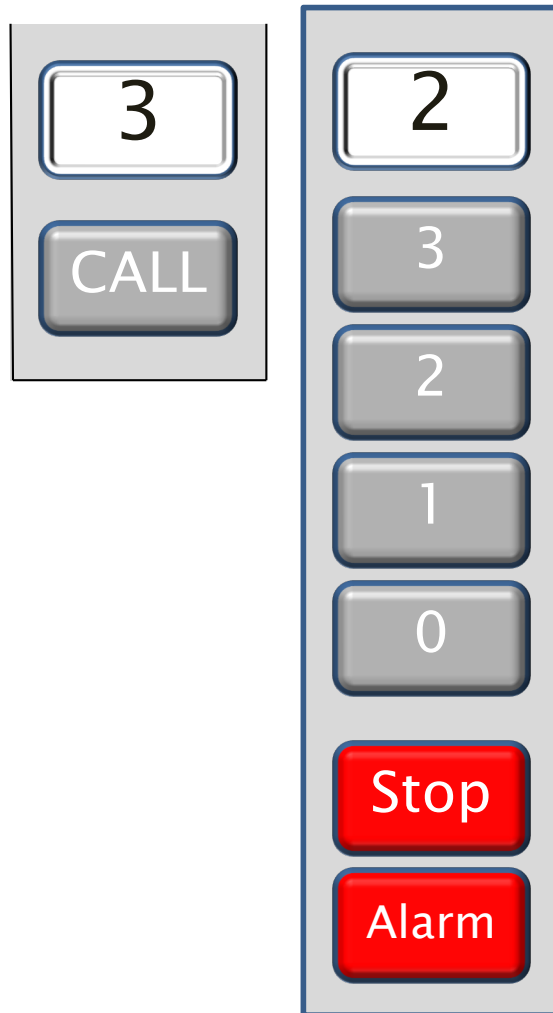


E.g.: Elevator

- Call the elevator
- Enter the elevator
- Select a floor
- Stop the elevator
- Calls for help
- Exit the elevator

what are the "**use cases**" of the user with respect to the system...
(User-oriented design)

The New Approach



... and **we design the interaction** accordingly
(Interaction Design)

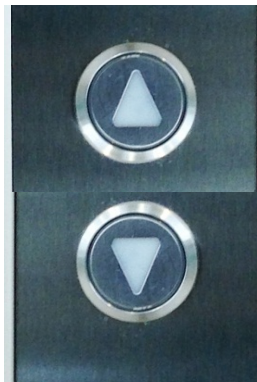
E.g.: Elevator

- Call the elevator
- Enter the elevator
- Select a floor
- Stop the elevator
- Calls for help
- Exit the elevator

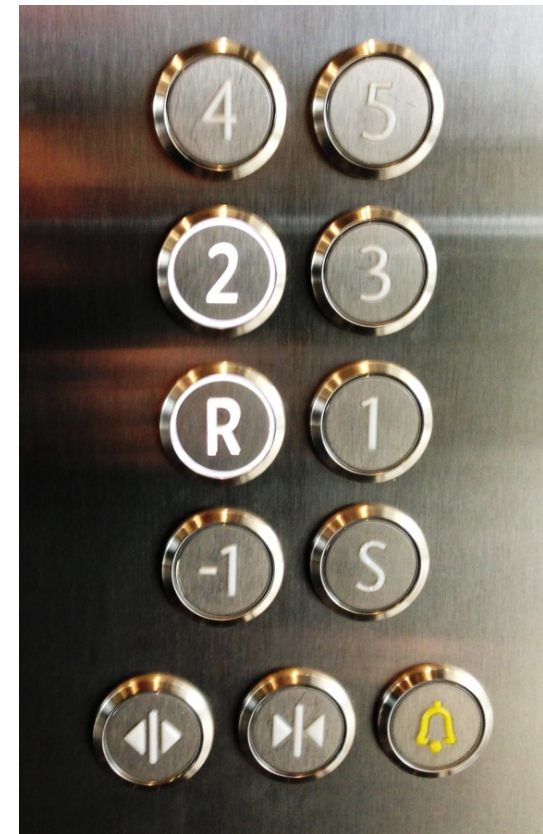
Example: Another Elevator

Use Cases

- Call the elevator
 - to go down
 - to go up
- Enter the elevator
- Select a floor
- Stop the elevator
- Ask for help
- Open the doors
- Close the doors
- Exit the elevator



Outside

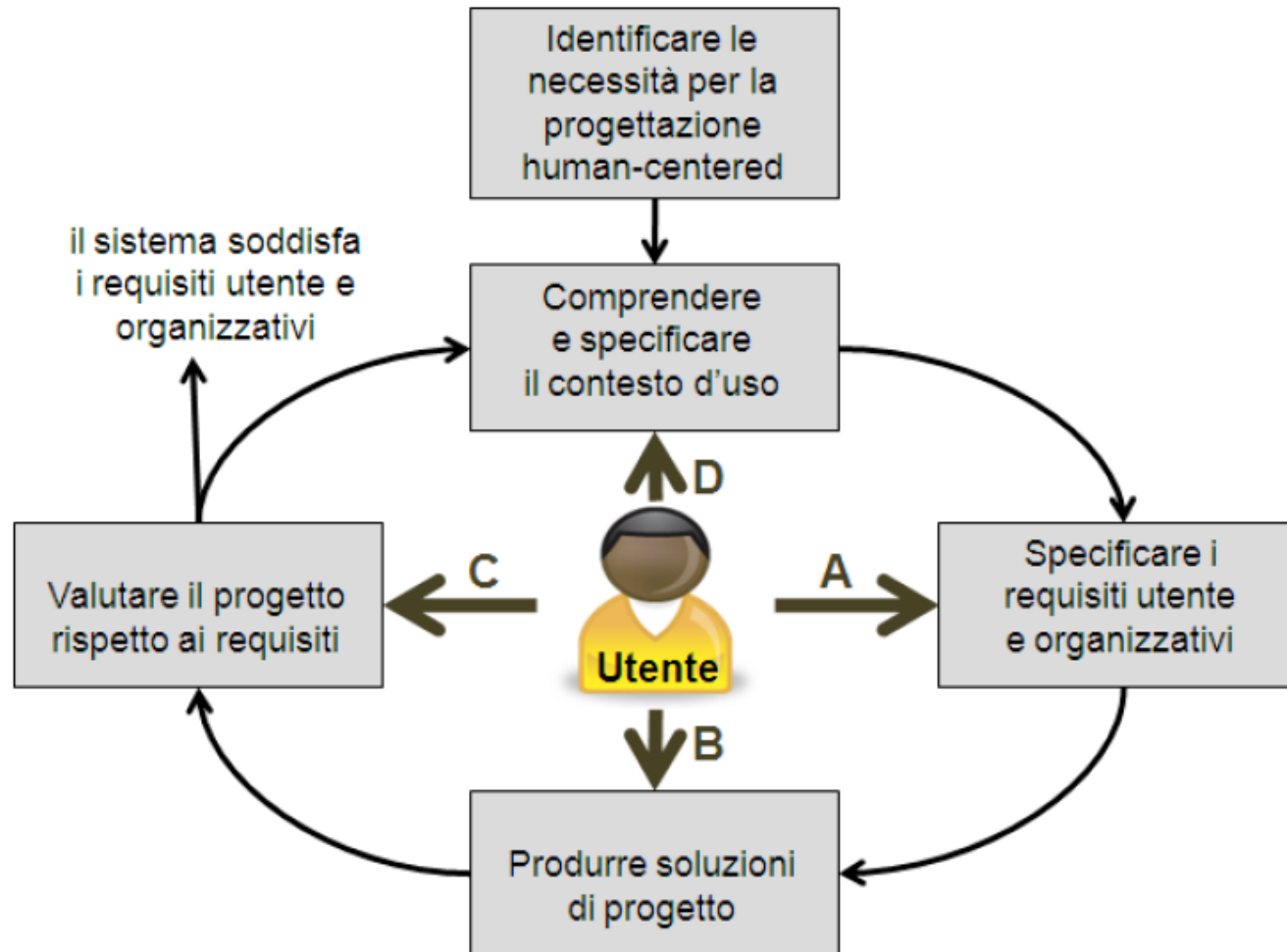


Inside

What...



Human Centered Design



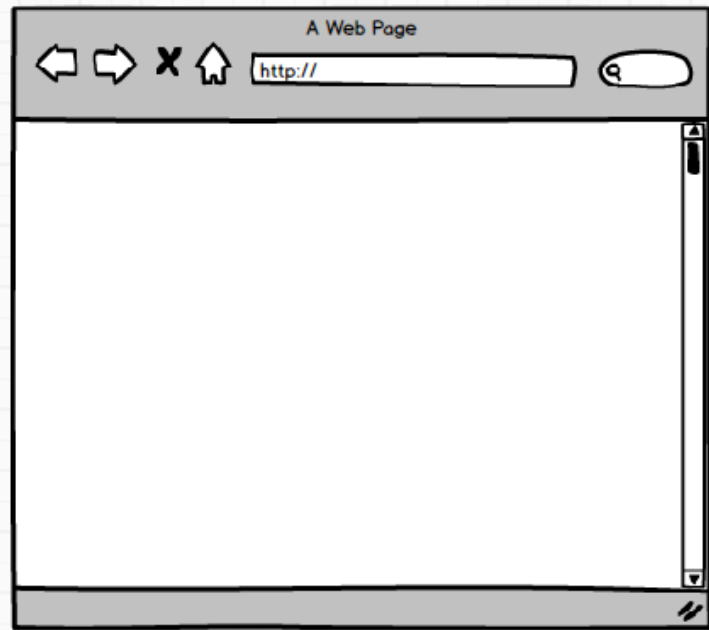
Define the requirements with the user

Tecnica	Serve per	Vantaggi	Svantaggi
Questionari	Rispondere a domande specifiche.	Si possono raggiungere molte persone con poco sforzo.	Vanno progettati con grande accuratezza, in caso contrario le risposte potrebbero risultare poco informative. Il tasso di risposta può essere basso.
Interviste individuali	Esplorare determinati aspetti del problema e determinati punti di vista.	L'intervistatore può controllare il corso dell'intervista, orientandola verso quei temi sui quali l'intervistato è in grado di fornire i contributi più utili.	Richiedono molto tempo. Gli intervistati potrebbero evitare di esprimersi con franchezza su alcuni aspetti delicati.
Focus group	Mettere a fuoco un determinato argomento, sul quale possono esserci diversi punti di vista.	Fanno emergere le aree di consenso e di conflitto. Possono far emergere soluzioni condivise dal gruppo.	La loro conduzione richiede esperienza. Possono emergere figure dominanti che monopolizzano la discussione.
Osservazioni sul campo	Comprendere il contesto delle attività dell'utente.	Permettono di ottenere una consapevolezza sull'uso reale del prodotto che le altre tecniche non danno.	Possono essere difficili da effettuare e richiedere molto tempo e risorse.
Suggerimenti spontanei degli utenti	Individuare specifiche necessità di miglioramento di un prodotto.	Hanno bassi costi di raccolta. Possono essere molto specifici.	Hanno normalmente carattere episodico.
Analisi della concorrenza e delle best practices	Individuare le soluzioni migliori adottate nel settore di interesse.	Evitare di "reinventare la ruota" e ottenere vantaggio competitivo.	L'analisi di solito è costosa (tempo e risorse)

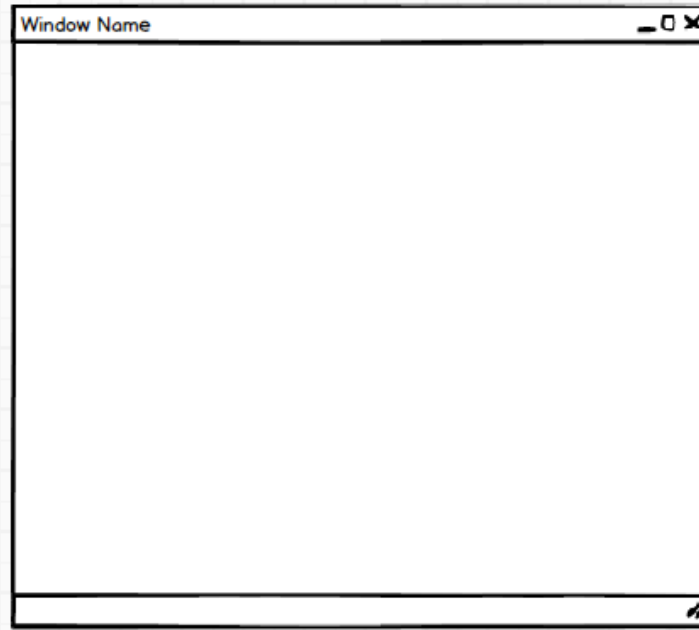
Design Step

- Sketch
- Wireframes
- Static components
- Functional mockups

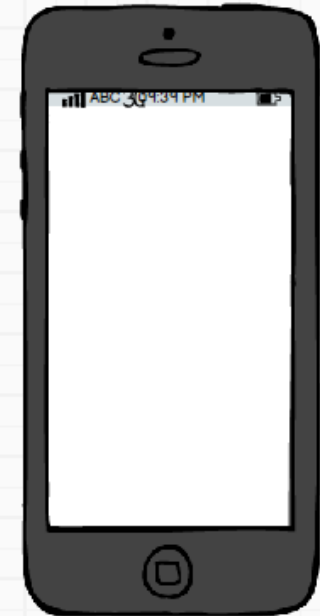
The Three Interfaces



Web



Desktop



Mobile

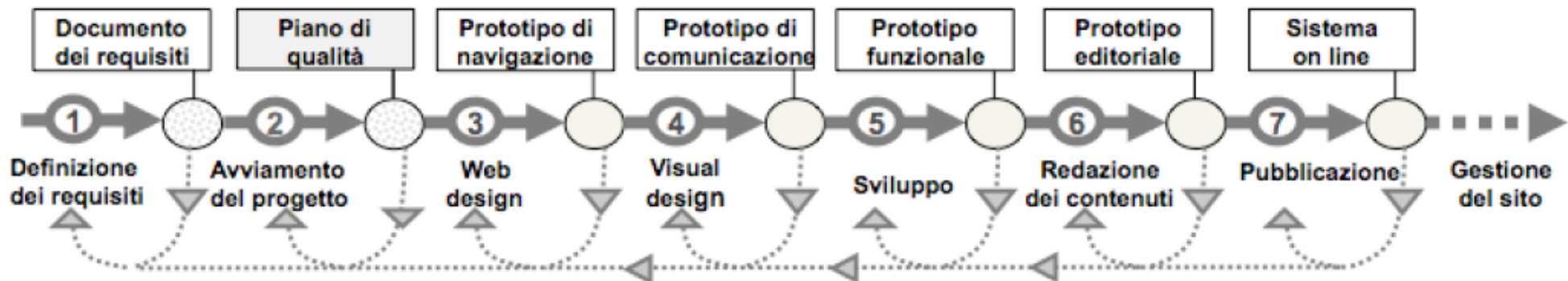
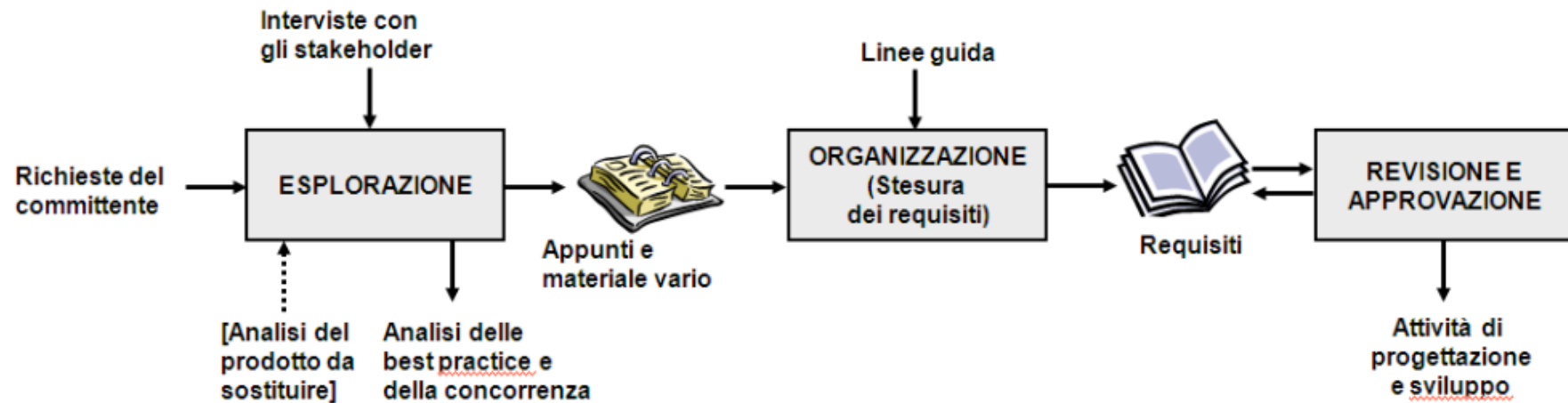
The project issues

- How are the elements connected to each other
- How they will be perceived by the user
- What must have immediate visibility: fewer actions to achieve the goal

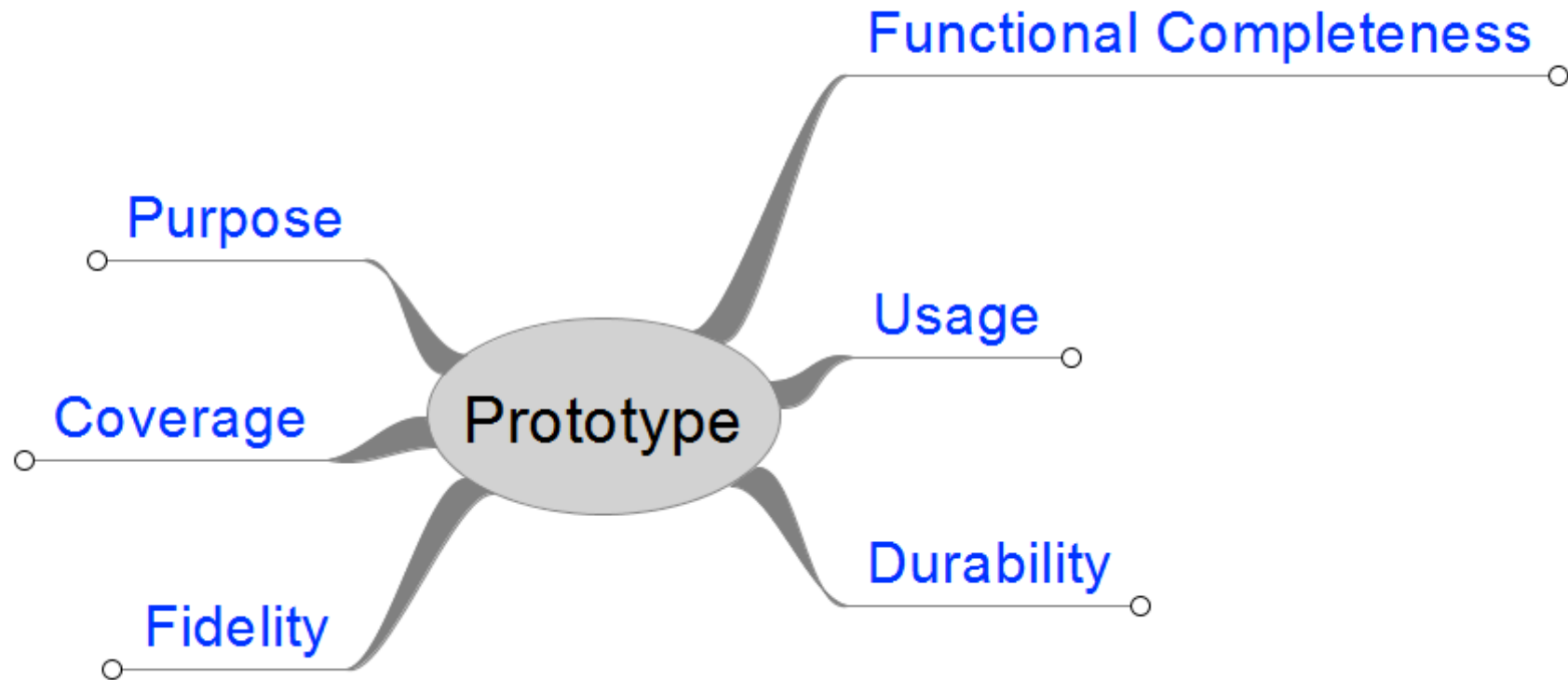
Prototypes

- An easily modified and extensible model (representation, simulation or demonstration) of a planned software system, likely including its interface and input/output functionality

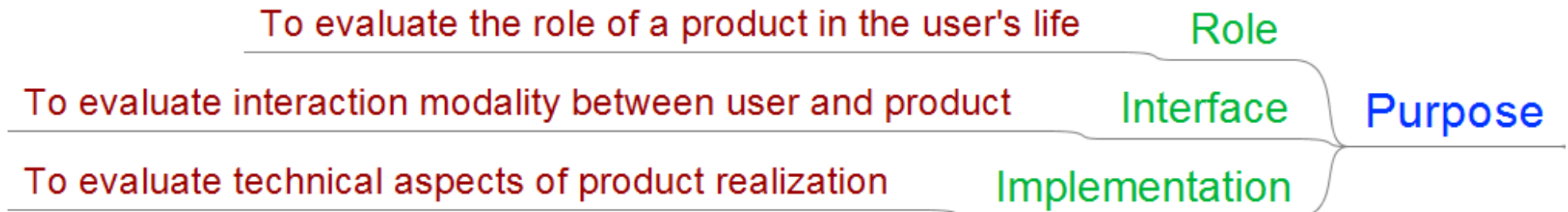
Prototypes



Prototype Features



Prototypes Features



Prototypes Features

A prototype of the entire system

- an expanded horizontal prototype
- models a greater number of features
- covers multiple levels of the system's structure chart
- useful throughout the design process

A prototype of a single usability-critical system component

- a vertical prototype that is focused on one feature
- useful at some specific stage of the design process

Global

Local

Coverage

Prototypes Features

A set of drawings (e.g., storyboard) that provide a static, non-computerized, non-working mock-up of user interface for the planned system

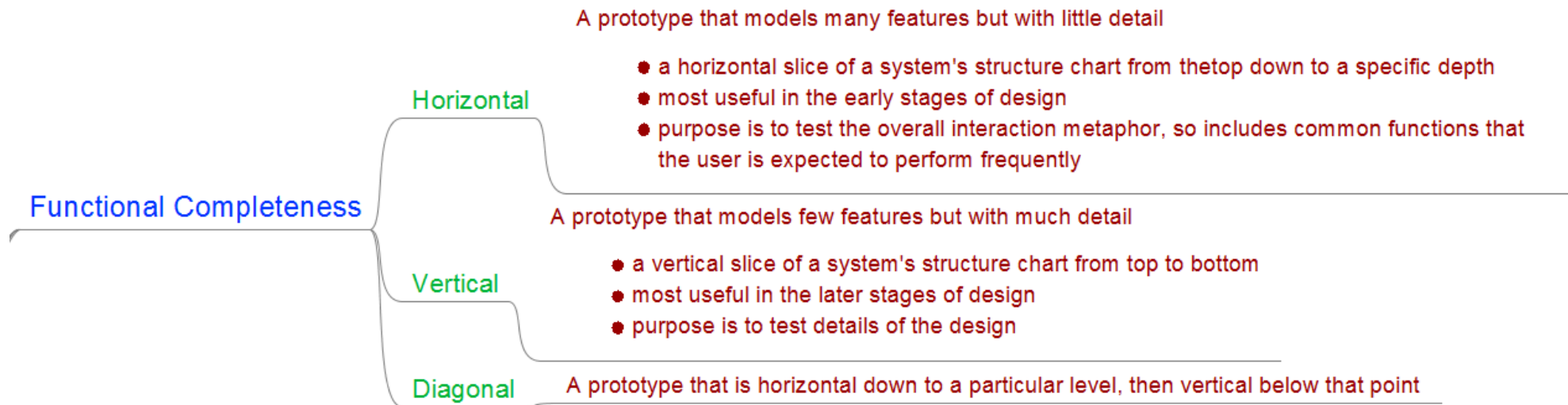
Low

A set of screens that provide a dynamic, computerized, working model of the planned system

High

Fidelity

Prototypes Features



Prototype Features

Usage	Static	Static representation of the product (storyboards, diagrams, ...)
	Dynamic	Dynamic (but not interactive) representation of the product (e.g., video)
	Interactive	Allows users to test the usage of the system, even if in an approximate and simplified way

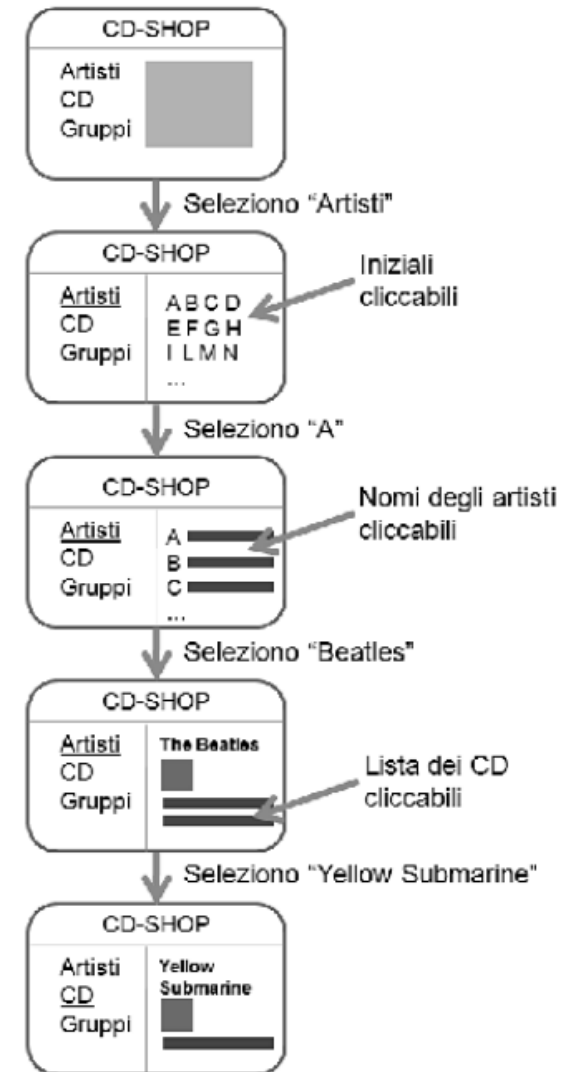
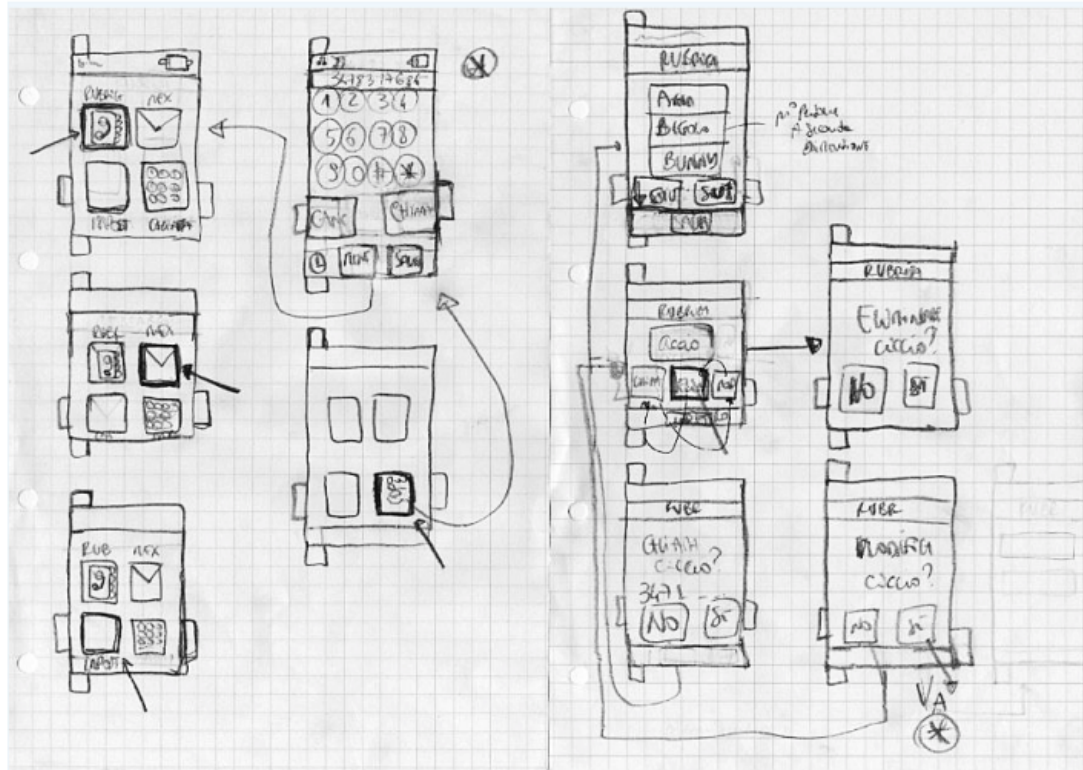
Prototypes Features

Durability	Exploratory	A throw-away prototype used to clarify project goals, to identify requirements, to examine alternative designs, or to investigate a large and complex system
	Experimental	A prototype used to validate system specifications
	Operational	An iterative prototype that is progressively refined until it becomes the final system

Sketch: Step 0



Sketch / Storyboard



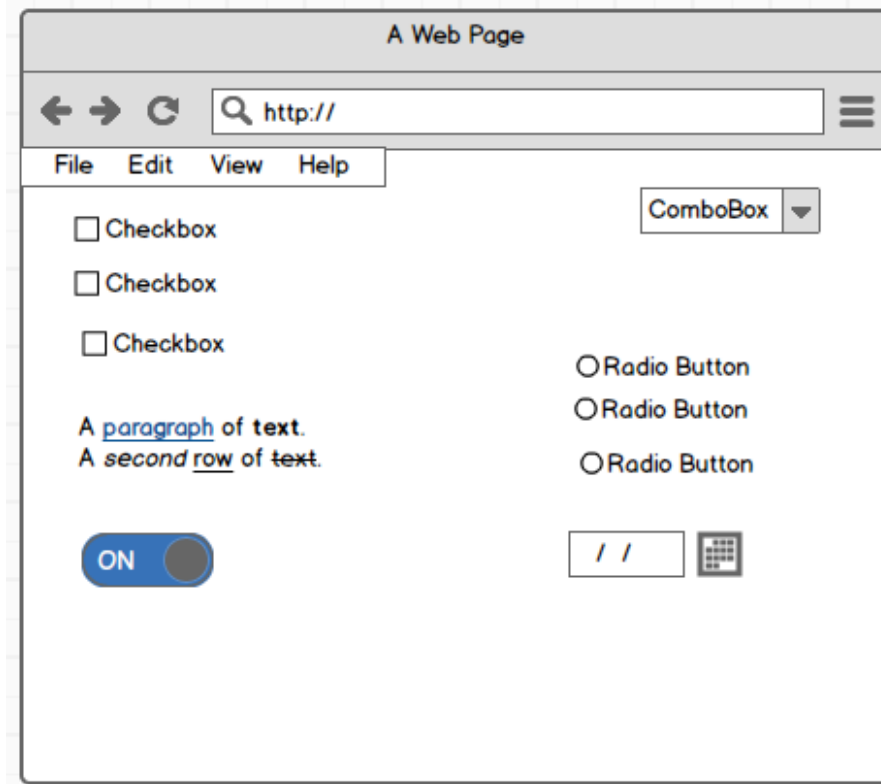
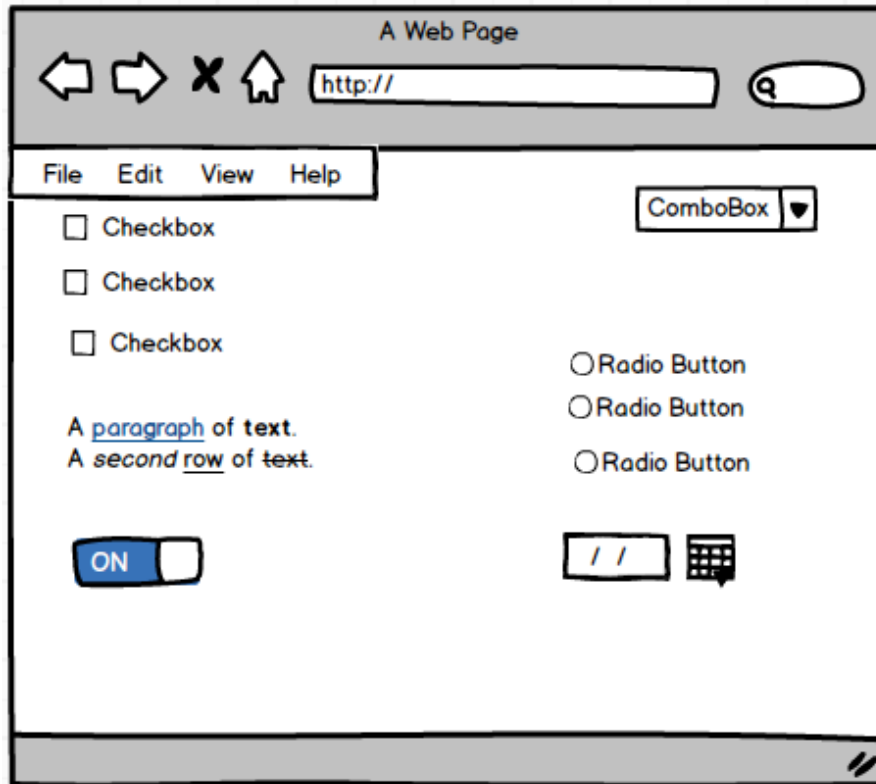
Usability Metrics

- Ease of learning
- Efficiency of use
- Storage
- Frequency and severity of errors
- Satisfaction

Project issues

- How to build navigation?
- Which reading order?
- Which elements to visualize?

Mockups VS Wireframes



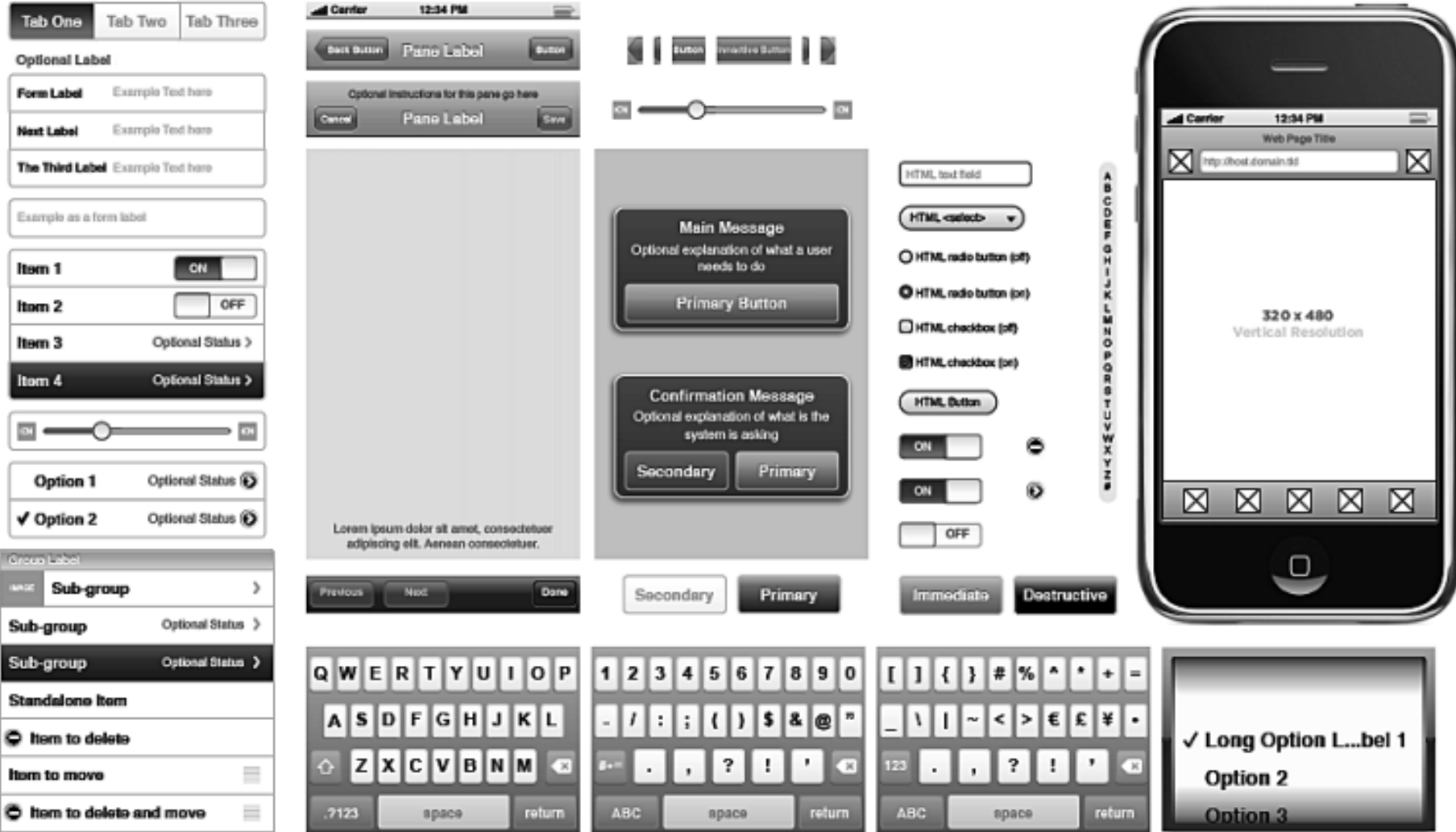
Paper Prototypes



Hypertext Prototypes (e.g. Powerpoint)



Stencil for Hypertext Prototypes



The UI Grammar

- Information architecture
 - ◆ Organization of information
- Layout
 - ◆ Organization of spaces
 - ◆ Each space has a specific informative value ("what" does it contain?)
 - ◆ Each space has a specific functional value ("what is it for"?)
- Interaction
 - ◆ What techniques to offer the user for interacting with the data?
 - ◆ Which widgets to use?

Interaction: What the User Can Do

- Read, display (text, images, ...)
- Analyze (lists, tables, graphs, ...)
- Insert (text, numbers, dates, ...)
- Choose (from lists, lists, ...)
- Search (starting from criteria)
- Filter (on existing lists)
- Confirm (ok, cancel, insert, delete, ...)
- Navigate (slideshow, paging, groups, tabs, ...)
- Select (one or more elements, parts of text, ...)
- Move (drag, swipe, ...)

Control / Widgets

- Button
- Text (but also numbers, dates, ...)
 - ◆ Single line / multiple lines
 - ◆ Display only / editable
- Radio buttons
- Check box
- List box
 - ◆ Visible
 - ◆ Drop down
- Combo box

Windows XP widgets

www.finndesign.fi

FINNDESIGN
professional creativity

Dynamic vs. Fixed Properties

- Map the following properties to system settings instead of coding fixed values:
 - Colours
 - Fonts
 - Regional settings
- Do not use dynamic text strings in control labels

Shortcut Keys

Show shortcut key combinations in menus to support learning

- Ctrl + A Select All
- Ctrl + C Copy
- Ctrl + F Find
- Ctrl + N New
- Ctrl + O Open
- Ctrl + P Print
- Ctrl + S Save
- Ctrl + V Paste
- Ctrl + X Cut
- Ctrl + Z Undo
- ESC Cancel
- F1 Contextual Help

Command buttons

Additional window...
Expand current window >>
Menu ▾

- Default size in Visual Studio: 75 x 23 pixels
- Use this size as the minimum size
- Remember ellipsis (...)

Option buttons

After I change display settings:

- Restart the computer before
- Apply the new display settings
- Ask me before applying the

- One is always selected
- Layout of one set is always a vertical stack

List boxes

- Make it wide enough to show large enough portion of each choice
- Avoid using horizontal scrollbar

Dropdown listboxes

- Width should match other dropdown, text or spinboxes in the same group
- List shows a minimum of 3 and maximum of 8 choices

Text fields

- Background color indicates, if the field is for input or output
- Single line text field width should reflect the expected string length
- Groups of text boxes should have equal lengths

Rescaling

- Primary windows should be designed rescalable
- Consider window layout during rescale
- Define minimum size and design a usable layout for that size
- Define, which controls move or stretch in a rescale by appropriate Anchor and Dock properties
- Design good default sizes for user-resizable elements

Message Boxes

Centre-aligned at the bottom

Menus

- Unavailable items must not be hidden

Progress Indicators

- 0 > 0.5 second response time - no indicator
- 0.5 > 5 seconds - Hourglass pointer
- 5 > n seconds - Progress bar
- If the progress cannot be monitored, use a continuously rotating animation

Images, Icons and Animations

- Use place-holder files until final graphics are available
- Locations are based on reserved area (bounding box), not visual content

Reading Direction

- User's task flow should follow normal reading direction
- In right-to-left languages layout may have to be mirrored

Focus Order

- Input focus movement by the TAB key should follow the reading direction
- ... and the user's task flow
- ... and the process workflow

Toolbars

- Place controls in toolbar in a task-based order
- Group toolbar controls in a logical way

Toolbar buttons

Text label is recommended with toolbar buttons

Statusbar

Avoid putting interactive controls in the statusbar

Common Dropdown Menus

Application-specific menus go between View and Window menus

Taskbar Status Area

- Contains status icons with:
 - Tooltip for explanation
 - Popup menu for actions
 - Double-click for default action
 - Balloon tip for notification
- Use only to notify user, when he is working with another application

Dialog boxes

- Leave 14 pixels between:
 - Window edges and contents
 - Tabbed page edges and contents
 - Group Box edges and contents
 - Unrelated controls
 - Paragraphs of text
- Leave 6 pixels between:
 - Related controls (controls forming a group)
 - Command buttons stacked on or in a row
 - Text label and its associated control
- Dialog buttons should have positive action first (OK, Apply, Cancel)

Alignment

- By default, use left alignment for the layout of controls
- Command buttons are right-aligned

Colours

- Map all colours to system colours
- Fixed colours may have contrast problems, if the user changes Windows colour theme
- Colour should never be the only way to convey information

System font

- It is recommended to use the system font (default GUI font) instead of any named font
- No italics, no different sizes

Sliders

- Best for setting only an approximate relative value between extremes
- Allow additional keyboard control
- Typically up and right arrow increases by one
- Shift + up or right arrow increases by 10

Slides

- Keep the number of tabs low to avoid tab label truncation
- Avoid multiple lines of tabs

Table headings

Font Name	Filename	Size	Modified	Attribu...
Aachen Bold	acb_...pfm	32K	16.10.1997 11:08	A
ACaslon Ornaments	awor_...pfm	68K	16.10.1997 11:48	A
Adventure Normal (T...				
AltArachuk Nebula (T...				

- Each column heading should have a label
- Alignment: numerical values to the right, text to the left.

Grouping

- Do not use Group Box with only one group
- Consider other grouping options
- Separator lines, color margins, indentations
- Make the scope of controls clear to the user
- Some controls affect only another control
- Some controls affect the whole process

Text Alignment

- Left alignment is default in Western languages
- Numerical values in lists are right-aligned (integers, dates) or aligned by the decimal point
- When showing numerical data, make sure that the font has equal-width numerals

Punctuation

- Add ellipsis (...) in menu items and buttons that require further input before the desired action
- Add colon (:) to the labels of controls
- Not in buttons, tabs or group boxes

Split Windows

- Save the split pane state, when the window is closed or minimized

Internationalisation

- Applications must be localisable without layout redesign
- Reserve at least 50% more space than required for English
- Reserve spaces for extra lines of text, too
- Placing the label above the control allows more horizontal space for the control and its label
- Avoid language-dependent layout
- E.g. using controls inside a sentence

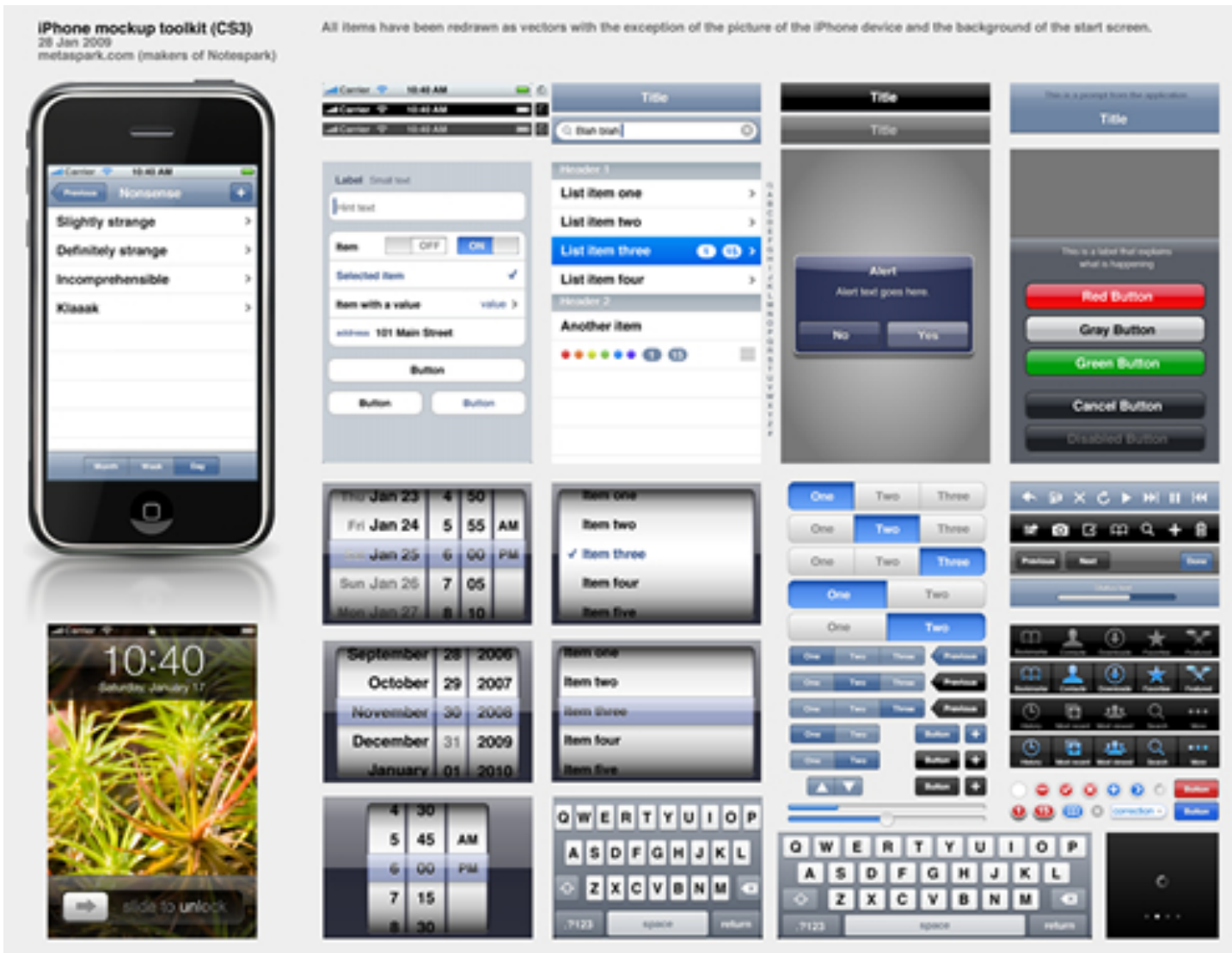
Selection and Activity

- Only one active selection set at a time

JavaFX Widgets



iPhone Widgets



Android Widgets



https://en.wikipedia.org/wiki/Programming_languages_used_in_most_popular_websites

MOCKUP DESIGN GUIDELINES

Choosing Controls

TASK	BEST CONTROL	IF SCREEN SPACE CONSTRAINTS EXIST
Mutually Exclusive	Radio Buttons	Drop-Down/Pop-Up List Box
Not Mutually Exclusive	Check Boxes	Multiple-Selection List Box
Select or Type a Value Text Entry Field	Radio Buttons with "Other"	Drop-DownComboBox
Setting a Value within a Range	Spin Button	TextBox

From Johnsgard et al. (1995).

<https://uxdesign.cc/>

1. *IF:*

USE:

- Mutually exclusive alternatives.
- Discrete data.
- Best represented verbally.
- Very limited in number (2 to 8).

Choose:

option 1

option 2

option 3

option 4

AND:

- Typed entry is never necessary.
- Content can never change.
- Adequate screen space is available.

RadioButtons

Color:

Red

Yellow

Green

Blue

OR:

- Typed entry is never necessary.
- Content can never change.
- Adequate screen space is not available.

Drop-Down/Pop-Up
List Box

Australia	↑
Canada	
England	
France	
Germany	
New Zealand	
Netherlands	↓

OR:

- Typed entry may be necessary.
- Content can change.
- Adequate screen space is available.

Combo box

Font Style:

Regular
Regular
Italic
Bold
Bold Italic

Size:

8	↑
8	
10	
12	
14	
18	↓

OR:

- Typed entry may be necessary.
- Content can change.
- Adequate screen space is not available.

Drop-Down/Pop-Up
Combo Box

9600	↓
1200	↑
2400	
4800	
9600	
19200	↓

Choosing Controls

2. IF:

USE:

- Mutually exclusive alternatives.
- Discrete data.
- Best represented verbally.
- Potentially large in number (9 or more).

AND:

- Typed entry is never necessary.
- Content can never change.
- Adequate screen space is available.

Single-Selection List Box

OR:

- Typed entry is never necessary.
- Content can never change.
- Adequate screen space is not available.

Drop-Down/Pop-Up
List Box

OR:

- Typed entry may be necessary.
- Content can change.
- Adequate screen space is available.

Combo Box

OR:

- Typed entry may be necessary.
- Content can change.
- Adequate screen space is not available.

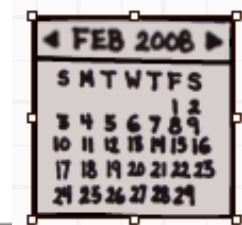
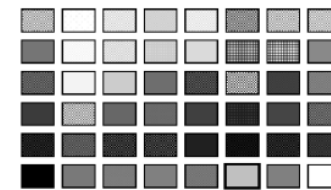
Drop-down/Pop-up
Combo Box

3. IF:

- Mutually exclusive alternatives.
- Discrete data.
- Best represented graphically.
- Content rarely changes.
- Small or large number of items.

USE:

Palette



4. IF:

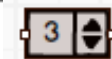
- Mutually exclusive alternatives.
- Not frequently selected.
- Content does not change.
- Well-known, easily remembered data.
- Predictable, consecutive data.
- Typed entry sometimes desirable.

USE:

AND:

- Adequate screen space is not available.

Spin Box



OR:

- Adequate screen space is available.

Combo Box

Choosing Controls

5. IF:

- Mutually exclusive alternatives.
- Continuous data with a limited range of settings.
- Value increases/decreases in a well-known, predictable way.
- Spatial representation enhances comprehension.

USE:

Slider



6. IF:

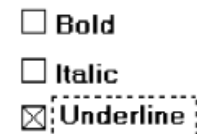
- Nonexclusive alternatives.
- Discrete data.
- Best represented verbally.
- Typed entry is never necessary.
- Content can never change.
- Adequate screen space is available.

USE:

AND:

- Very limited in number (2 to 8).

Check Boxes



OR:

- Potentially large in number (9 or more).

Multiple-Selection List Box

Grouping

- Border
- Tabs
- Accordion
- Pop-up
- Menu

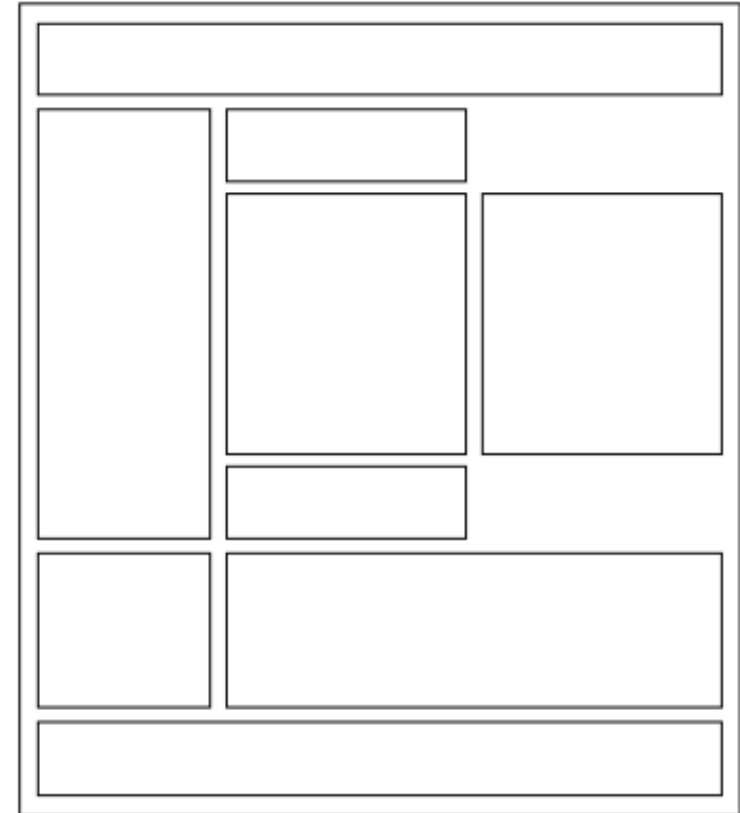
DOCUMENT	
Justification:	<input checked="" type="radio"/> None <input type="radio"/> Left <input type="radio"/> Center <input type="radio"/> Right
Contents:	<input checked="" type="checkbox"/> Preface <input checked="" type="checkbox"/> Illustrations <input checked="" type="checkbox"/> Index <input checked="" type="checkbox"/> Bibliography

AUTHOR	
Name:	<input type="text"/>
Telephone:	<input type="text"/>

Layout

- Spaces Hierarchy
- Function Recognition
- Spaces
- Includes navigation

- Adaptable to the screen of the device?



Use Cases VS Mockups

- Use cases (normally) describe round-trips between the system and the user
 - ◆ System-to-user:
 - Some information to show (for the user to read/view)
 - A set of interactive controls
 - ◆ User-to-system
 - Some specific data (provided by means of interaction with the controls)
- **Main requirement:** UI elements should be consistent with the exchanged data
- **Secondary requirements:** UI elements should be used correctly, maximizing usability

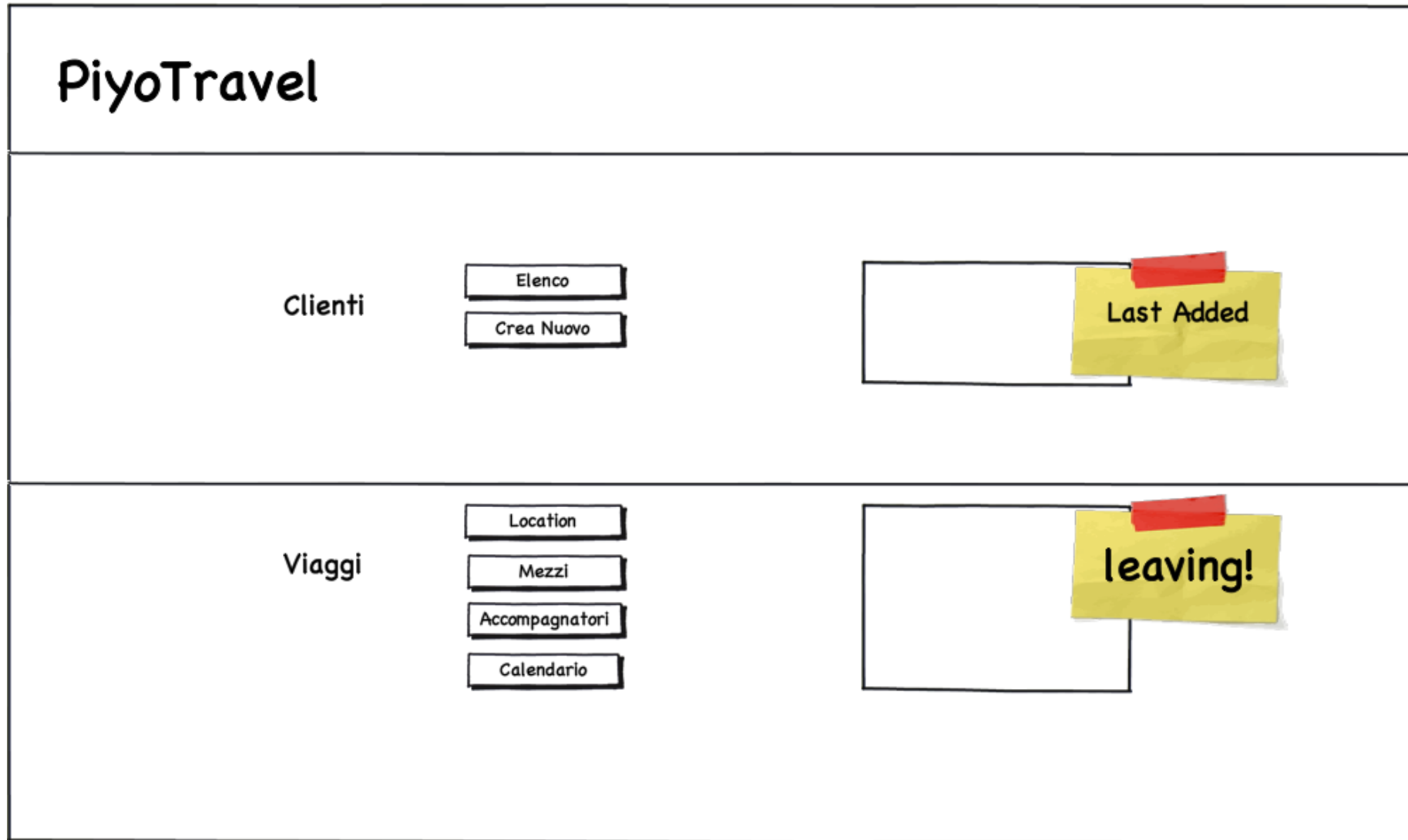
EXAMPLES

The real word is different...

- The users
 - Functionality
 - Flexibility
 - Portability
 - Reliability
 - Security
 - Integrity
 - Maintenance
 - Performance
 - Scalability
- Costs
 - Maintenance
 - Development times
 - Interactions with existing systems
 - Interactions with the “physical” world



Example



Example

PiyoTravel

Clienti Viaggi

search

Gruppi ▾

[A](#)
[B](#)
[C](#)
[D](#)
[E](#)
[F](#)
[G](#)
[H](#)
[I](#)
[K](#)
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telefono 1 telefono 2

telefono 3

indirizzo

note Gruppo

Stato fattura

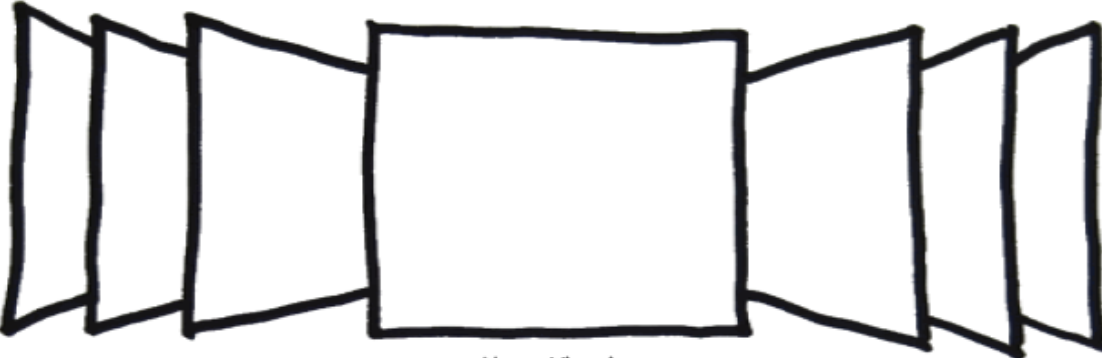
Example

PiyoTravel

Clienti Viaggi

Location mezzi accompagnatori calendario

search A B C D E



Nome Viaggio

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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	

Look & Feel



Patterns: Some Examples

- Navigation Menu
- Login and Registration
- Search e Result pages
- Paging o scrolling
- Date Picker o Data Input
- Call for action

Patterns references

- <http://quince.infragistics.com/>
- <http://interface.fh-potsdam.de/infodesignpatterns/patterns.php>
- <http://www.welie.com/patterns/index.php>
- <http://patterntap.com/>

Best Practices: Some Examples

- Space Managements: all in one window, scrolling, resize
- Widget Selection: multiple list selection, Drag&Drop, command line
- Error Messages
- Panels: accordion, modal panel (LightBox)
- Wizard

Sources and References

- Facile da Usare – Una Moderna Introduzione all'Ingegneria dell'Usabilità, R. Polillo, <http://www.slideshare.net/rpolillo/facile-da-usare-una-moderna-introduzione-allingegneria-dellusabilit>
- The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques , W.O. Galitz, Wiley, 2007, ISBN: 978-0-470-05342-3
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