# Usability principles/heuristics (Jakob Nielsen)

* Visibility of system status – (battery status, SSL status)
* Match between system and real world – (timezone)
* User control and freedom – (multiple verification before order, redo and undo)
* Consistency and standards – (shortcut, scroll up-down between Windows and Mac)
* Error prevention – (only numeric number for zip, confirm blanket have been filled before submit, beep for lock and unlock cars)
* Recognition over recall – (command line tool, phone for connect & email hint for receiver)
* Flexibility and efficiency of use – (memorization of username and password)
* Aesthetic and minimalist design – (format difference result in paper needed for printing)
* Help users recognize, diagnose, and recover from errors – (undo, autosave, wifi disconnection with diagnose panel)
* Help and documentation

# Gestalt principles

• Whole picture, perception in context

* + 1. - Assign on the same line
    2. - Background highlighting
    3. - Cluster together for similar things

# Memory

* Short term and Long term
* Recognition vs. recall
* Active vs. passive learning

- Doing than listening

# Conceptual/mental models

• Model: abstraction, simplification

Functional (how it works, how to use)

 Structural (how it’s organized, built)

Metaphors

Skeuomorphism: design derived from a different medium – (spiral calendar)

# Guidelines to Reduce Memory Burden

* Use recognition instead of recall
* Help users chunk information
  1. - related items cluster together
* Require as little short-term memory as possible
* Consider users’ mental models
* Provide visual clues and memory aids
  1. - P – print, C- copy
* Provide feedback: Let users know their input was received
  1. - login

George Miller

Short term memory 7 +/- 2 items

# Affordances: giving a clue

• What the user can see that an object does

• Chairs afford sitting; handles afford pulling

• By now, many users are used to on-screen conventions (affordances are just perceived)

* Learned conventions
* E.g., buttons and scrollbars—clear to novices?
* Metaphors, e.g. play/pause button

The retina

• Rods: Degrees of brightness; **not in fovea**

• Cones: Colors; **in fovea** mainly.

Graphical coding

- differences in color / shape / words / line width / object size / ...

Menu positioning time (“P”)

* Fitts’ Law: P = C1 + C2(log2(2D/W))
* C1 and C2 are constants depending on device
* D is distance to the center of the target
* W is size (width) of the object (how much can you miss its center by?)
* The time to acquire a target is a function of the distance to and size of the target
* Screen edge: no chance to overshoot (size is effectively infinite)

Anthropomorphism – fake human for communication

User-centered design

* Early focus on users (cognitive, behavioral, attitudinal characteristics) and tasks
* Actual measurement: observe, record, analyze users’ reactions and performance
* Iterative design: find problems, fix them, test again
* Users’ involvement in process Affects product acceptance and success
* Makes users active stakeholders
* Manages expectations
* Gets head start on training
* Communicates without sales hype
* Provides vital information about needs, requirements, usability

Data analysis

• Don’t let data get stale • Do this iteratively, too • Decide which tools, how much formalism

–  Quantitative vs. qualitative

–  Scenarios (narrative) and personas (detailed description)

–  Use cases (describe interaction with system, alternative paths)

–  “Essential use cases,” “hierarchical task analysis” (more formal methods)

Menu selection time

• Selection time = search time (“S”) +

– if using keyboard, time to press key(s)

– if using pointer, positioning time (“P”) + activation time (e.g., to click mouse)

• For beginners searching menu size *n*:

– if label unknown, examine all items, S ~ *n*

– if label known, search linearly or randomly; in either case, S ~ *n*

• Experts can remember position; S is constant

Menu positioning time (“P”)

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House automation

Users

Pets

Homeowners

Caregivers

Guest

Family members’ possible characteristics

* Dexterity issues (young, elderly, disabled)
* Disjoint schedules
* Culture
* Language

Personas

Interaction design:

Interactive products to support the way people communicate and interact

Need to know different things about users, technologies and interaction between them

Process of interaction design:

Identify needs and establish requirement

Develop alternative designs

Building iteractive designs

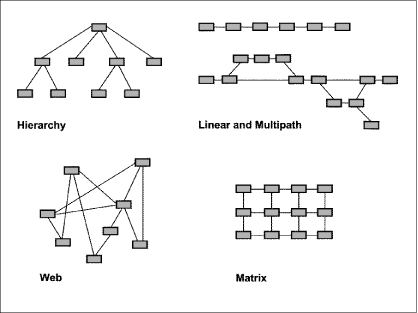
Evaluate and user experience

## Organize information

Organizational schemes

* Exact: alphabetical, chronological, geographical
* Inexact/ambiguous: topical, task-oriented (e.g. university website for students/ alumni, applicant/visit), audience-specific (e.g. shopping site for women, men stuff)
* Combinations

Organization structures

* Shape can be hierarchical, linear/multipath, network/web, matrix
* Unrestricted  linking makes  orientation hard
* Network/web  structures hard  for beginners
* Database •
* 

university

Wikipedia (unrestricted)

“Information scent”

• Link should “smell right” to user: confidence before clicking, feel closer afterwards

Error avoidance

* Provide advance information
* Keep dangerous controls away from frequently used ones
  + 1. “discard” “save” “cancel”
* Warn users of irreversible effects; don’t make them the default; request confirmation
* Turn safety options on by default
* Recognize errors and react ASAP

Advance information

• What’s possible now? What will happen next? What can I do now?

• Prevent errors, unexpected results

Human memory and interaction features that reduce reliance

on memory

Mental models: Recognizing a user's incorrect mental model

Recognition of HCI flaws in terms of HCI principles

or guidelines (including guidelines for web design,

forms, error messages, menus, color, and typography)

Requirements: Identifying data requirements, environmental

requirements, user requirements, and usability requirements

Different kinds of prototypes and the situations where

they're most effective

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Evaluation and analysis techniques, including Fitts's Law,

and the situations where they're most effective; different roles

in the evaluation and design process

Users with disabilities: Potential difficulties and

ways to eliminate or accommodate them

Information design and visualization: Presenting information

accurately and clearly (including good typography and Tufte's

analysis of the cholera and Challenger cases)

PowerPoint: drawbacks and advantages\_

## Typography

• HCI for documents, affects effectiveness • Display type vs. body type

– Quick recognition of letters, words, lines • Great control now in user’s hands

– “With more power comes the power to mess up in new and more spectacular ways.” —DGK

• Differences between displays and paper

paper’s resolution is twice better compared to screen

 • Less designer control for text on the WWW

Typeface guidelines (characters)

• Mix upper and lower case

• Choose proportional spacing over monospace

• Use fonts with varying stroke width

• Choose serif over sans-serif font

* But on the web ...

Flush right: alignment on the right side

Rag right is more readable because different space between words slow the speed

Typography/text guidelines

• Favor visuals over text

 • Keep lines short (10–12 words; ~40 chars

• Don’t justify margins

* Extra white space
* Justification and monospace fonts

• Consider extra leading

 • Minimize number of fonts  (code different from text)

• Use emphasis minimally

Graphics

Data increase show ACCURATELY in linear plot

Cheriff faces:

Each face icon conveys

1. don’t be misleading when represent data, trend
2. 2d – 1d
3. effective design
4. reduce misleading decorations

bad design:

one font for body, one font for title

texture shading obscure the text

capitalize between words in the title is different

old-fashion, religious style need to have relation with content

bullet point: same item in one category, small mono-space to text

bullet : visual indicator

image: