Lesson 13

Interaction Design (CM3055)

Usability evaluation

valuating how well a design or
implemented system meets its requirements

- the usability of a system
- the extent of system functionality
- the effect of the interface on the user

User Centred Design

Usability Evaluation can….

- identify the problems users have
- highlight design inadequacies
- provide suggestions for improving prototypes or recommendations for redesign
- determine if the system meets statutory safety requirements
- investigate productivity, usability and safety
- test a system against a competitor’s products
- be conducted in laboratory (controlled) or natural settings (uncontrolled)

Graphic from romainvv.ddns.net

Many Approaches to Evaluation

Usability goals:

- Effectiveness
- Efficiency
- Safety
- Utility
- Learnability
- Memorability

User experience goals:

- Satisfying
- Pleasurable
- Rewarding
- Fun
- Provocative

4 evaluations

1. Analytical evaluation

- testing the design or implemented system against the specified user requirements and usability principles
- Often called “discount evaluations”
- Standards enforcement
- Heuristic evaluations & cognitive walkthroughs
- Users are not involved

2. Empirical evaluation

- carrying out experiments or empirical studies where data is collected and analysed
- Users are involved

[Cognitive walkthroughs (Video)]

4 evaluations

3. Early (formative) evaluation

- undertaking an evaluative study before a runnable programme of any sort exists

4. Late (summative) evaluation

- testing when a fully implemented system or a runnable prototype is available
- can be carried out by both analytical and empirical means
- divided by levels of formality and informality (‘discount’ or cheap techniques)

Evaluations

Informal techniques

1. Heuristic Evaluation
2. Cognitive Walkthrough

Formal techniques

1. Wizard of Oz
2. Experimental evaluation

Graphics from putnam-consulting.com

Evaluations - Informal techniques

Heuristic Evaluation

- involving or serving as an aid to learning, discovery, or problem-solving by experimental and especially trial-and-error methods (merriam-webster.com)
- originally proposed by Nielsen and Molich, 1990 is a discount method for quick, cheap, and easy evaluation of the user interface
- highly informal team-oriented discount usability method for discovering usability problems in a user interface design
- end-users are not involved in evaluating the interface
- a number of expert evaluators (3 to 5 HCI specialists) to examine a given interface (a design or a prototype) and judge its compliance with recognised usability principles
- 10 heuristic by Jakob Nielson

Phases of Heuristic Evaluation

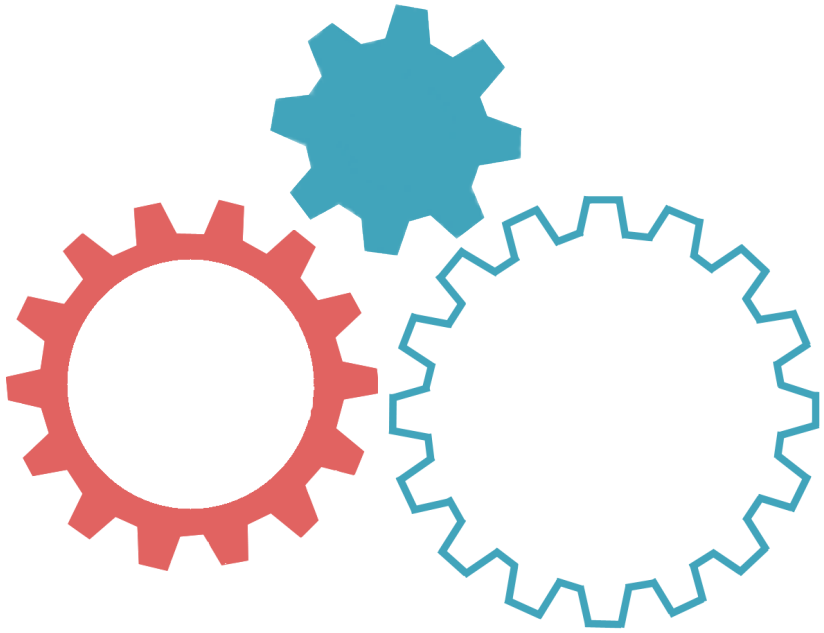
1. **Pre-evaluation training**
   - give evaluators needed domain knowledge & information on the scenario

2. **Evaluation**
   - individuals evaluates UI & makes list of problems

3. **Severity rating**
   - determine how severe each problem is

4. **Aggregation**
   - group meets & aggregates problems (w/ ratings)

5. **Debriefing**
   - discuss the outcome with design team



Phases of Heuristic Evaluation

How to Perform Evaluation

- At least two passes for each evaluator (3-5 people)
  - first to get feel for flow and scope of system
  - second to focus on specific elements

- If system is walk-up-and-use or evaluators are domain experts, no assistance needed
  - otherwise might supply evaluators with scenarios

- Each evaluator produces list of problems
  - explain why with reference to heuristic or other information
  - be specific & list each problem separately

Phases of Heuristic Evaluation

Severity Ratings

- Used to allocate resources to fix problems
- Estimates of need for more usability efforts
- Combination of

  - frequency
  - Impact
  - persistence (one time or repeating)

- Should be calculated after all evaluations are in
- Should be done independently by all judges

Severity ratings for evaluations

0 = I don’t agree that this is a usability problem at all.

1 = Cosmetic problem only: need not be fixed unless extra time is available on project.

2 = Minor usability problem: fixing this should be given low priority.

3 = Major usability problem: important to fix, so should be given high priority.

4 = Usability catastrophe: imperative to fix this before product can be released.

Phases of Heuristic Evaluation

Debrief

- Conduct with evaluators, observers, and development team members
- Discuss general characteristics of UI
- Suggest potential improvements to address major usability problems
- Development team rates how hard things are to fix
- Make it a brainstorming session
  - little criticism until end of session

Typical evaluation session

- 1–2 hours

- An evaluator taking several passes through the interface, comparing the interaction activities against a list of heuristics which describe common properties of usable

  1st pass - allows the evaluator to get a '…feel for the flow of interaction and general scope of the system.

  2nd pass - allows the evaluator to focus on specific interface elements while knowing how they fit into the larger whole'.

Heuristic Evaluation

Pros

- Can be done by even a single person
- No ethics, recording, or other human-related problems
- Minimal expense to find a large number of potentially expensive problems

Cons

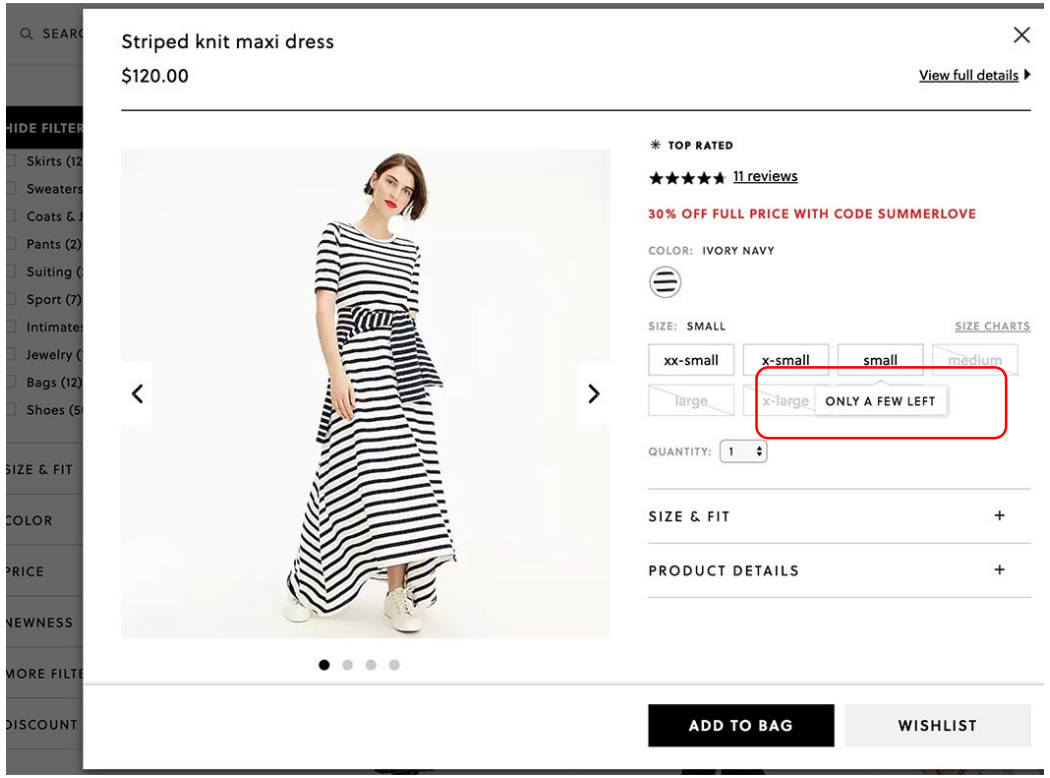
- Experts are not the same as end users, they will miss some things
- Heuristics are the most common types of problems but they do not represent all problems

10 Heuristics for User Interface Design

developed by Jakob Nielsen

1. **Visibility of system status**
   Let the user know what is going on

   - Always keep users informed about what is going on, through appropriate feedback within reasonable time.



i.e.
“how far through the sign up process am I?”
“How much of this file is loaded?”
“How long will I have to wait for the next stage?”

Extra Reading: https://www.nngroup.com/articles/visibility-system-status/

10 Heuristics for User Interface Design

developed by Jakob Nielsen

2. Match between system and the real world

Design systems based on familiar ideas and concepts

- Speak the users' language, with words, phrases and concepts familiar to the user rather than system-oriented terms.
- Follow real-world conventions, making information appear in a natural and logical order.

i.e.

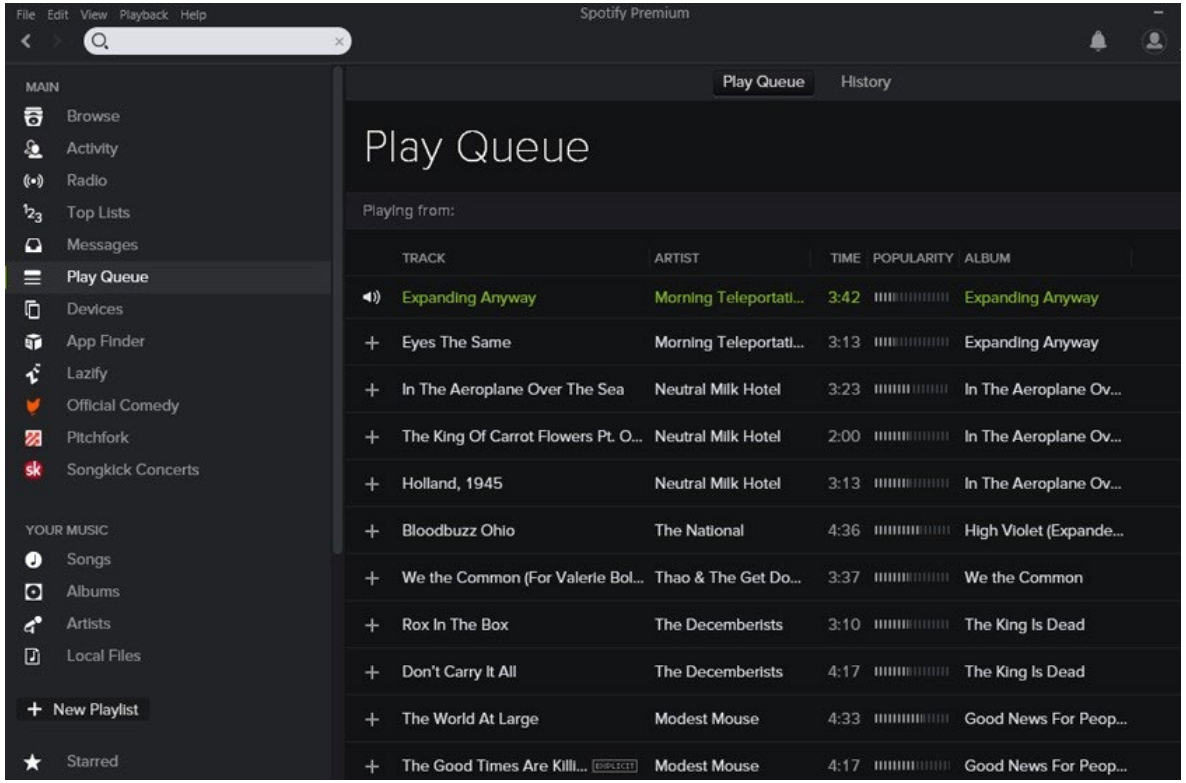
- folders, pages, files, windows and buttons
- appropriate language for the sort of system one is designing (teenagers vs elderly website)

Extra Reading: https://www.nngroup.com/articles/match-system-real-world/

Match between system and the real world

Spotify uses words and concepts like “Queue”, “Playlist”, “History”, “Lists” etc.

All of these are things we’re familiar with from the real word, and they are words used in music listening offline too

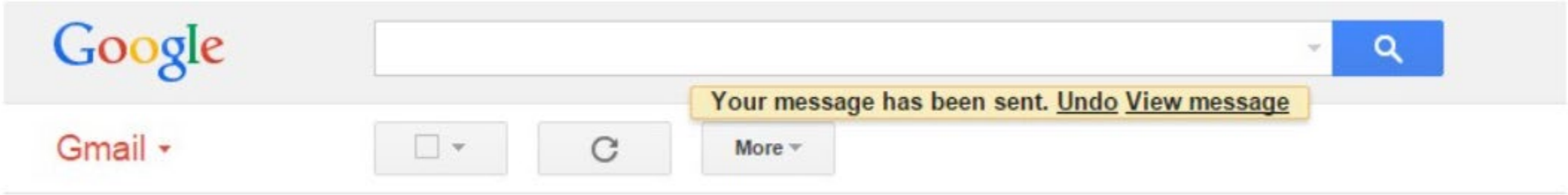


10 Heuristics for User Interface Design

developed by Jakob Nielsen

3. User control and freedom

- Put the user in charge and give them the ability to do things freely
- Users should have the ability to “go back” and fix mistakes without hassle (undo and redo)



10 Heuristics for User Interface Design

developed by Jakob Nielsen

4. Consistency and standards

- Should not have to wonder whether different words, situations, or actions mean the same thing.

Follow platform conventions. → users are used to links being highlighted with a different colour or an underline (or both).

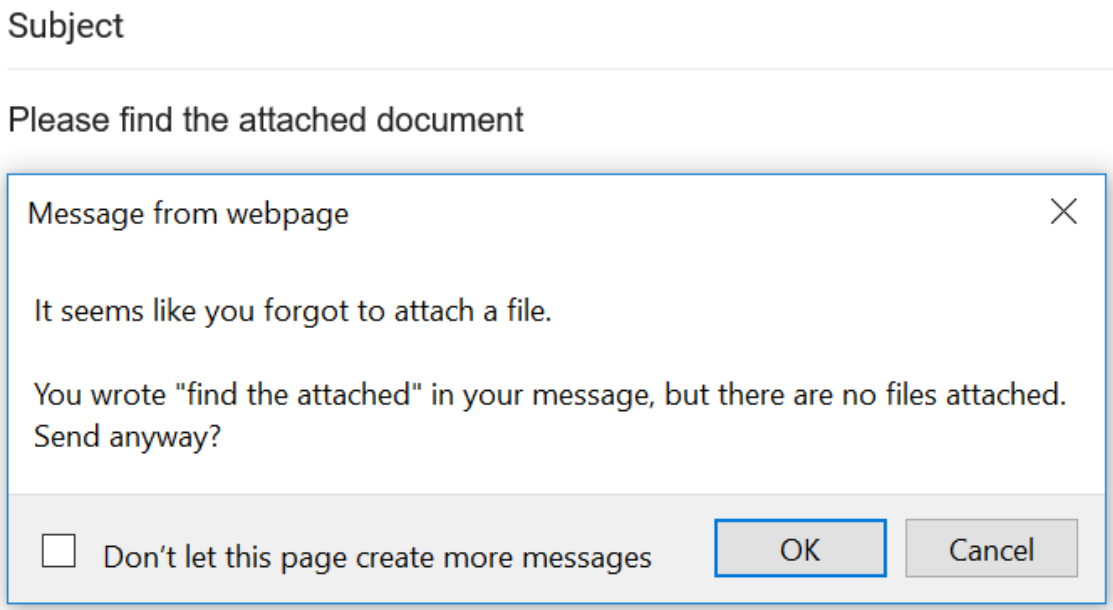
- Keep consistency within your own system
  i.e. If the menu is in the top left on one page, should be there on every page

10 Heuristics for User Interface Design

developed by Jakob Nielsen

5. Error prevention

- A careful design or design things clearly so, for example, the “delete” button is clearly distinct from the “save” button.
- Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.



When writing an email and talking about an attachment, Gmail informs if attachment is missing.

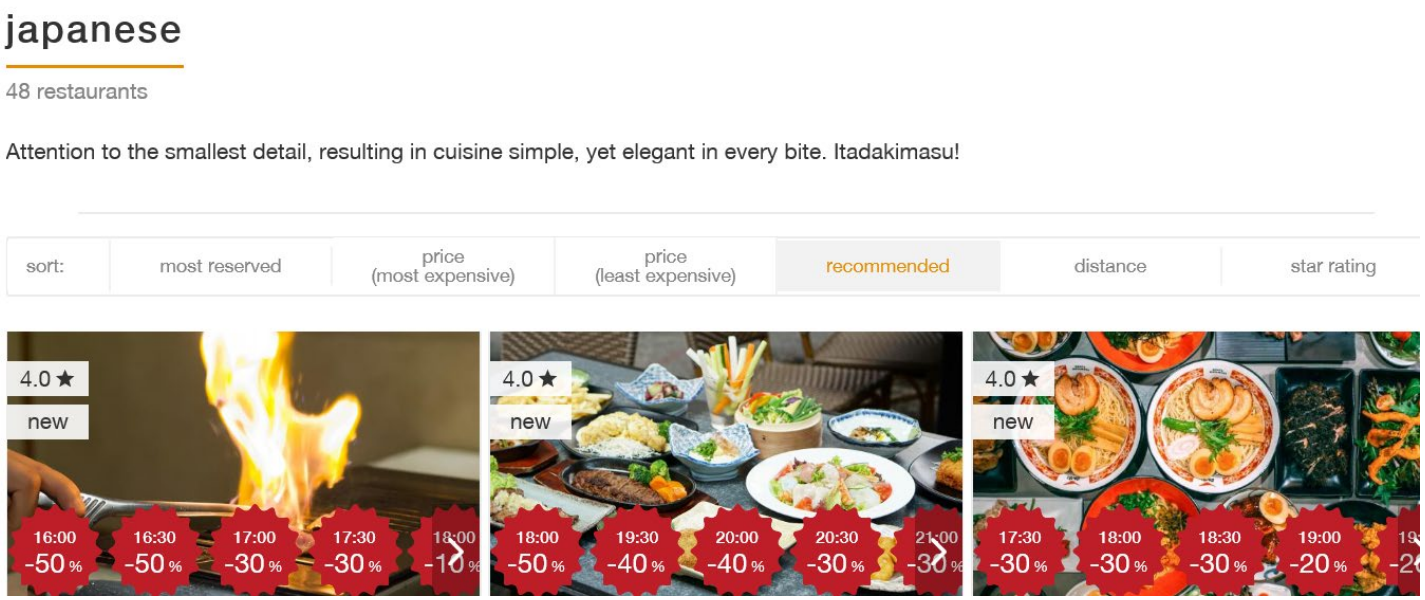
Extra Reading: https://www.nngroup.com/articles/recognition-and-recall/

10 Heuristics for User Interface Design

developed by Jakob Nielsen

6. Recognition rather than recall

- Minimize the user's memory load by making objects, actions, and options visible.
- Users should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.



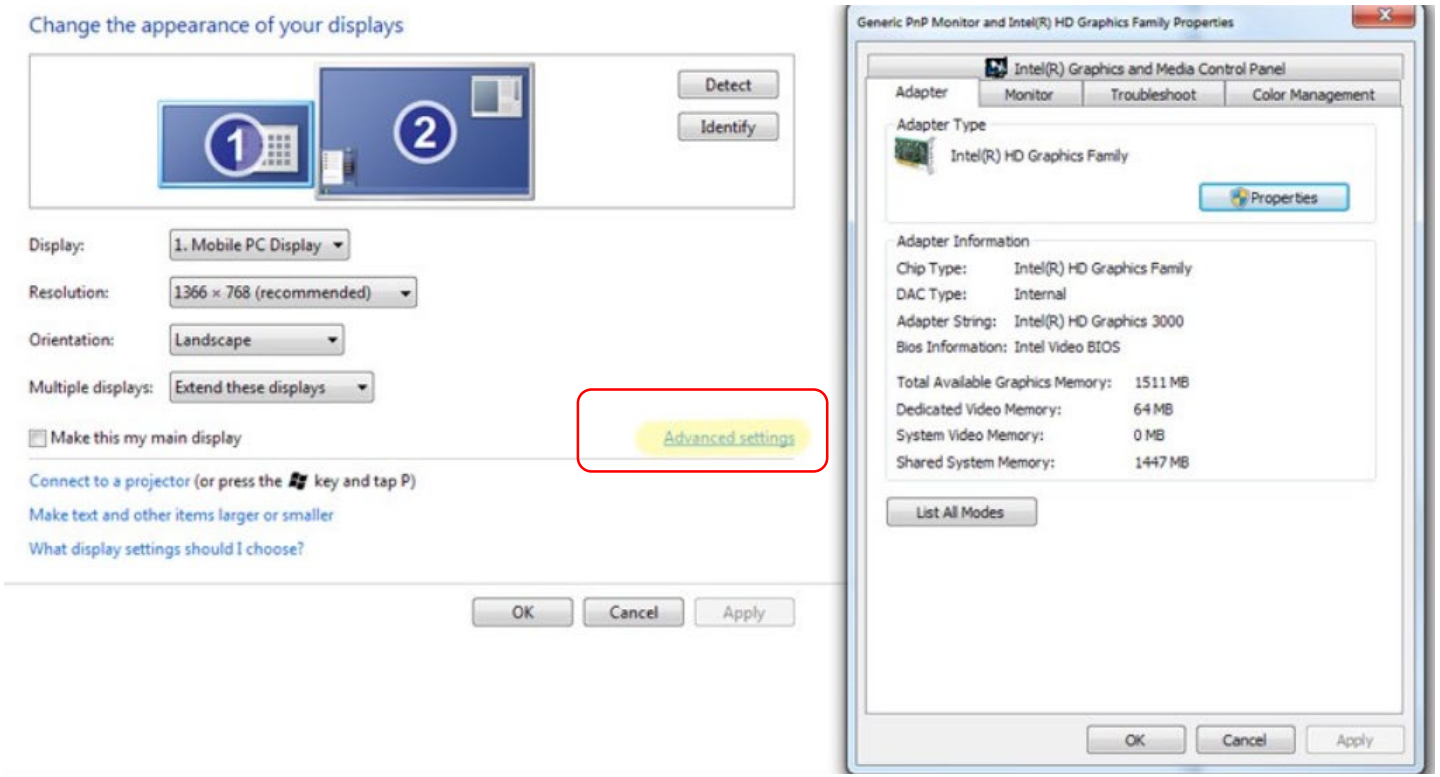
Extra Reading: https://www.nngroup.com/articles/recognition-and-recall/

10 Heuristics for User Interface Design

developed by Jakob Nielsen

7. Flexibility and efficiency of use

- Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users.
- Allow users to tailor frequent actions.



windows showing a simpler display settings and hides the more complicated options behind 'Advanced Settings'

10 Heuristics for User Interface Design

developed by Jakob Nielsen

8. Aesthetic and minimalist design

- Dialogues should not contain information which is irrelevant or rarely needed.
- Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

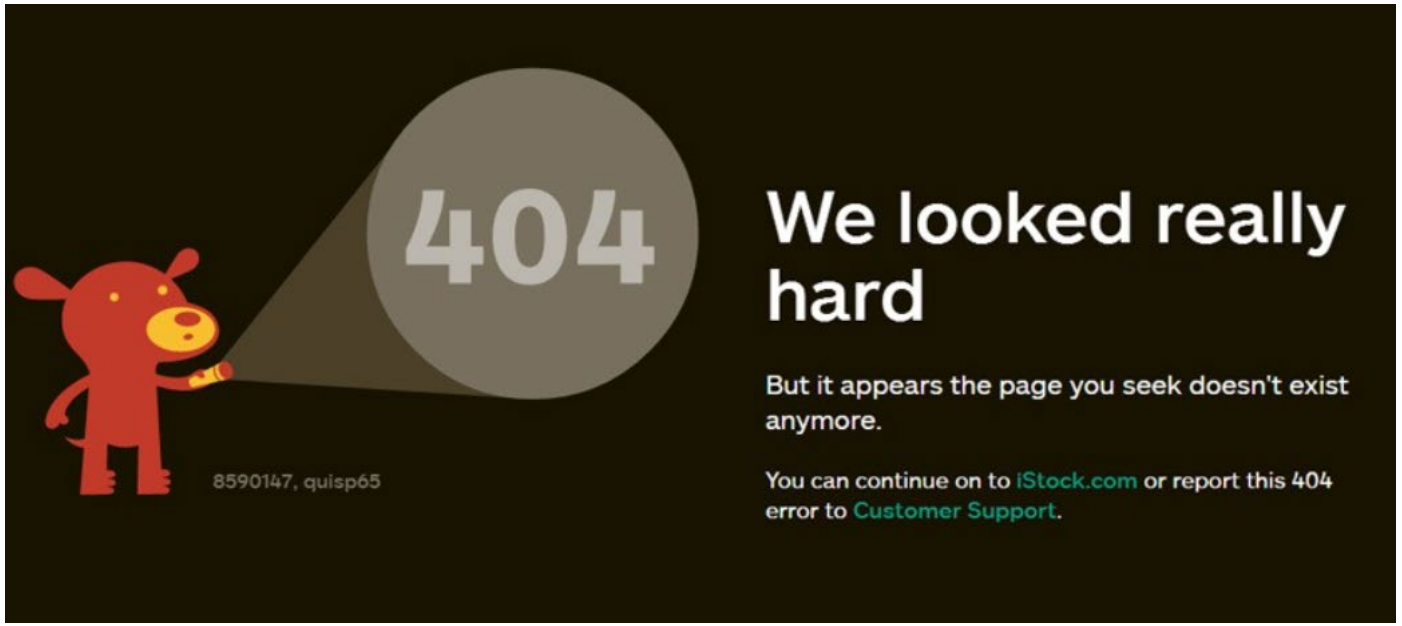
Google’s search page- show personality by changing the logo to celebrate various special days

10 Heuristics for User Interface Design

developed by Jakob Nielsen

9. Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.



Istockphoto showed a nice image from their artist and speak in language that humanises the site and doesn't imply the problem was my fault and even suggest some links that might help me out

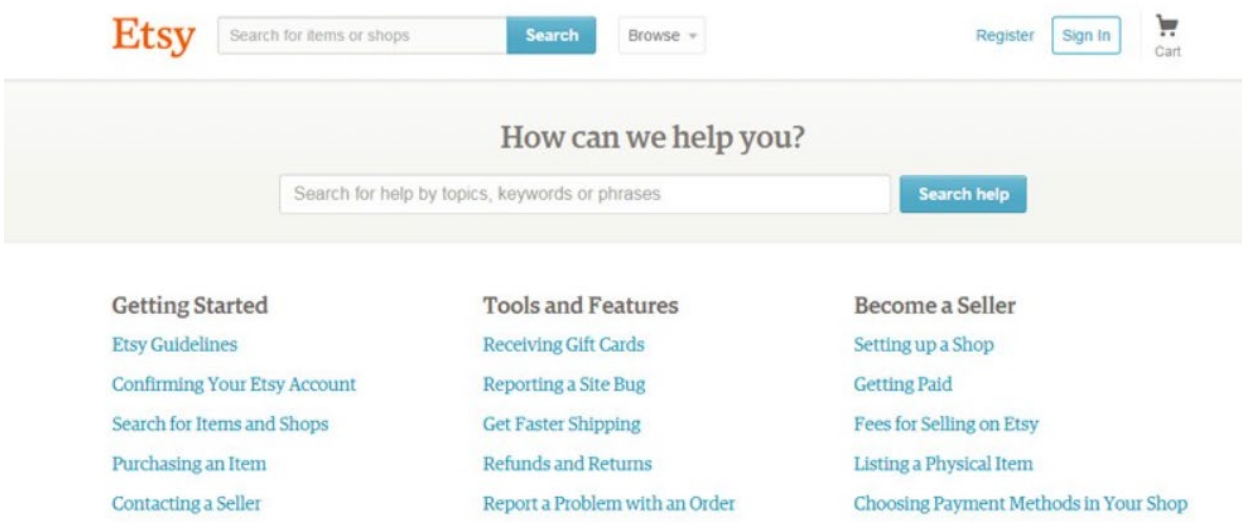
Extra Reading: https://www.nngroup.com/articles/error-message-guidelines/

10 Heuristics for User Interface Design

developed by Jakob Nielsen

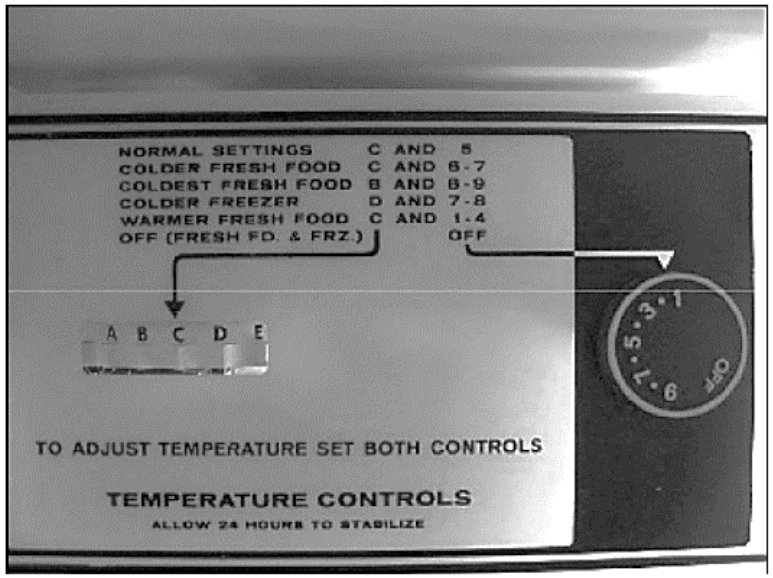
10. Help and documentation

- Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation.
- When help and instructions are needed, they should be accessible, understandable and accurate
- Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

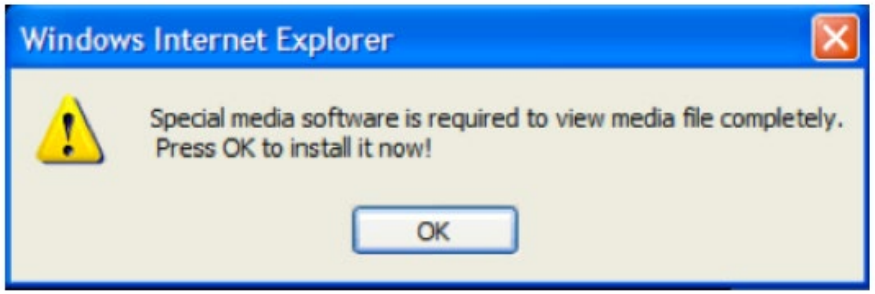


Provided links to some of the most commonly needed resources, in a few different ways. 1. organised into categories, 2. with large icons. 3. More detailed help, they direct me towards the FAQ, the forums and the site policies. 4. the contact link is there if answer not found

User interfaces should always make visible the system status



real world match – Does this?
Why not something like "cold to really cold"?



User control and freedom?

The dialog above is a major violation of this principle; it gives all of the power to the computer

How to Use Heuristic Evaluations to Improve Product Designs

https://xd.adobe.com/ideas/process/user-testing/how-to-heuristic-evaluation-analysis-ux-design/

Evaluations - Informal techniques

Cognitive Walkthrough

- developed early 1990s by Clayton Lewis, Peter Polson and John Rieman – modified by Cathleen Wharton
- One of a number of discount or economical usability methods used to examine the usability of a product
- End-users are not involved in evaluating the interface - internal usability evaluation
- Focus on first-time users
- Task oriented
- It is extremely cost-effective and fast to carry out

Video

Evaluations - Informal techniques

Cognitive Walkthrough

- Can be implemented prior to development during the design phase which can give rapid insight before budget is spent developing an unusable product
- Must be aware of user capabilities
- Designer walks the team through use scenarios, following the expected “Happy Path”; at each step of the task, the team questions the clarity of communication between the interface and the user

Why Cognitive Walkthrough?

aims to look at how easy and obvious goals and actions are and to highlight areas of possible confusion

Is it obvious what to do?

- Will people formulate the right goals?
- Will they realise a goal has been achieved?
- Will they undertake inappropriate goals?
- Will they inadvertently kill off some higher or related goal

Is it obvious how to do it?

- Will people identify the correct actions?
- Will the action contribute to achieving the goal?
- Do actions match people's goals?
- Are there physical difficulties performing actions?

What is the Goal?

To improve the design

Evaluations - Informal techniques

Cognitive Walkthrough Process

- HCI specialist/expert to ‘walk through’ the design
- Identify potential ease-of learning problems

▼

- Expert carries out a range of representative tasks in order of increasing complexity and notes all the problems

▼

- Evaluation of the steps necessary to perform a task
- identifies the difficulties for users trying to learn an interface by exploration and can be performed on low-or high-fidelity prototypes

Evaluations - Informal techniques

Cognitive Walkthrough

Preparation> Address these questions

- How is the interface defined?
- Who will be the users of the system?
- What task (or tasks) will be analysed?
- What is the correct action sequence for each task, and how is it described?

Answering the questions means:

- Making explicit assumptions about the user population and the context of use
- Determining a task scenario
- Identifying the task flow of a successful interaction.

What the user **must know** prior to performing the task

What the user **should learn** while performing the task.

Cognitive Walkthrough

Pros

- May be done without first hand access to users
- Unlike some usability inspection methods, takes explicit account of the user's task
- Provides suggestions on how to improves learnability of the system
- Can be applied during any phase of development
- Is quick and inexpensive to apply if done in a streamlined form

Cons

- Value of the data is limited by the skills of the evaluators
- Tends to yield a relatively superficial and narrow analysis that focuses on the words and graphics used on the screen
- Method does not provide an estimate on the frequency or severity of identified problems
- Following the method exactly as outlined in the research is labour intensive

Improvements to Cognitive Walkthrough

- using experts familiar with the application domain as well as being usability experts
- making tedious form-filling less laborious (e.g. by asking less ambiguous questions and thus lessening the evaluator's load)
- allowing macros of actions – rather than every individual one – to be documented
- allowing the evaluator to document their goal structure to minimise task confusion

6 Steps to Follow in the Cognitive Walkthrough Process

Step 1: Define your user base

- Usability of your site all depends on the specific user
- Setback to cognitive walkthroughs - Do not have the ability to see and understand the site through their eye
- First define your user base through personas
- Conduct your cognitive walkthrough with each of your personas in mind
- To ensure your analysis matches the real experience of different users

6 Steps to Follow in the Cognitive Walkthrough Process

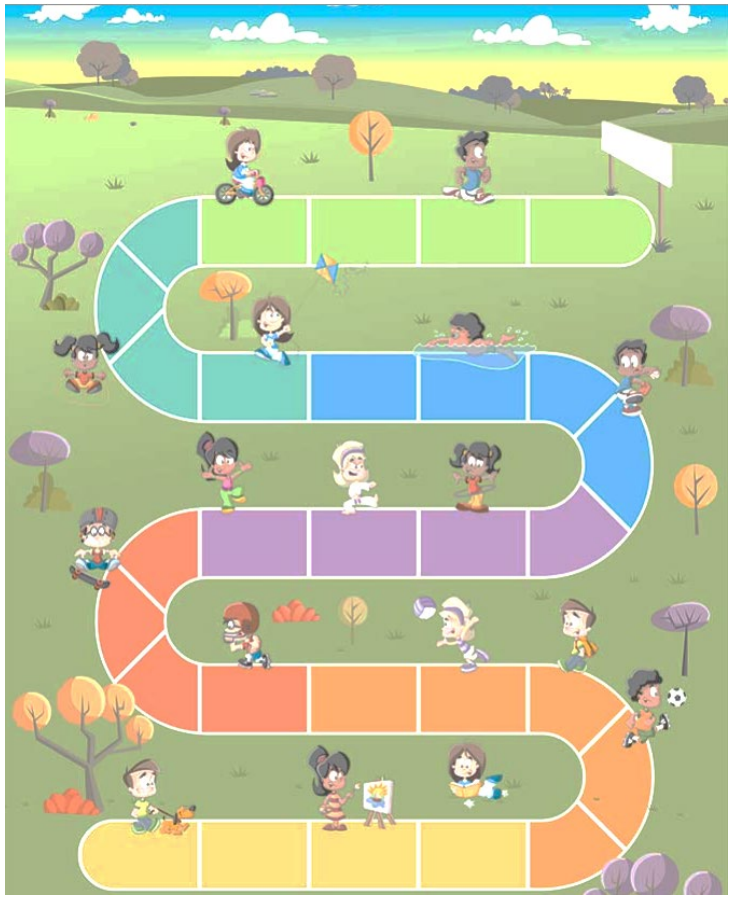
Step 2: Define your user goals

- Compile a list of goals a potential user may have when visiting your website
- Cognitive walkthroughs can be used to evaluate the general usability of your site

6 Steps to Follow in the Cognitive Walkthrough Process

Step 3: Identify the “happy path”

- Create a list of actions a user should take on your site in order to reach that goal you want to test
- Known as the “happy path” to usability testers **“Happy path”** - a scenario where there’s no exceptions or mistakes in the user’s navigation of your site for that specific goal.



List of actions

i.e. Navigate to your main page > Click the “subscribe” button > Fill out contact information > Click next
Choose their desired product version > Click next > Fill out payment information > Click next > Click the pay button

6 Steps to Follow in the Cognitive Walkthrough Process

Step 4: Invite the right team members

Invite internal team members, industry experts to participate in the walkthrough.

Should you invite your designers?

- May/May not
- Might feel the need to defend their design choices, instead of taking a less biased-approach to the walkthrough
- Just make sure everyone is prepared to focus on usability factors specifically

6 Steps to Follow in the Cognitive Walkthrough Process

Step 5: Conduct your walkthrough

- Designate a facilitator who will go through the “happy path” for each task of the walkthrough
- Ask the group participants each of the 4 questions at each step
- Work together to identify any potential issues that could lead a user to stray from the path
- Take notes on issues found

6 Steps to Follow in the Cognitive Walkthrough Process

Step 6: Implement site improvements

- Good understanding of what problems might lead users away from the "happy path" for each goal after asking the 4 questions
- CW can be a huge undertaking when evaluating whole site at once.
- More manageable if CW is conducted each time a new page is created or make major changes to an old one
- Valuable strategy to evaluate website from the perspective of a potential user

CW can help you identify assumptions and issues that prevent the average user from having a good experience on your website

4 Questions to be Asked during a Cognitive Walkthrough

By Blackmon, Polson, et al. in 2002

1. Will the user try and achieve the right outcome?
   - examines whether you are making any assumptions about your users that affect their ability to follow the correct path for a specific goal
2. Will the user notice that the correct action is available to them?
   - finding hidden, obscured, or confusing options on your web page that could prevent users from making the right choice

4 Questions to be Asked during a Cognitive Walkthrough

By Blackmon, Polson, et al. in 2002

3. Will the user associate the correct action with the outcome they expect to achieve?

   - Language used on your site. If you use confusing language or industry jargon on your website, it might limit the ability of some users to understand your site and make the right choice.

4. If the correct action is performed; will the user see that progress is being made towards their intended outcome?

   - Good conversion-driving user experience design affirms that users are on the right track for a task whenever they take the correct action. Ecommerce stores with progress bars in the checkout process do this very well

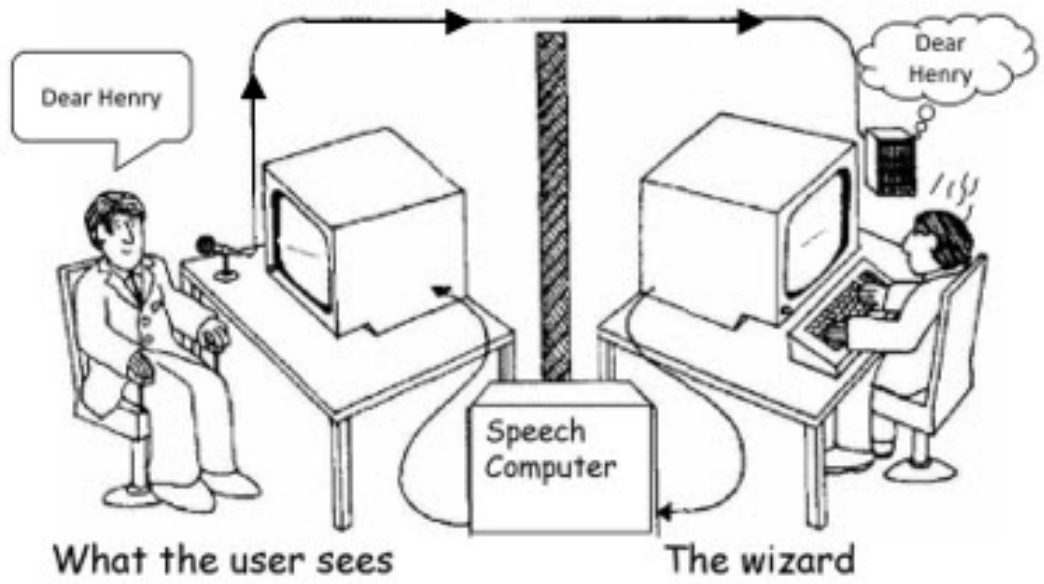
The Cognitive Walkthrough: A Low-Cost Usability Testing Method and Empathy Training Tool

https://xd.adobe.com/ideas/process/user-testing/cognitive-walkthrough-improve-ux/

Evaluations - Formal techniques

Wizard of Oz (WOz)

- Coined by John F. Kelly
- Involves a user interacting with a computer system which is actually operated by a hidden developer
- Method is specific type of observational evaluation, known as interactive observation
- Widely accepted as an evaluation and prototyping- used to analyze a partially implemented computer application for design improvements



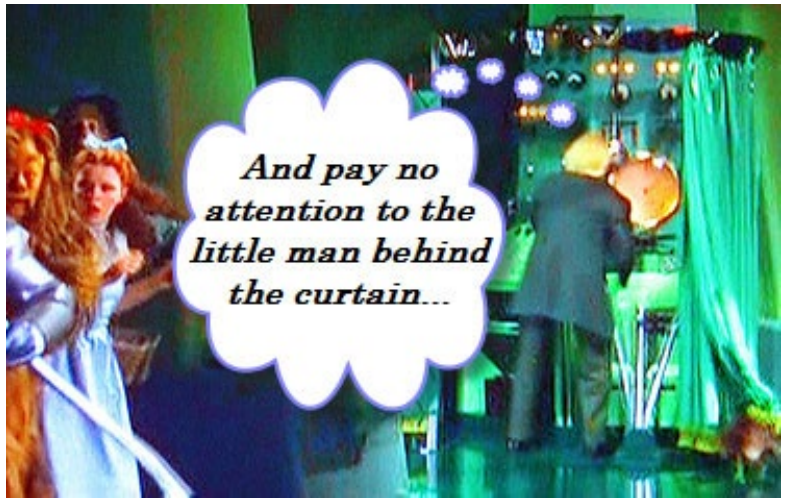
Wizard of Oz testing – The listening typewriter IBM 1984
The user is sitting in one room talking into a microphone while the 'Wizard' sits behind the scenes typing what the user is saying so it appears on the user's screen as if it was done by the computer.

Wizard of Oz

Allows researchers to test a concept by having one practitioner – the '**Moderator**' – leading the session face to face with each user, whilst another practitioner – the '**Wizard**' – controls the responses sent to the user via the chosen device.

Evaluations - Formal techniques

Wizard of Oz (WOz)



Wizard ▶

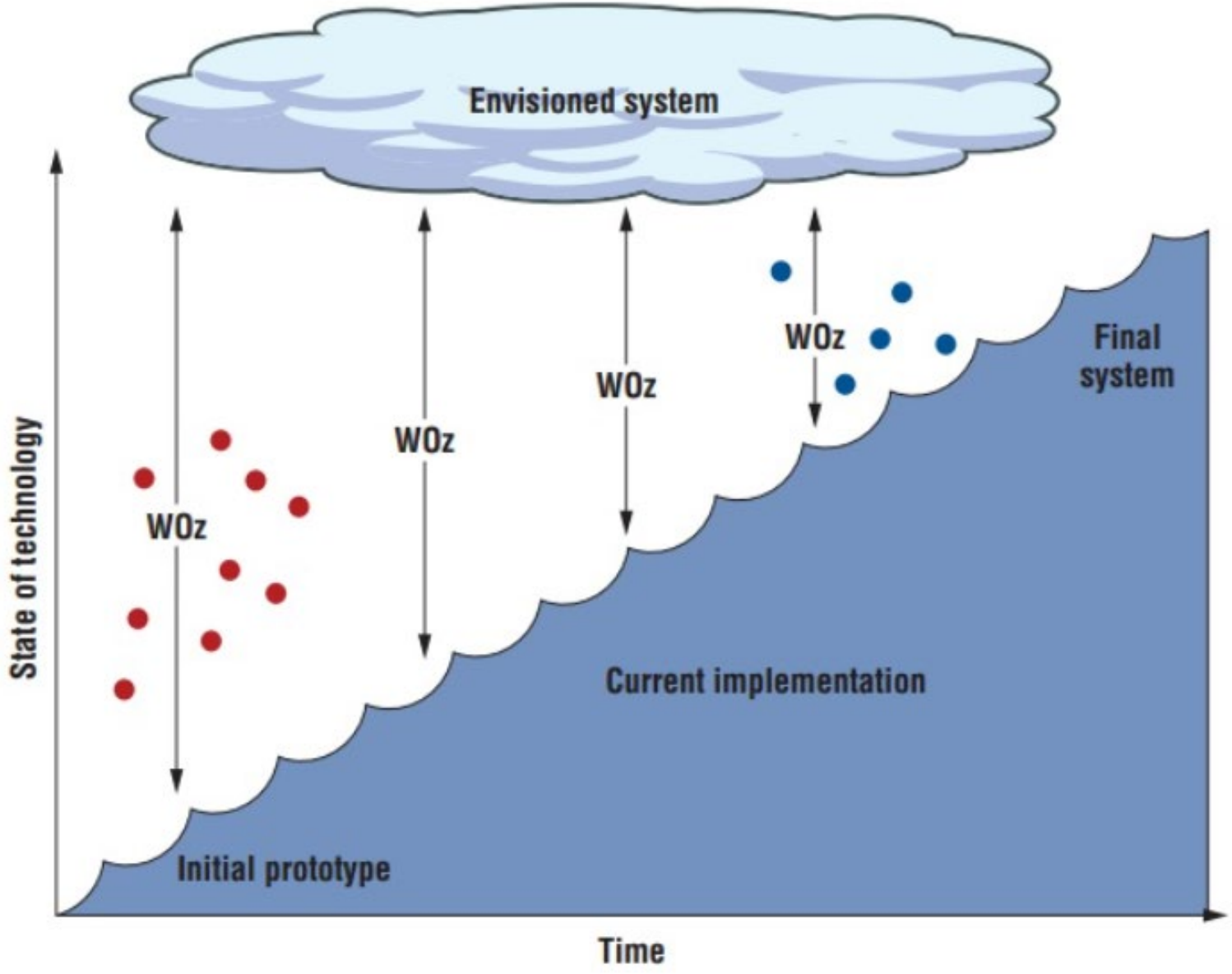
- takes input from a user and simulates system output
- User - led to believe that they are interacting with and directly controlling a computer system or real application – usually a software prototype

Evaluations - Formal techniques

When to use Woz in a design process

- employed to simulate and test unimplemented technology, mainly fits in the early stage of design

Could solicit valuable feedback on future design direction and rule out wrong assumptions before they lead to any serious consequences



WOz is commonly used in the initial prototyping stage (red dots)

It can serve to fill the gap between the current implementation and envisioned system and to provide user experience insights throughout the entire design process.

Dow, S., MacIntyre. B, Lee, J., Oezbek, C., Bolter, J.D., Gandy, M. Wizard of Oz Support throughout an Iterative Design Process. In *Pervasive Computing, IEEE*, 4(4), 18-26. Authors re-emphasized the value of using Wizard of Oz in an iterative design process.

Designing and Running a Wizard of Oz Study

Designing

- Plan scenarios and application flow
- Deploy the interface "skeleton"
- Decide the form of input from the Wizard and implement it
- Rehearsal

Designing and Running a Wizard of Oz Study

Running

- Two roles: the facilitator (who interacts with participants and takes notes or measures or observe) and the Wizard (the operator)
- Forms of user feedback can be
  - Think aloud
  - Retrospective (such as questionnaires)
  - Heuristics
  - Quantitative measurement
- Debrief if needed
- Rehearsal

Steps in conducting WOz

by **RESPECT** European Usability Support Centre

1. Develop the Wizard of Oz prototype, design the tasks, and recruit the users.
2. Allocate the role of wizard and the role of facilitator to the relevant staff.
3. Assemble the necessary equipment and interconnecting software.
4. Select appropriate users to test the prototype, and try to cover the range of users within the target population.
5. Prepare realistic task scenarios for the evaluation.
6. Pilot the evaluation procedure, ensure the wizard is well practised in playing the role of the computer.
7. Ensure recording facilities are available and functioning.

Steps in conducting WOz

by **RESPECT** European Usability Support Centre

8. Conduct each session. The facilitator instructs the user to work through the allocated tasks interacting and responding to the system as appropriate.

9. Conduct post-session interviews with the users, drawing upon pre-set questions and issues raised during the use of the prototype.

10. Debrief the users and thank them for their co-operation.

11. Analyse information obtained, summarise observations and user evaluations. Consider the themes and severity of the problems identified.

12. Summarise design implications and recommendations for improvements, and give feedback to the design team. Video recordings can support this.

13. Where necessary, refine the prototype and repeat the above process.

Limitation of WOz

- The ‘wizard’ must appreciate the functionality of the proposed system in order to provide a convincing representation.
- Approach requires a high commitment of resources (people, staging, equipment, software tools, and task designs: the minimum required is the system under evaluation, a system to control the evaluation, two evaluators – wizard and recorder).
- Evaluators need intimate knowledge of the operation of the system in order to ensure a convincing representation.
- Problematic to evaluate systems with a large graphical interface element.

WOz

Pros

1. Faster, cheaper and more
2. Available in early stages of design
3. More "real" than other early prototyping methods
4. Useful for envisioning and proactively evaluating hard-to-build interfaces
5. A designer learns when playing as the wizard

Cons

1. Simulations may conceal possible errors or problems in technology implementation
2. Simulated technologies may not be possible to implement now, or ever.
3. Challenges of a Wizard
4. Cost-intensive
5. Some features cannot be easily simulated by human

Experimental evaluation

Empirical evaluation

- carrying out a study or experiment on a number of participants (or subjects, or users) to establish whether or not a system meets specific, testable user requirements.

- Involves users in assessing an interface for usability in order to demonstrate factors such as ease of use or ease of learning.

- Provides metrics to test whether usability requirements are met.

- Approaches cover a range of subjective data collection activities to get users' opinions and identify preferences.

Experimental evaluation

Definitions

1. Experiment
2. Variables
3. Independent variables
4. Dependent variables
5. Data
6. Subjects
7. Hypotheses testing
8. Experimental design
9. Procedure

Carrying out an Experimental evaluation

- formulate hypotheses about the different interfaces
- list all the variables which might affect the results of the experiment
  - decide on the independent variables (and their levels), the dependent variables and which variables need to be controlled by some means
- decide on the experimental design, or data collection method
  - select subjects or users
  - devise a set of tasks that will enable the hypotheses to be tested
  - decide on the appropriate statistical or other analysis

Carrying out an Experimental evaluation

- measure dependent variables
- collect quantitative data from users
- analyse data using statistical tests
- derive metrics and draw comparative conclusions
- write up the study and describe what was found.

Choosing an evaluation techniques

- Heuristic Evaluation - meet specific requirement
- Benchmark tests - meet specific usability targets
- Laboratory experiments- choose from alternative designs
- Scenarios or field studies - to inform the early stages of design

Graphic from fastlubeplus.com

Choosing an evaluation techniques

Strategies based on activity classifications

Observing users

- Observation, as an outsider or insider; in a controlled laboratory environment versus in a natural environment, examining the people, places, and things involved in the task

- Indirect observation via interaction logging; user diaries or journals

- Interpretation through grouping together of qualitative notes, or by statistical analysis of quantitative data to find incidents of note, patterns, or groupings

Choosing an evaluation techniques

Strategies based on activity classifications

Asking users

- Interviews – open or unstructured; structured; semi-structured; individual; group; focus group.
- Questionnaires – specific/structured questions for large samples.

Choosing an evaluation techniques

Strategies based on activity classifications

Testing users

- **Experiment**
  - searching for new knowledge and has independent and dependent variables. Issues of control and repeatability are important.

- **Testing**
  - goals to be determined, questions decided upon, users selected, tasks developed, and the test itself run.

  - Issues to be focused on will be task-based questions, the navigation trail made by users and feedback on user satisfaction through a post-test questionnaire.

Choosing an evaluation techniques

Strategies based on activity classifications

Modelling users

- **Design inspections**
  - by an expert evaluator, rather than a user, such as Heuristic Evaluation and Cognitive Walkthrough
- **Predictive models**
  - GOMS, KLM, and Fitt's law..
  - Assess the cognitive skill and knowledge required to use an
  - interface based on psychological models of the user.
    Used to predict performance times to carry out certain tasks but have
  - Some problems in usage, such as scalability and dealing with errors and complex behaviour

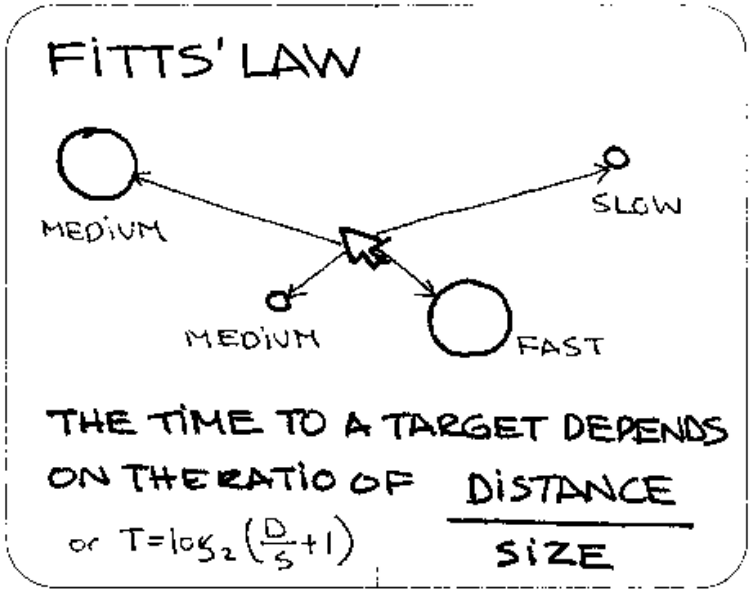
Choosing an evaluation techniques

Strategies based on activity classifications

GOMS (Goals, Operators, Methods, and Selection)
A family of predictive models of human performance that can be used to improve the efficiency of human-machine interaction by identifying and eliminating unnecessary user actions.

KLM
Keystroke-Level Model GOMS (KLM-GOMS) is a quantitative modeling tool for predicting how long it will take expert users to complete a specific task with no errors.

Fitts's law
The time required to reach a target is based on the distance from the starting point and the size of the target.



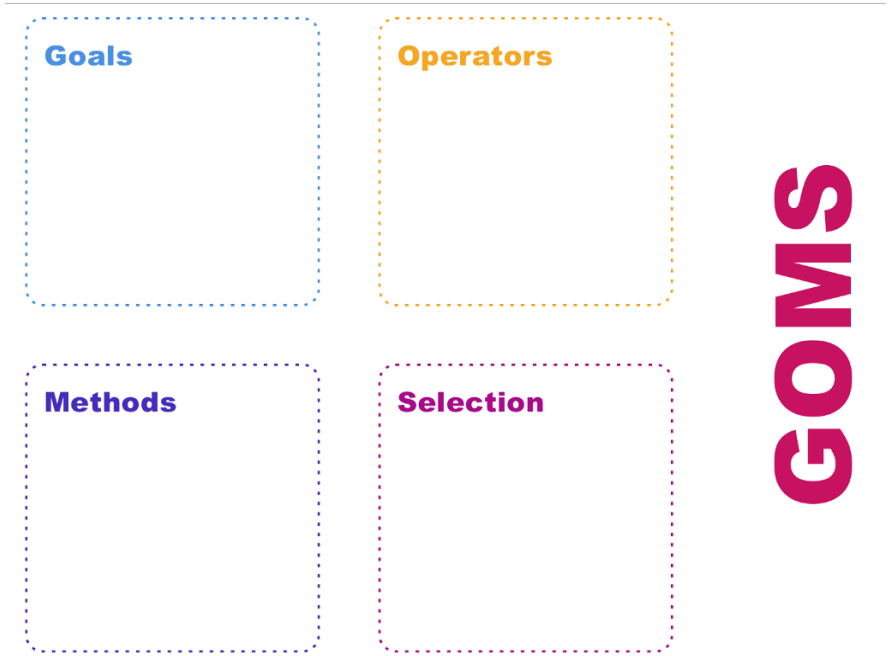
GOMS is a model of human performance and it can be used to improve human-computer interaction efficiency by eliminating useless or unnecessary interactions.

G → Goals (G) as a task to do e.g. “Send e-mail”

O → Operators (O) as all actions needed to achieve the goal e.g. “amount of mouse clicks to send e-mail”

M → Methods (M) as a group of operators e.g. “move mouse to send button, click on the button”

S → Selection (S) as a user decision approach e.g. “move mouse to send button, click on the button” or “move mouse to send button, click ENTER”



References and reading

Usability 101: Designing for A Better User Experience
https://www.invespcro.com/blog/usability-101-designing-for-a-better-user-experience/

User Interface Usability Evaluation with Web-Based Questionnaires
http://garyperlman.com/quest/

Thinking Aloud

Thinking Aloud

In a thinking aloud test, you ask test participants to use the system while continuously thinking out loud — that is, simply verbalizing their thoughts as they move through the user interface.

Running a basic thinking aloud usability study

1. Recruit representative users
2. Give them representative tasks to perform.
3. Shut up and let the users do the talking.

https://www.nngroup.com/

Think - Aloud Benefits

1) **Cheap**
   - no special equipment needed
   - sit next to a user and take notes as he or she talks

2) **Robust**
   - Still get reasonably good findings, even from a poorly run study

3) Flexible
   - any stage in the development lifecycle, from early paper prototypes to fully implemented, running systems
- Suited for agile projects

4) Convincing

5) Easy to learn

Think - Aloud Downsides

1) **Unnatural situation**
   - Hard for test participants to keep up with required monologue – most people don’t sit and talk to themselves all day

2) **Filtered statements (vs. brain dump)**
   - Users are supposed to say things as soon as they come to mind rather than reflect on their experience and provide an edited commentary after the fact. Essential to get the user's raw stream of thought.

3) **Biasing user behaviour.**
   - Prompts and clarifying questions, such interruptions from untrained facilitator can very easily change user behaviour.

4) **No panacea.**
   - Thinking aloud serves many purposes, but not all purposes.
     Explore other usability methods

Rethinking Thinking Aloud:
A Comparison of Three Think-Aloud Protocols

https://www.coursera.org/learn/uol-cm3055-interaction-design/supplement/ML2qg/think-aloud-reading