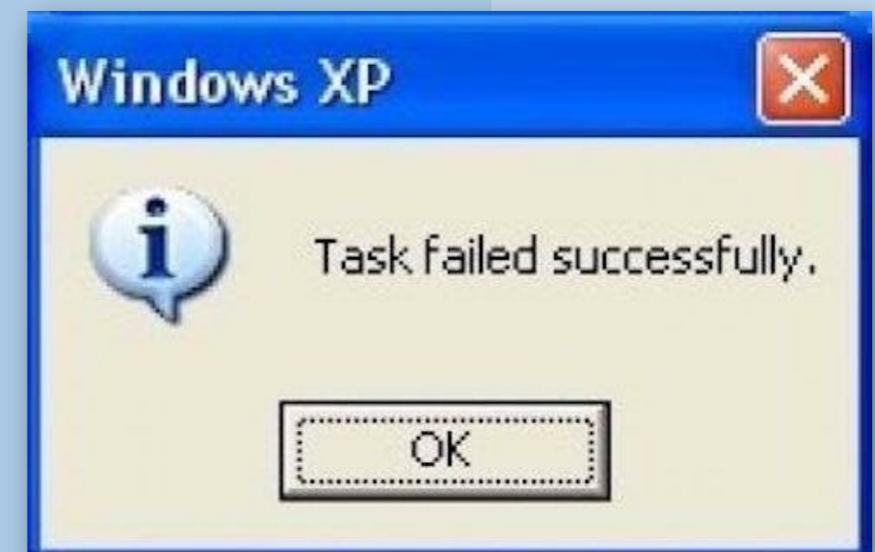


Introduction to Software Engineering

User Interface Design



Roadmap

- > Motivation
- > Graphical User Interfaces (GUI)
- > Interface design
- > Design principles
- > Usability Testing



Literature

Sources

- > ***Software Engineering***, Ian Sommerville. Addison-Wesley, 10th edition, 2015
- > ***Software Engineering — A Practitioner's Approach***, R. Pressman, McGraw Hill, 8th edition, 2003.

Recommended reading

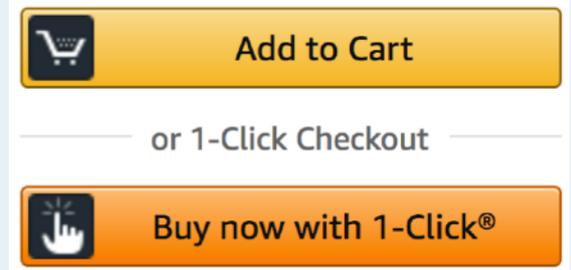
- > Jakob Nielsen, ***Usability Engineering***, Morgan Kaufmann, 1999.
- > Alan Cooper, ***About Face — The Essentials of User Interface Design***, Hungry Minds, 1995.
- > Alan Cooper, ***The Inmates are running the Asylum***, SAMS, 1999.
- > Jef Raskin, ***The Humane Interface***, Addison Wesley, 2000.
- > Jeff Johnson, ***GUI Bloopers***, Morgan Kaufmann, 2000.

Roadmap



- > **Motivation**
- > Graphical User Interfaces (GUI)
- > Interface design
- > Design principles
- > Usability Testing

When one click can make a difference



Home > News > E-Business

September 18, 2000 6:15 PM PDT

Apple licenses Amazon's 1-Click

By Troy Wolverton
Staff Writer, CNET News

Apple Computer has become the first company to license Amazon.com's controversial patented 1-Click technology.

Apple added the feature to its online store today, said Mitch Mandich, senior vice president of worldwide sales at Apple.

"It's great technology," Mandich said. "It provides (Amazon's) customers with excellent service and easy ordering. We wanted customers to have that same kind of experience in our store."

Amazon executives did not immediately respond to calls seeking comment. Mandich declined to disclose the financial terms of the licensing agreement.

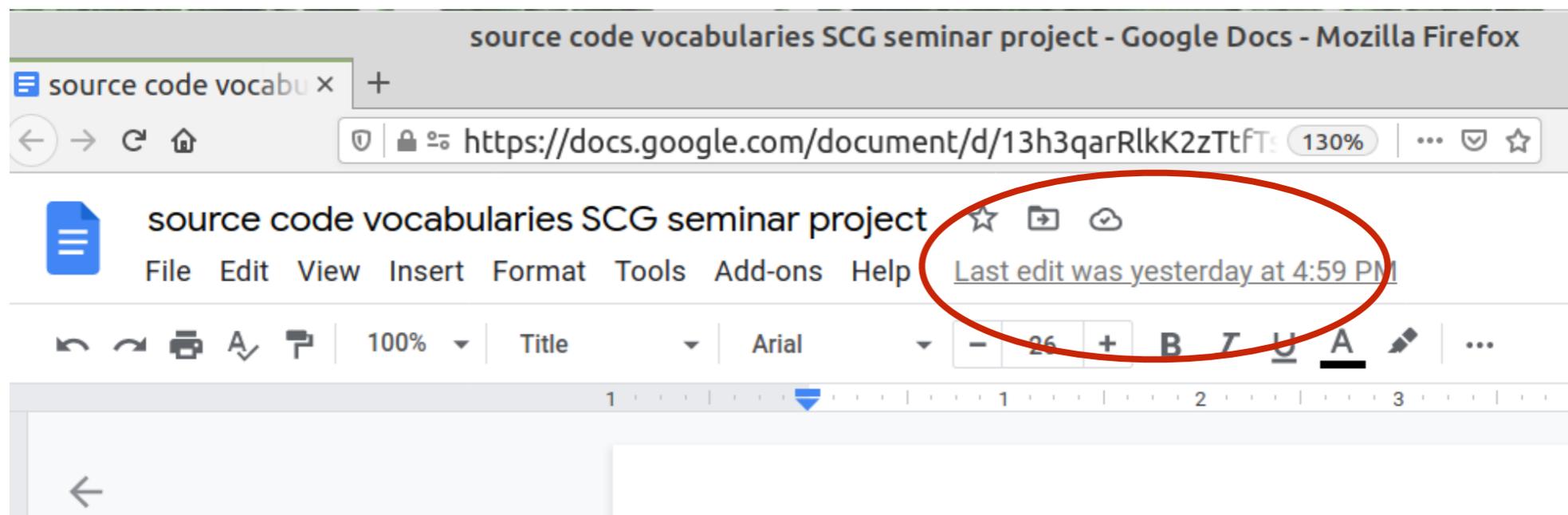
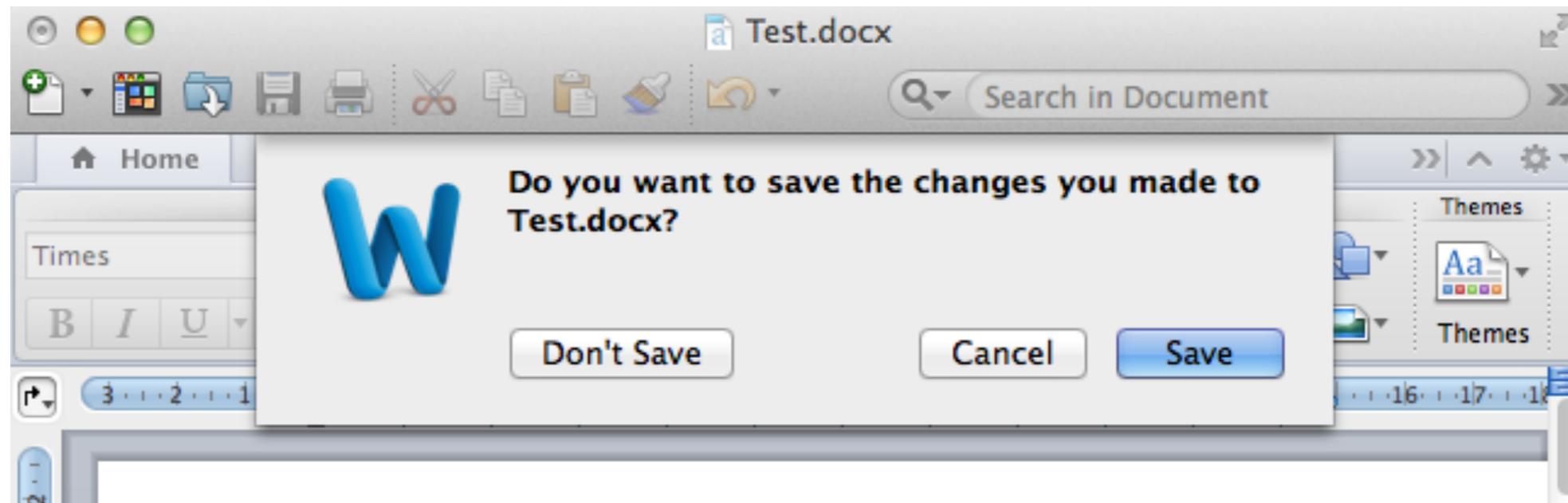
Amazon's 1-Click feature allows returning customers to purchase items by simply pressing one mouse button. The technology saves people from having to re-enter shipping addresses or credit card numbers.

The technology is at the center of a patent dispute between Amazon and Barnesandnoble.com. Amazon [sued](#) its bookstore rival in October, accusing Barnesandnoble.com of illegally copying its 1-Click feature.

Patent: “Method and System for Placing a Purchase Order via a Communication Network” — placing a cookie on a user’s machine that allows her to be identified and thus buy without logging. The fact that Amazon got a patent on 1-click buy was unfortunate (the patent was cancelled in the meantime).

The fact that users buy more in this way is validated by the fact that Apple licensed the patent from Amazon.

User interaction design is a humanitarian duty



Time is life.

You are either saving time, or wasting time.

Do not squander the time of your user.

(Many modern editors just save all your changes without asking, and let you undo if necessary.)

Usability should be more important than aesthetics



Usability should be more important than aesthetics



Designers tend to emphasize form over functionality. Reward structures in the art world encourage that.

Customer: The roof is leaking all over dinner guest.

Frank Lloyd Wright: Tell him to move his chair.

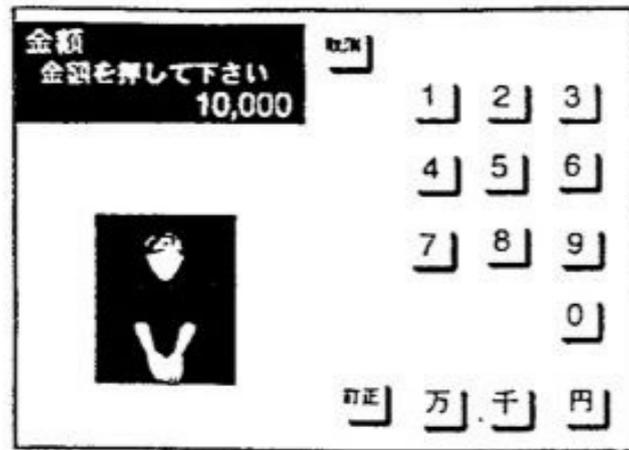
<https://www.dezeen.com/2013/04/18/santiago-calatrava-must-pay-for-ysios-winery-leaking-roof/>

Student: I feel dizzy when I look out of the window because of the way the grates reflect light.

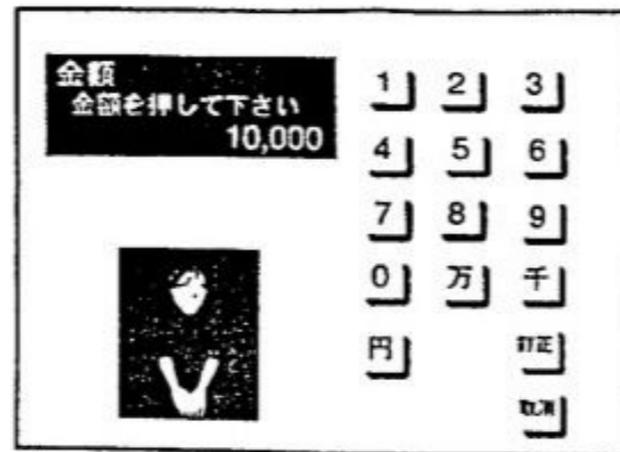
Architect: Don't look out of the window.

(The lovely building in the picture is the computer science building at the University of Lugano. The windows are all covered with fixed grates.)

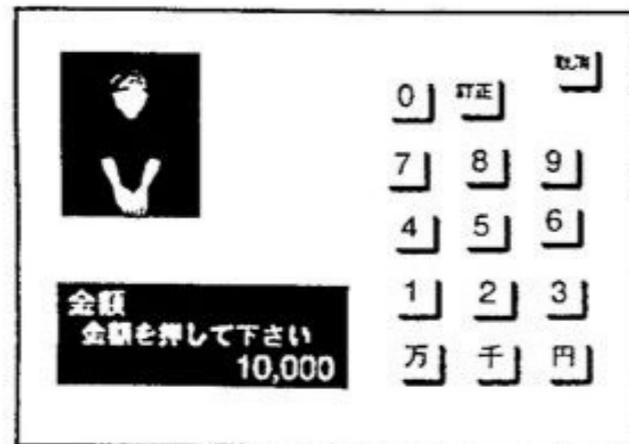
Aesthetics should not be dismissed



High Usability Score and Low Beauty Score (No.6)



High Usability Score and High Beauty Score (No.23)



Low Usability Score and Low Beauty Score (No.17)



Low Usability Score and High Beauty Score (No.13)

Fig.2 Typical sample layouts.

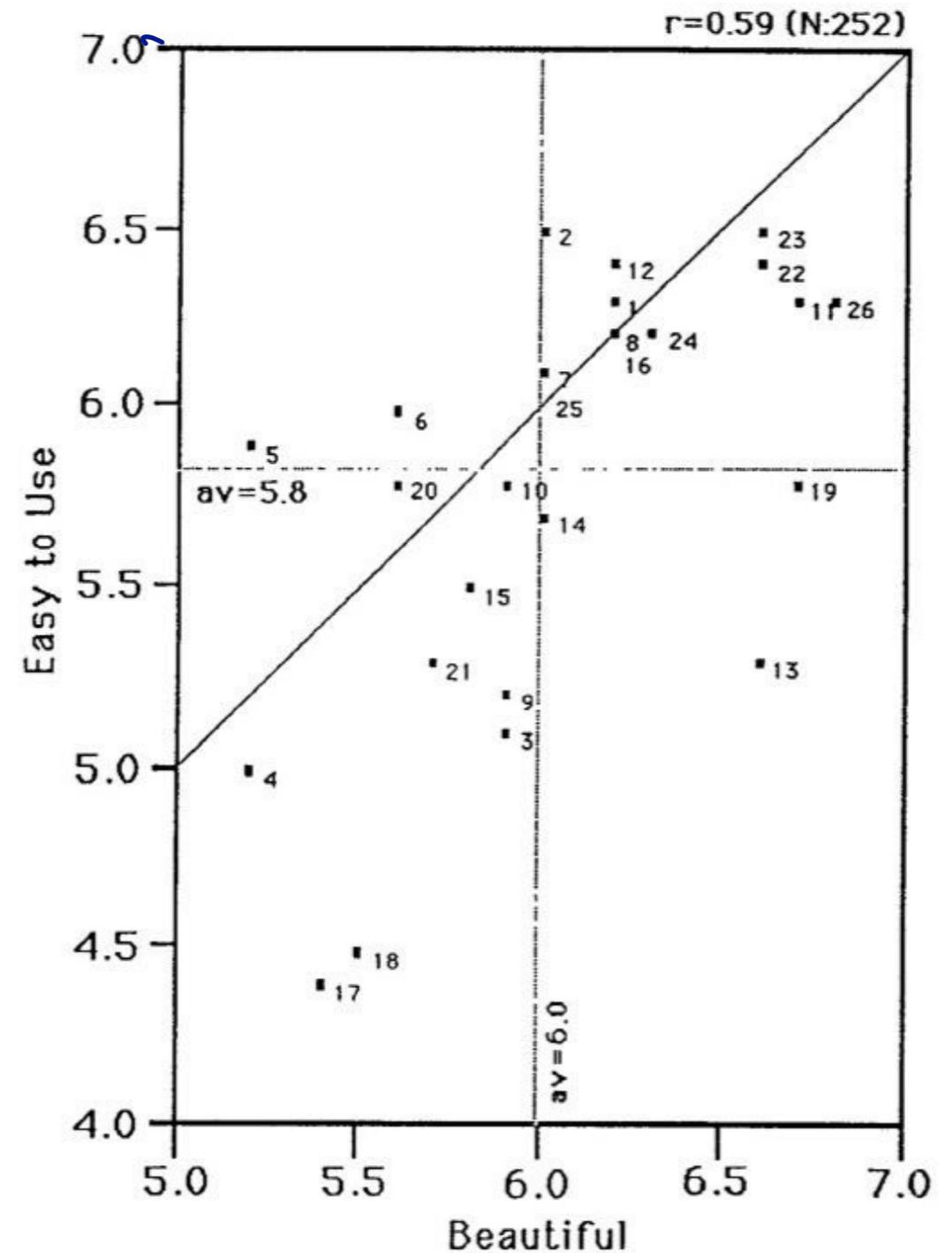


Fig.1 Correlation between two kinds of judgements for 26 layout samples.

Usability influences perception of usefulness

In experimental analysis on the determinants of the apparent usability, poor usability (e.g., poor keyboard layout) was perceived as poor aesthetics.

Kurosu, M., & Kashimura, K. (1995). Apparent usability vs. inherent usability: experimental analysis on the determinants of the apparent usability.

<http://dl.acm.org/citation.cfm?id=223680>

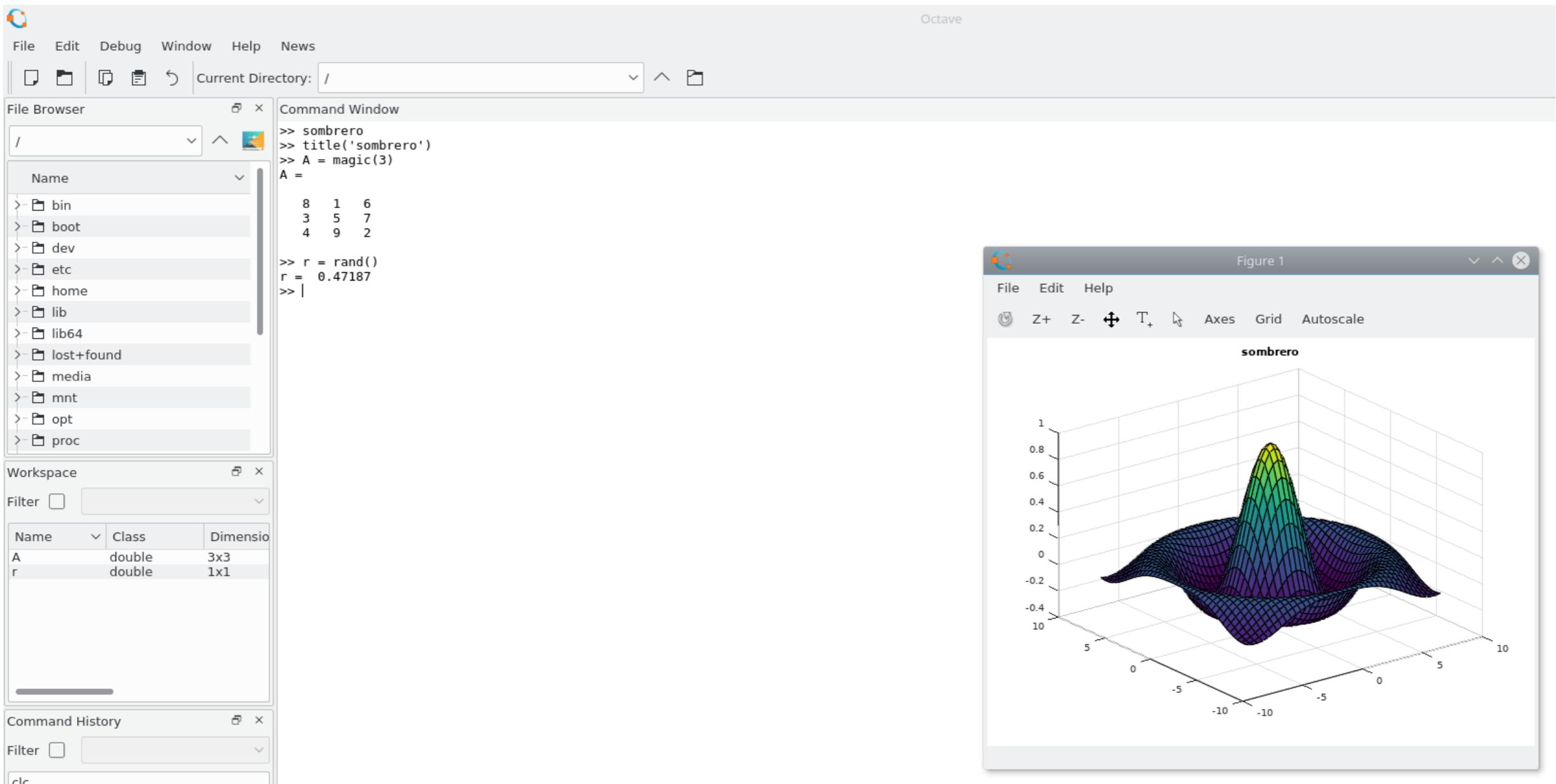
Roadmap

- > Motivation
- > **Graphical User Interfaces (GUI)**
- > Interface design
- > Design principles
- > Usability Testing



Command Line Interfaces

With a command language, the user types commands to give instructions to the system



The image displays the Octave software interface, which is a command-line environment for numerical computing. The main window is titled "Octave" and features a menu bar with "File", "Edit", "Debug", "Window", "Help", and "News". Below the menu bar is a "Current Directory" field set to "/".

The interface is divided into several panels:

- File Browser:** Shows a tree view of the file system with folders like bin, boot, dev, etc, home, lib, lib64, lost+found, media, mnt, opt, and proc.
- Command Window:** Contains the following commands and their output:

```
>> sombrero
>> title('sombrero')
>> A = magic(3)
A =
    8    1    6
    3    5    7
    4    9    2

>> r = rand()
r = 0.47187
>> |
```
- Workspace:** A table showing the current workspace variables:

Name	Class	Dimension
A	double	3x3
r	double	1x1
- Command History:** Shows the command "clc" entered.

On the right side, a separate window titled "Figure 1" displays a 3D surface plot of the sombrero function. The plot is titled "sombrero" and shows a central peak with a color gradient from purple at the base to yellow at the top. The axes are labeled with values from -10 to 10.

Command Line Interfaces

Advantages

- > Allow experienced users to *interact quickly* with the system
- > Commands can be *scripted* (!)

Problems

- > Users have to *learn and remember* a command language
- > Not suitable for *occasional* or inexperienced users
- > An *error detection* and recovery system is required
- > *Typing ability* is required (!)

WIMP GUIs

Characteristic

Description

Windows

Multiple windows allow *different information to be displayed simultaneously* on the user's screen.

Icons

Usually icons represent *objects* (including files, folders and applications), but they may also stand for *processes* (e.g., printer drivers).

Menus

Menus bundle and organize *commands* (eliminating the need for a command language).

Pointing

A pointing device such as a mouse is used for *command choices* from a menu or indicating items of interest in a window.

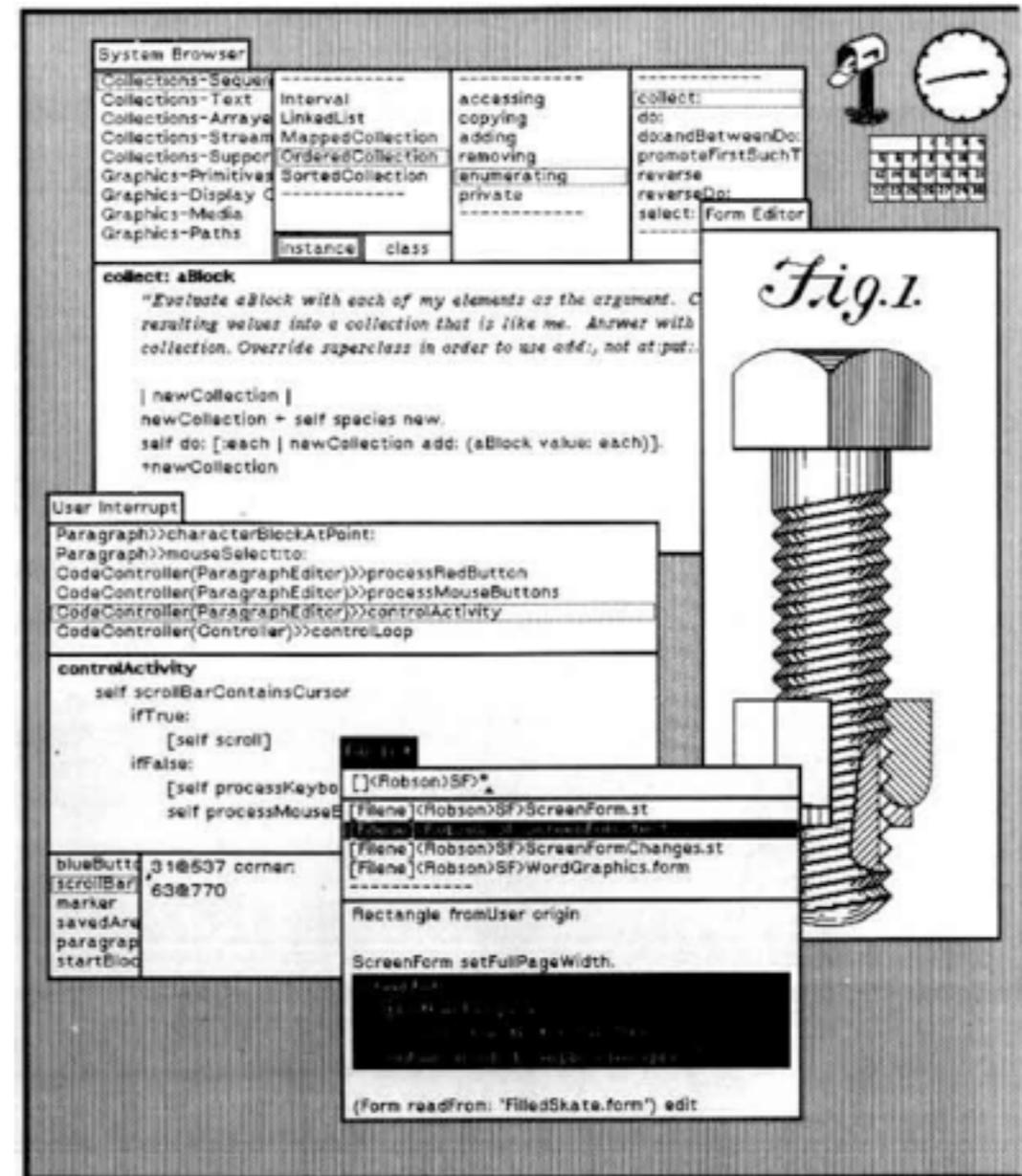
Graphics

Graphical elements can be *commands* on the same display.

The Origin of GUIs



XEROX Alto



Smalltalk 80

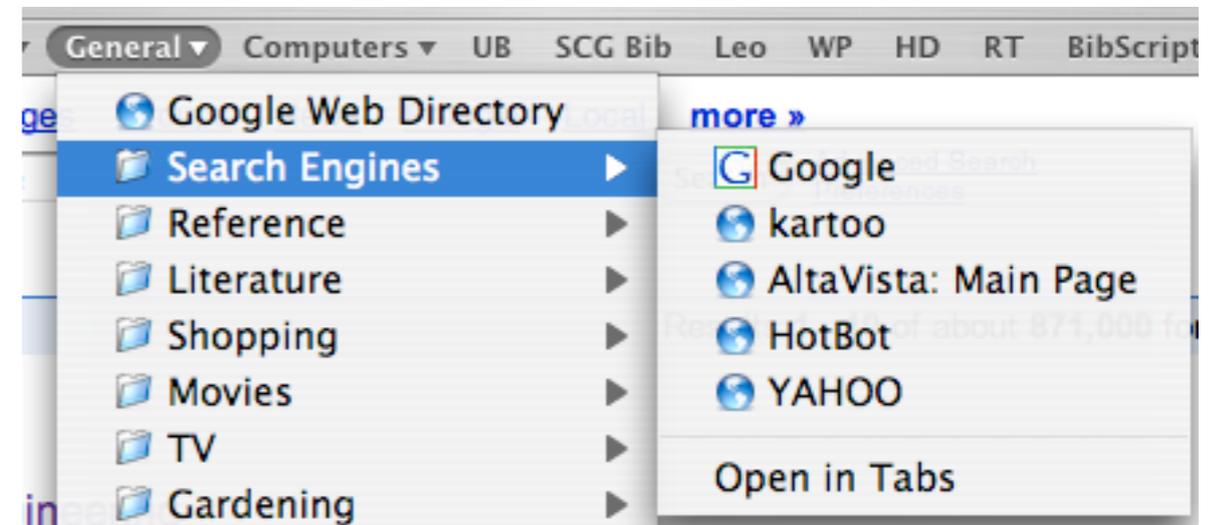
The XEROX Alto was the first computer to use the desktop metaphor and a mouse in the early 1970s.

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

Menu Systems Interface

Advantages

- > Users don't need to remember command names
- > Typing effort is minimal
- > **User errors are trapped by the interface**



Problems

- > Actions involving *logical conjunction* (and) or disjunction (or) are *awkward* to represent
- > If there are many choices, some *menu structuring* facility must be used
- > *Experienced users find menus slower* than command language

Menu Structuring

Scrolling menus

- > The menu can be scrolled to reveal additional choices
- > Not practical if there is a very large number of choices

Hierarchical menus

- > Selecting a menu item causes the menu to be replaced by a sub-menu

Walking menus

- > A menu selection causes another menu to be revealed

Associated control panels

- > When a menu item is selected, a control panel pops-up with further options

GUI - Summary

Advantages

- > They are *easy to learn* and use.
 - Users without experience can learn to use the system quickly.
- > The user may *switch attention* between tasks and applications.
- > *Fast, full-screen interaction* is possible with immediate access to the entire screen

Problems

- > A GUI is not automatically a good interface
 - Many software systems are *never used* due to poor UI design
 - A poorly designed UI can cause a user to make *catastrophic errors*

Visual vs audio?



“In 1986, I asked a group of 57 computer professionals to predict the biggest change in user interfaces by the year 2000. The top answer was speech I/O, which got twice as many votes as graphical user interfaces.” — Jakob Nielsen

People think that voice interfaces are inherently superior as IO but this is probably mostly due to the Star Trek show.

Visual interfaces are inherently superior to audio for many tasks. In few cases audio is better:

- eyes-busy / hands-busy

- disabilities

- no access to keyboard / monitor

The main drawback? Visual interfaces are heavily parallel. Audio is serial.

See Nielsen's "Voice Interfaces: Assessing the Potential":

<http://www.nngroup.com/articles/voice-interfaces-assessing-the-potential/>

Roadmap

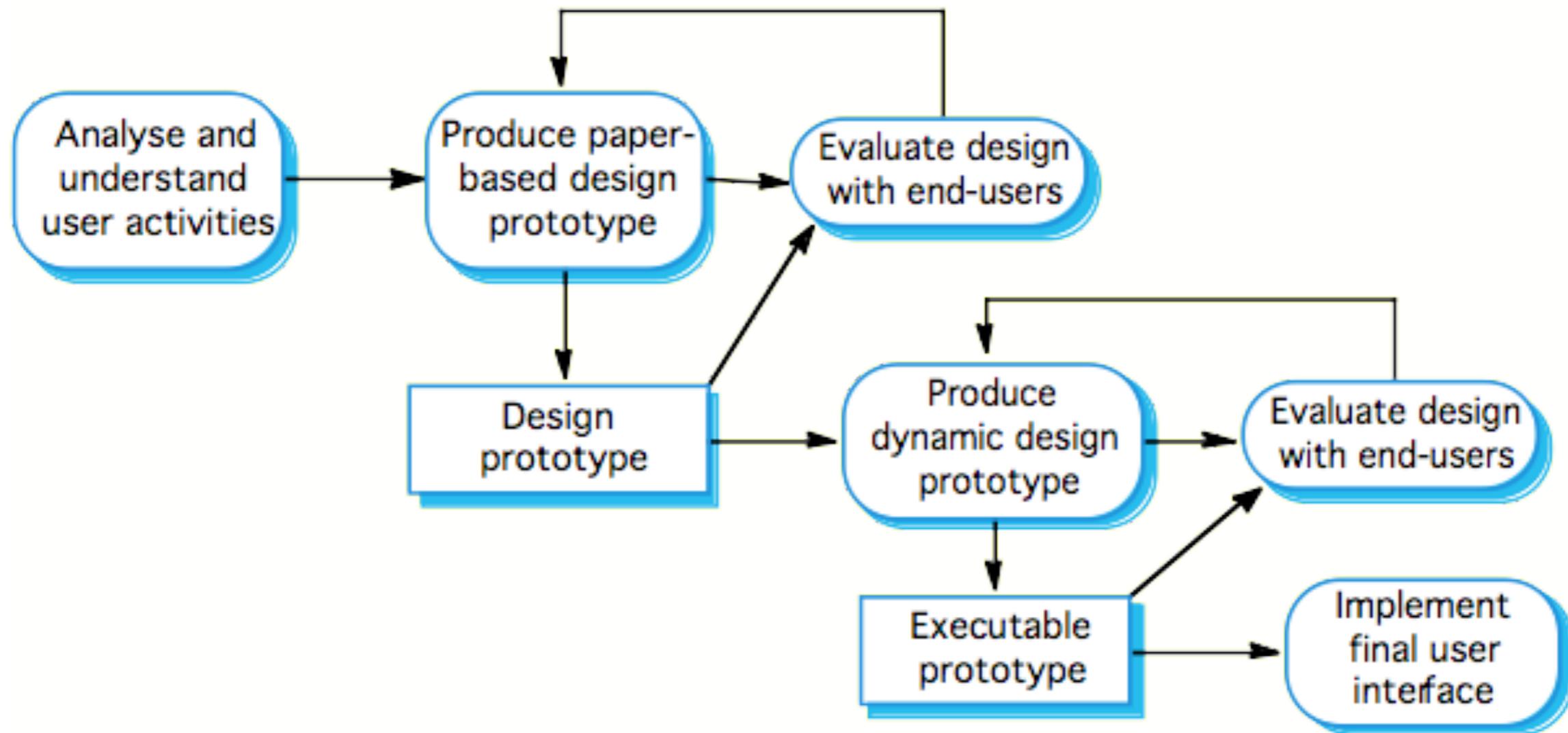
- > Motivation
- > Graphical User Interfaces (GUI)
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- > Usability Testing



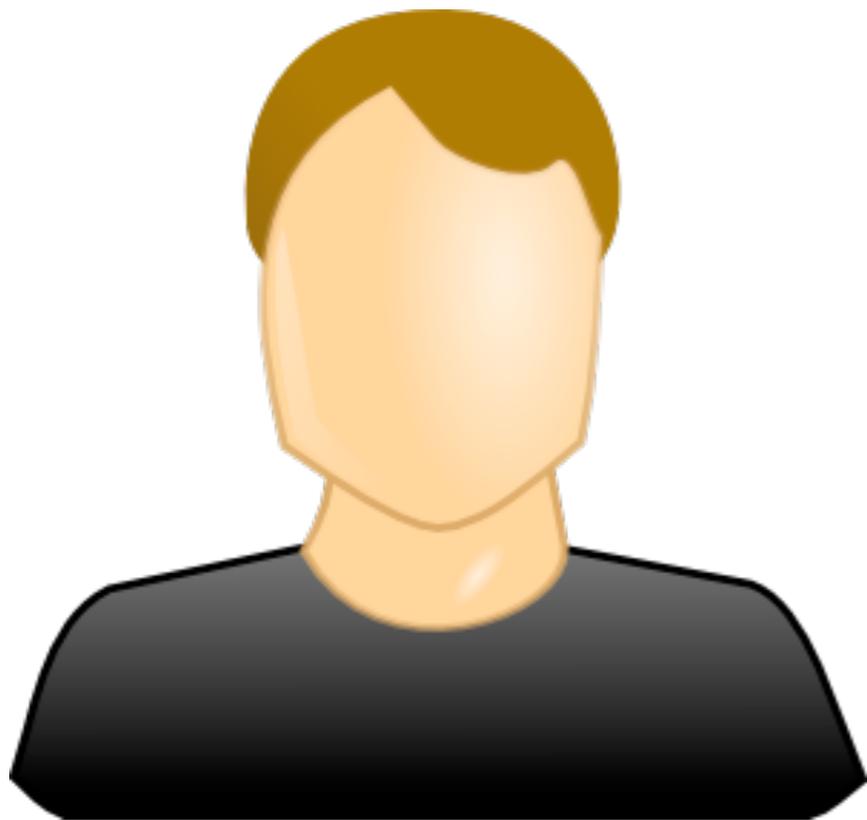
The interface design process

- > User-Interface (UI) design is an ***iterative process*** involving close liaisons between users and designers.
- > The 3 core activities in this process are:
 - ***User analysis***. Understand what the users will do with the system;
 - ***System prototyping***. Develop a series of prototypes for experiment;
 - ***Interface evaluation***. Experiment with these prototypes with users.

The design process



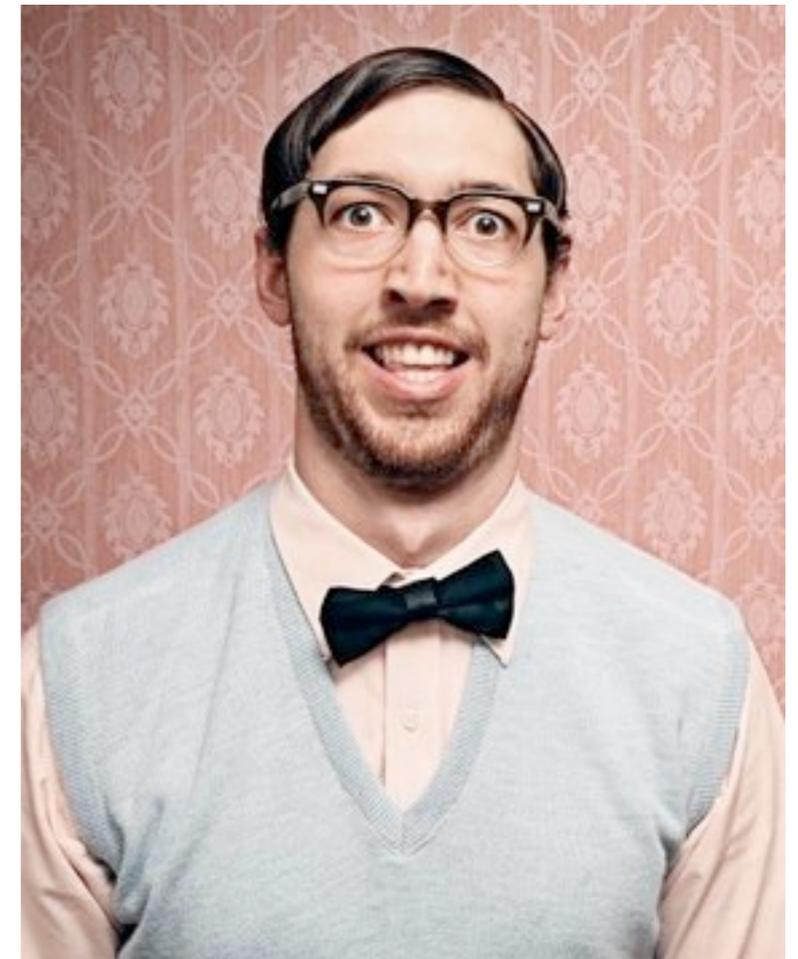
Personas [Alan Cooper]



The User



Maud



Elmer

It is sometimes better not to talk about “the user” but think about *a specific customer*.

Think about an n-dimensional space generated by user characteristics. The more characteristics you have, the higher the chance that you are going to come out with a combination that does not represent anybody.

Technique from Marketing

- generate characteristics after interviews with users
- helps in focusing a product’s features
- a single persona should be the main focus of a design

Imagine designing a phone for Maud. Or a motorcycle. Popularized by Alan Cooper in his book “The Inmates are Running the Asylum”.

Common exercises:

- propose a product and explain how would you design it differently for each of the two personas

Roadmap

- > Motivation
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User Interface Design Principles [1/2]

<i>Principle</i>	<i>Description</i>
<i>User familiarity</i>	Use terms and concepts <i>familiar</i> to the user.
<i>Consistency</i>	Comparable operations should be activated in the <i>same way</i> . Commands and menus should have the same format, etc.
<i>Minimal surprise</i>	If a command operates in a known way, the user should be able to <i>predict</i> the operation of comparable commands.
<i>Feedback</i>	Provide the user with visual and auditory feedback, maintaining <i>two-way communication</i> .

User familiarity: standard web page layout

Consistency: consistent save dialogue; consistent infinite undo

Minimal surprise: swipe left/right to delete? (motorcycle acceleration — which way to rotate?)

Feedback: is the application doing something? has it frozen?

Where to click to search this site? *(user familiarity)*

The screenshot shows the Hobbycraft website homepage. At the top right, there is an "Email newsletter signup" form with a search icon. The main navigation bar includes the "hobbycraft" logo, "Ideas Library", "Online Shop", and "Stores". A large banner for "Cake Craft" features a glass cake stand with cupcakes and a teacup, with the text "view our range »". To the right, another banner for the "ONLINE SHOP" lists various craft categories like "Model, kits, Knitting, Craft, Baking, Card making, Kids craft, Art, Framing, Jewellery, Framing, Sewing, Knitting, Card, Jewellery making, Baking, A making, Cross Stitch, Sewing, Model". Below these are three promotional tiles: "Sizzix Big Shot Machine - GREAT PRICE!", "Deal of the Week: Cartoon Backpacks. £6.99!", and "Inspirational Ideas - Visit our Ideas Library". The bottom row contains three detailed product tiles: "Sizzix Big Shot" (a cutting and embossing machine), "Kids Stationery Activity Backpack" (featuring Peppera Pig characters), and a grid of various craft projects.

Email newsletter signup »

hobbycraft

Ideas Library Online Shop Stores

Cake Craft
view our range »

visit our
ONLINE SHOP »

Model, kits, Knitting, Craft, Baking, Card making, Kids craft, Art, Framing, Jewellery, Framing, Sewing, Knitting, Card, Jewellery making, Baking, A making, Cross Stitch, Sewing, Model

1 2 3 4

Sizzix Big Shot Machine - GREAT PRICE!

Deal of the Week: Cartoon Backpacks. £6.99!

Inspirational Ideas - Visit our Ideas Library

Sizzix Big Shot
The original cutting & embossing machine.
Was £74.99

Kids Stationery Activity Backpack
Was £8.99

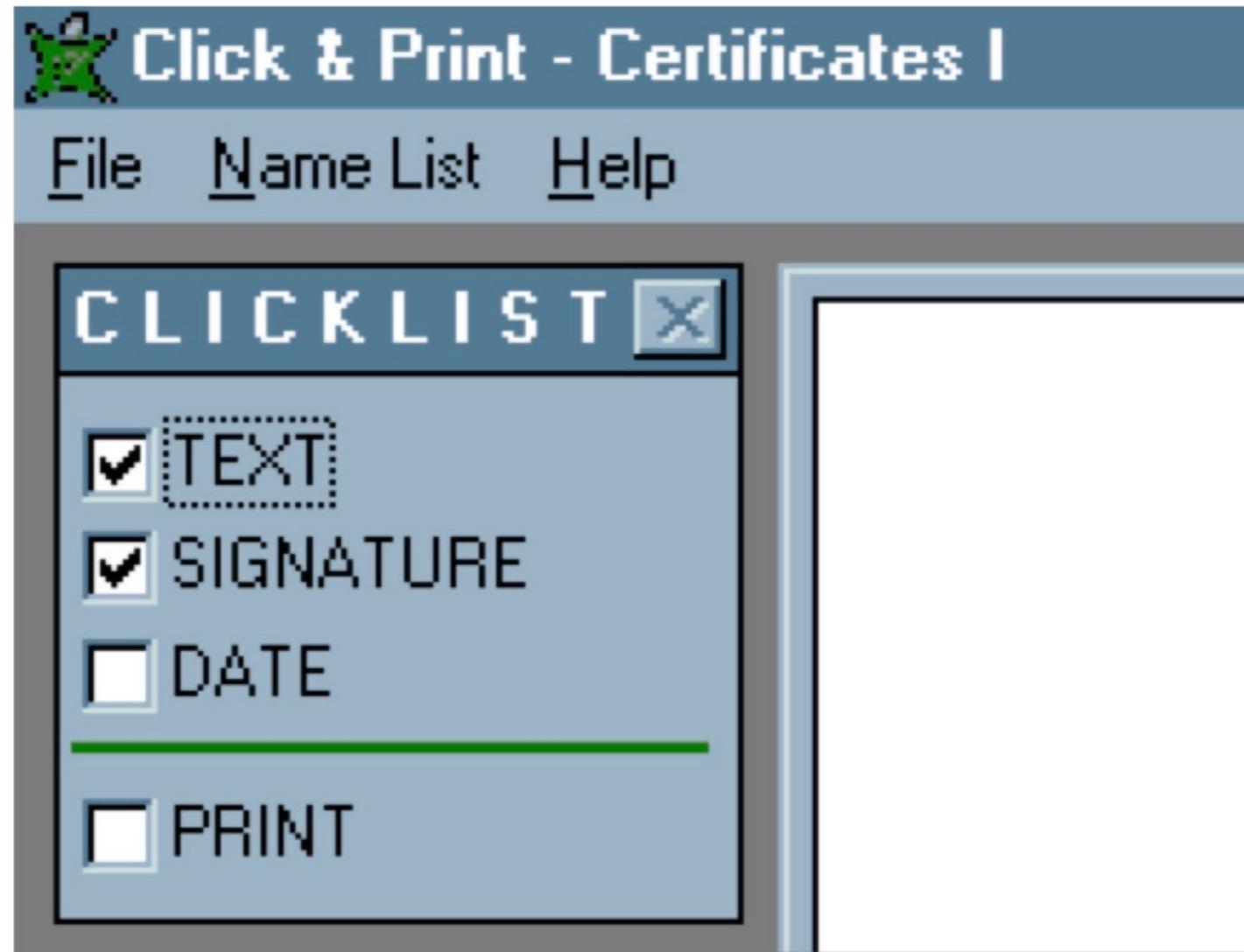
3

“Quick question: If you wanted to search this web site for a product, where would you click?

Maybe you managed to stop yourself in time, realising that the field at the top right is in fact a newsletter sign up form, not search. But I’m sure that they must have many other users who type search requests in that field. The fact is, we have certain expectations about where certain items will be on a web page. As a designer it makes sense to cash in on those expectations rather than try to subvert them.”

<http://blog.userfocus.co.uk/we-have-expectations-about-page-layout/>

Yes, I want that print thing too (*consistency*)



“While checkboxes typically provide the means by which to specify options, *Click & Print* uses checkboxes as indicators and as command buttons. ...

The most problematic aspect of the design is evident when the user attempts to check the Print checkbox before he or she has checked all of the checkboxes above it: An error message is displayed, stating “The checklist is not complete. Are you sure you want to print?”

Here's a lesson from GUI 101:

- Checkboxes are used to toggle an option on or off
- Command buttons are used to initiate actions.

Don't let your confusion confuse the user.”

— User Interface Hall of Shame, Frank Mahler

I want them all!

Effects

<input type="checkbox"/> Strik <u>e</u> through	<input type="checkbox"/> Shadow	<input checked="" type="checkbox"/> S <u>m</u> all caps
<input checked="" type="checkbox"/> Double strik <u>e</u> through	<input type="checkbox"/> <u>O</u> utline	<input type="checkbox"/> <u>A</u> ll caps
<input type="checkbox"/> Sup <u>e</u> rscript	<input type="checkbox"/> <u>E</u> mboss	<input type="checkbox"/> <u>H</u> idden
<input checked="" type="checkbox"/> Sub <u>s</u> cript	<input checked="" type="checkbox"/> Engr <u>a</u> ve	

“In the Font dialog box for Word 97 the user can set text attributes using an array of checkboxes; no problem there. However, there are 4 pairs of mutually exclusive options listed: strikethrough/double strikethrough, subscript/superscript, emboss/engrave, and all caps/small caps. The controls look like checkboxes but behave like option buttons. Obviously, using option buttons would have spoiled the aesthetics of the control group.”

— User Interface Hall of Shame, Frank Mahler

In Excel, “cut” doesn’t mean cut *(minimal surprise)*

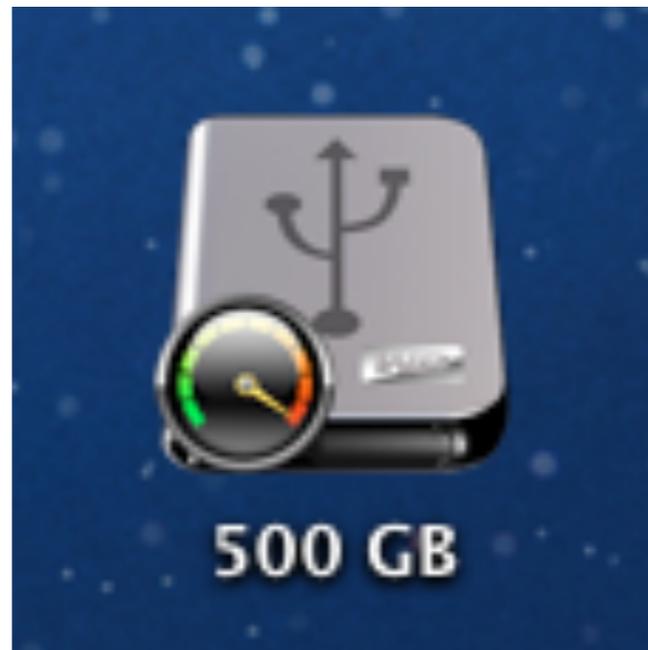
Region	January	February
North	10111	13400
South	22100	24050
East	13270	15670
West	10800	21500

“In Excel, “cut” doesn’t mean cut

Select Cut from the Edit menu of just about any application and what happens? The selected text or object is removed (and a copy is placed in the clipboard for later use). ... Unfortunately, the designers of Microsoft's Excel weren't familiar with the phrase [“Cut and Paste”]. To them, “Cut” means “Leave it there”, or at least, “Leave it there until I Paste it somewhere else.” ...”

— User Interface Hall of Shame, Frank Mahler

What does this icon mean? *(feedback)*



- (a) The disk 500GB is nearly full.
- (b) The disk 500GB is about to fail.
- (c) The disk 500GB is running at turbo speed.

“When I polled a group of people on Twitter, the correct answer (c) was chosen by about a third of people. Most people picked (b): “It looks like it’s about to blow, Captain!”

The icon appears when you install Western Digital’s drivers. It’s meant to show that the disk is in turbo (high speed) mode. But there’s something not right about that needle pointing to the red zone...”

<http://blog.userfocus.co.uk/what-does-this-icon-mean/>

User Interface Design Principles [2/2]

<i>Principle</i>	<i>Description</i>
<i>Memory load</i>	Reduce the amount of information that must be remembered between actions. <i>Minimize</i> the memory load.
<i>Efficiency</i>	Seek efficiency in dialogue, motion and thought. <i>Minimize keystrokes and mouse movements.</i>
<i>Recoverability</i>	Allow users to <i>recover from their errors</i> . Include undo facilities, confirmation of destructive actions, 'soft' deletes, etc.
<i>User guidance</i>	Incorporate some form of <i>context-sensitive user guidance</i> and assistance.

Memory load: where is that menu item? put related things together!

Efficiency: split screen on iPad; menu navigation vs shortcuts; use OO UIs (don't put settings somewhere else)

Recoverability: unlimited undo should be standard

User guidance: put help close to the actions

Overly Complex Password Protections (*memory load*)

Password cannot contain any dictionary words and it must meet the following criterias:

- ✓ Password must be 12 characters long
- ✓ At least 1 character must be alphabetical AND at least 1 character must be a digit OR a special character: ! # \$ %
- ✓ At least 6 characters must occur only once in a password
- ✓ Passwords cannot contain any string that is also contained in the username
- ✓ Passwords cannot contain any common strings such as a sequential series of letters (abcd) or a sequential series of numbers (1234) or pattern of numbers (2468)

Old Password:

New Password:



Confirm New Password:



Continue

Cancel

“It’s difficult enough to remember what’s on our immediate schedules, never mind the intricacies of an enigmatic password that we need to change every month or so anyway. And to top it all off, there’s evidence to suggest that these added levels of complexity don’t result in that much added security.”

<http://thenextweb.com/dd/2015/09/29/6-examples-of-awful-ux-design>

Long Forms with Quick Resets (*recoverability*)

* - Denotes Required Information

> 1 Donation > 2 Confirmation > Thank You!

Donor Information

First Name*

Last Name*

Company

Address 1*

Address 2

City*

State*

Zip Code*

Country*

Phone

Fax

Email*

Donation Amount* None \$50 \$75 \$100 \$250 Other
(Check a button or type in your amount) Other Amount \$

Recurring Donation (Check if yes) I am interested in giving on a regular basis.
Monthly Credit Card \$ For Months

Honorarium and Memorial Donation Information

I would like to make this donation To Honor In Memory of

Name

Acknowledge Donation to

Address

City

State

Zip

Additional Information

Please enter your name, company or organization as you would like it to appear in our publications:

Name

I would like my gift to remain anonymous.

My employer offers a matching gift program. I will mail the matching gift form.

Please save the cost of acknowledging this gift by not mailing a thank you letter.

Comments (Please type any questions or feedback here)

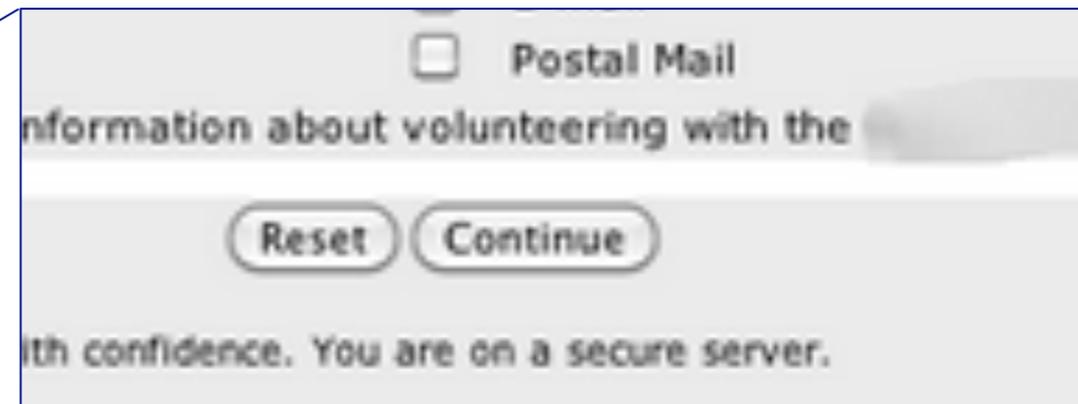
How may we contact you? E-mail Postal Mail Telephone Fax

I would like to receive newsletters and information about special events by: E-mail Postal Mail

I would like information about volunteering with the

Donate online with confidence. You are on a secure server.

If you have any problems or questions, please contact support.



“Certainly, you need to collect some information, but you must carefully select how much information you ask for. Long forms are a major turnoff. Long forms with asterisks next to seemingly inconsequential information are even worse. Long forms that have a reset button that’s dangerously close to the continue button? Now that’s a recipe for immediately ruining any and every sort of positive UX.”

<http://thenextweb.com/dd/2015/09/29/6-examples-of-awful-ux-design/>

Helpful error messages

Welcome David Travis | Support | [Manage your Account](#) | [Sign out](#)

Cisco webex Why WebEx Products How To Plans [Host a Meeting](#) [Attend a Meeting](#)

[WebEx](#) > [My Resources](#) > Manage My Account

My Resources

- [Manage My Account](#)
 - [View order / support history](#)
 - [Pay my bill / view invoices](#)
 - [Service Summary](#)
 - [Invoice and payment history](#)
 - [Auto Pay / Update credit card](#)
 - [Account billing address](#)
- [My Profile](#)

Tools & Information

- [Knowledge Base – help articles](#)
- ['How Do I' videos](#)
- [Documentation](#)
- [Support utilities](#)
- [System requirements](#)

Contact Support

- [Submit support case](#)
- [View order / support history](#)

Assist Services

Online Training

Have you tried the following solution(s)?

Request for account number: 573605
Site URL: meetingsIn.webex.com

Suggested Knowledgebase article:

⌛

Did the above solution address your issue?

[Yes, I'm done](#) [No, continue](#) [Yes, but I need to continue](#)



The page at <https://support.webex.com> says:
Error

[OK](#)

“And the winner of this month’s worst error message goes to...”
<http://blog.userfocus.co.uk/and-the-winner-of-this-months-worst-error-mes/>

Colour

Colour can help the user *understand complex information structures*.

- > Don't use (only) colour to *communicate meaning!*
 - Open to *misinterpretation* (colour-blindness, cultural differences ...)
 - Design for monochrome then add colour*
- > Use colour coding to support user tasks
 - highlight exceptional events
 - allow users to control colour coding
- > Use *colour change* to show *status change*
- > Don't use **too many** colours
 - Avoid colour pairings **which clash**
- > Use colour coding *consistently*

Stop, please

Admin	Claimants	Crops/Application	Pest	Settlement	Pay To		
Settlement							
Settlement Type:	SETTLE NOW WITH A CHECK						
Close Date:	7/9/97	mm/dd/yy					
Desired Payment Date:		mm/dd/yy					
Estimated Settlement \$:							
Total Settlement \$:							
Post and Send	Save for Later	1	2	3	4	5	6

Admin <input type="checkbox"/>	Claimants <input checked="" type="checkbox"/>	Crops/Application <input type="checkbox"/>	Pest <input type="checkbox"/>	Settlement <input checked="" type="checkbox"/>	Pay To <input checked="" type="checkbox"/>
--------------------------------	---	--	-------------------------------	---	--

“The “stoplights” are displayed in the lower right corner of the window. Their purpose is to indicate the user's progress while entering information in a complicated tabbed dialog box. Stoplight 1 relates to the first tab, Stoplight 2 relates to the second tab, and so on (anyone see a problem here?). The stoplight can be any of three colors: Yellow Some information has been entered on the tab; Red Not all required information has been entered; Green All required information has been entered

... there are some significant problems specifically related to the stoplight metaphor.

Too much information. The stoplight metaphor requires the user to learn the meanings of three states, when only one is necessary. ...

Conflicting messages. Notice in the image above that the “Post and Send” button is currently enabled, even though the stoplights indicate that required information has not been entered. ...

Labeling and Placement of the stoplights. The stoplights are labeled 1 through 6, yet the tabs are not numerically labeled. ...

We would suggest ... as an alternative ... [see figure]”

— User Interface Hall of Shame, Frank Mahler

Green good — red bad



“This image was borrowed from one particular application that hard-coded the colors of the text in the command buttons such that all affirmative buttons (OK, Yes, Open) have green-colored text and all negative buttons (Cancel, No, Close) have red-colored text. ...

As shown above, hard-coding the color of the text can make it difficult, and in some cases, impossible to read. Secondly, as shown in this example, Green/Red-Affirmative/Negative distinction may be inconsistent with a particular task. In western society, users may interpret the green label as indicating the “good” or proper response. As shown in this example however, deleting all records is more than likely not a good thing to do.

Additionally, enforcing your particular color associations on your users may create some incompatibilities with cultural interpretations of color. In certain eastern societies, for example, red is considered an affirmative, or positive color. Subjecting these users to your color associations is an indication of cultural arrogance.

Finally, a significant percentage of the population has some degree of color vision deficiency; the most prevalent of which, is the diminished ability to distinguish between red and green. ...”

— User Interface Hall of Shame, Frank Mahler

Roadmap

- > Motivation
- > Graphical User Interfaces (GUI)
- > Interface design
- > Design principles
- > **Usability Testing**



Usability Testing

- > Observe a group of test subjects performing a pre-defined scenario
 - Which test subjects?
 - How many test subjects?
 - Which scenarios?
 - What to observe?

Usability testing differs from other kinds of testing in that we need to involve actual test subjects — it is not possible to automate usability tests.

The idea is to observe a number of test subjects attempting to carry out realistic use cases. By carefully observing their behaviour, one should be able to draw conclusions about shortcomings in the user interface (obscure features, confusing UI elements, complicated dialogues, sources of errors. etc.)

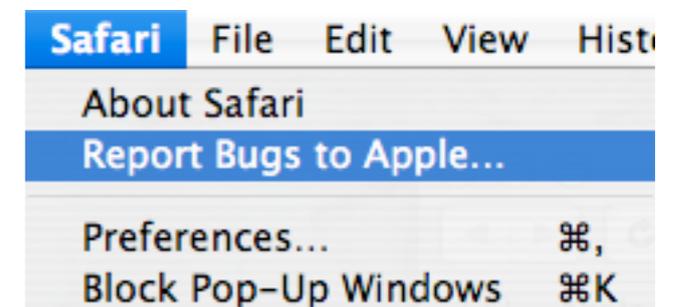
https://en.wikipedia.org/wiki/Usability_engineering

User interface evaluation

- > Some evaluation of a user interface design should be carried out to assess its *usability*.
- > Full scale evaluation is very *expensive* and *impractical* for most systems.
- > Ideally, an interface should be evaluated against a *usability specification*. However, it is rare for such specifications to be produced.

Simple evaluation techniques

- > *Questionnaires* for user feedback.
- > *Video recording* of system use and subsequent tape evaluation.
- > *Instrumentation* of code to collect information about facility use and user errors.
- > The provision of code in the software to collect *on-line user feedback*.



Hints

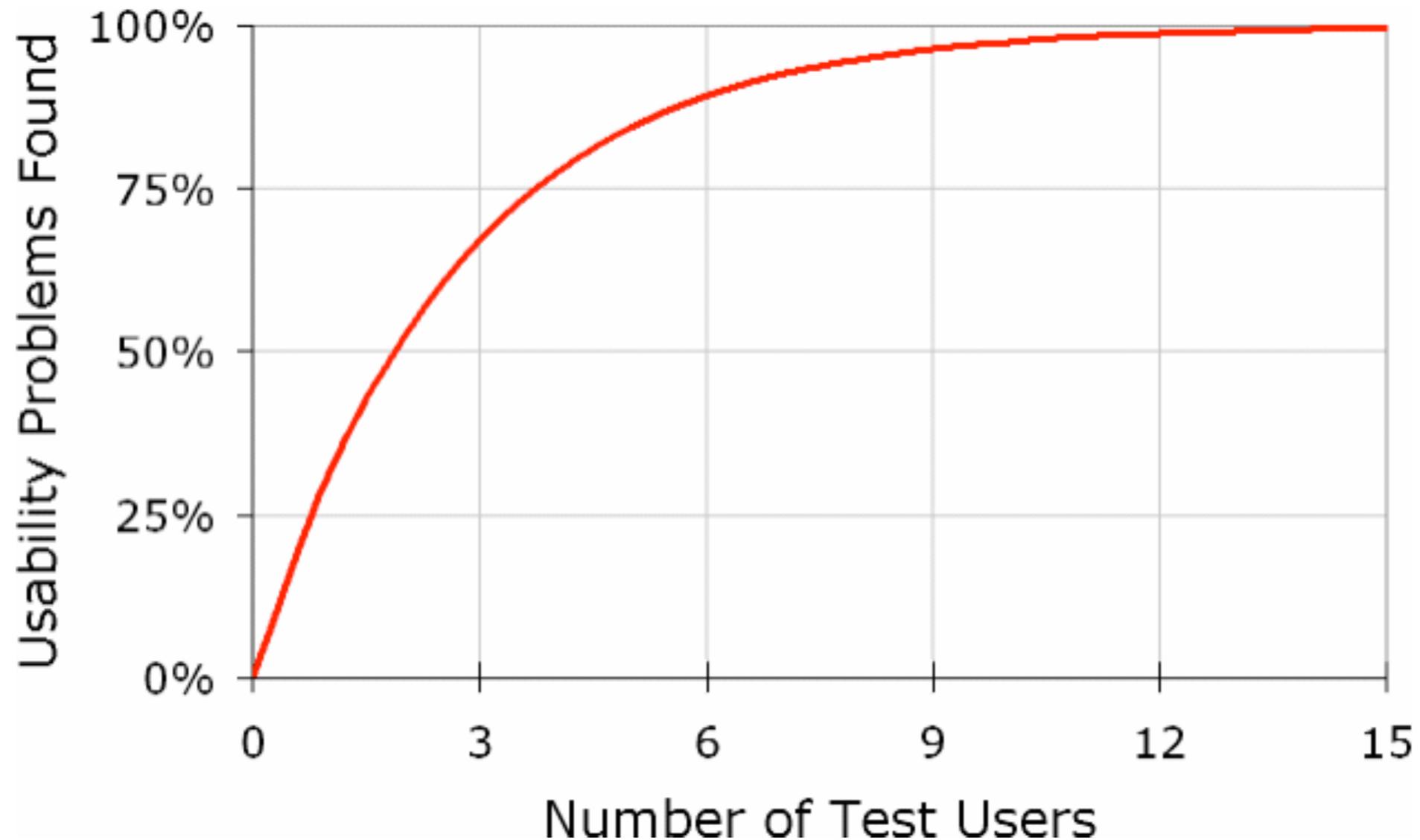
- > Establish concrete goals — what do you want to achieve?
 - What criteria will you use to establish “success”?
 - What data will you collect?
 - Choose ***representative test tasks***.
- > Carry out a ***pilot test*** first.
- > Test users should truly represent the intended users.
- > Use experienced experimenters. (Get trained!)
 - Make the test subjects feel comfortable.
 - Don’t bias the results.

As is the case with any kind of empirical study, due to the high cost of surveying actual users, it is crucial to carry out a pilot study first in which one can debug the questions and the testing process.

Usability Attributes

<i>Attribute</i>	<i>Description</i>
<i>Learnability</i>	How long does it take a new user to become <i>productive</i> with the system?
<i>Speed of operation</i>	How well does the system <i>response</i> match the user's work <i>practice</i> ?
<i>Robustness</i>	How <i>tolerant</i> is the system of user error?
<i>Recoverability</i>	How good is the system at <i>recovering</i> from user errors?
<i>Adaptability</i>	How closely is the system tied to a <i>single model</i> of work?

Why you need to test with 5 users



Nielsen, Jakob, and Landauer, Thomas K.: "A mathematical model of the finding of usability problems," *Proceedings of ACM INTERCHI'93 Conference* (Amsterdam, The Netherlands, 24-29 April 1993), pp. 206-213.

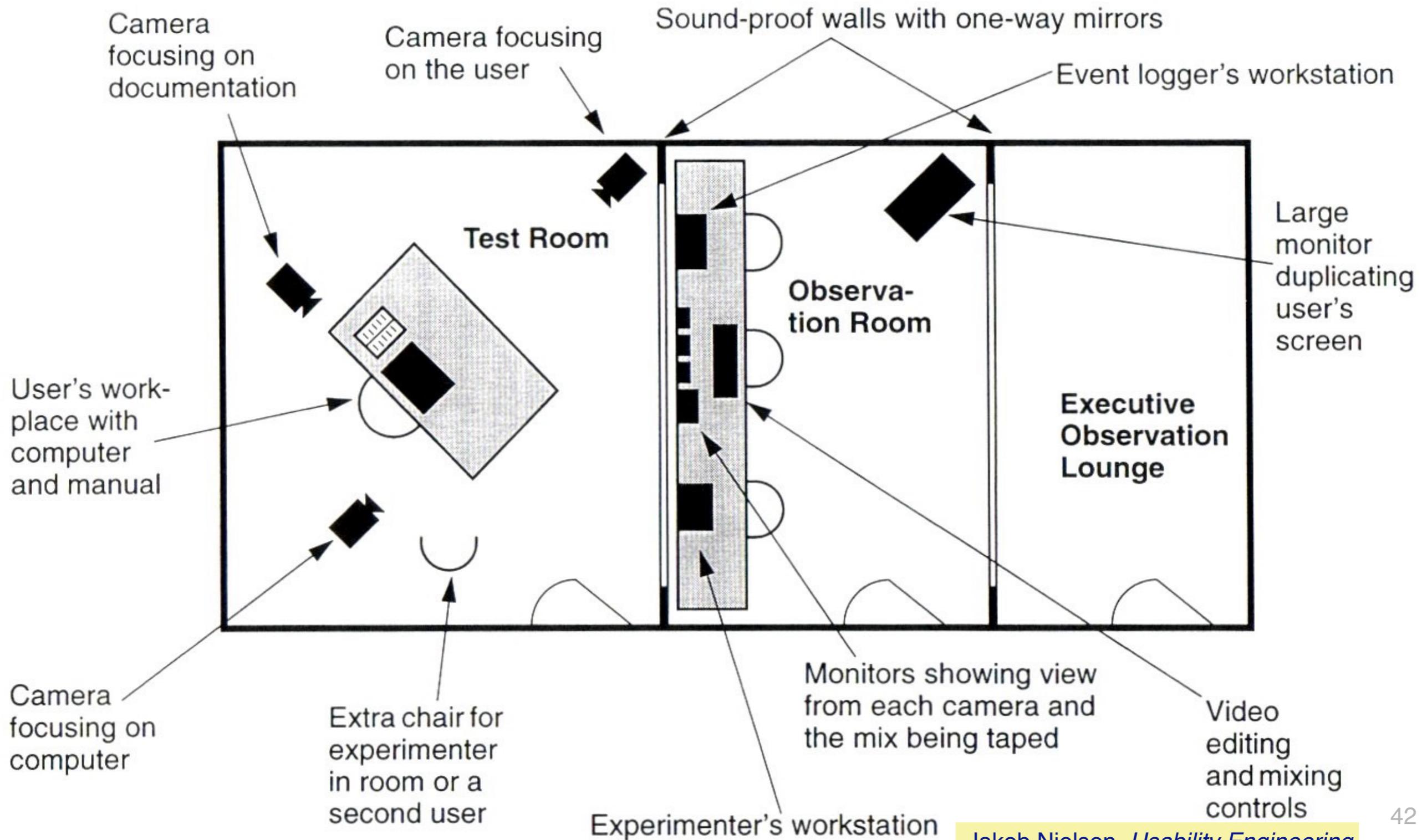
Studies show that most usability errors can be discovered by testing with around 5 users, after which relatively few further problems will be discovered.

See:

<https://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/>

<http://scgresources.unibe.ch/Literature/ESE/Niel93b-Usability.pdf>

Usability laboratories (!)



You don't need a fully decked-out usability lab to carry out usability testing, but it can help!

At a minimum you should offer a quiet environment where the test subject will not be distracted. The experimenter simply watches and takes notes. It may be useful to record the proceedings with videotape, or to record the user interactions directly from the computer (or both).

The test subject may be asked to “think aloud” to provide insight into her thought process.

Normally the test subject and the experimenter do not communicate, but if the test subject is completely stuck on how to proceed, it is permissible to give a hint.

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

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

Roadmap

- > Motivation
- > Graphical User Interfaces (GUI)
- > Interface design
- > Design principles
- > Usability Testing
- > **Summary**



Key points

- > The user interface design process involves *user analysis*, *system prototyping* and *prototype evaluation*.
- > *User interface design principles* should help guide the design of user interfaces.
- > *Interaction styles* include direct manipulation, menu systems form fill-in, command languages and natural language.
- > *Colour* should be used *sparingly and consistently*.
- > The goals of *UI evaluation* are to *obtain feedback* on how to improve the interface design using *representative test tasks*, and to assess if the interface meets its *usability requirements*.

What you should know!

- > Interface design principles
- > What are personas and why are they useful
- > Trade-offs between menus and command languages
- > How to use color to improve a UI

Can you answer the following questions?

- > Why is it important to offer “keyboard shortcuts” for equivalent mouse actions?
- > How would you present the current load on the system? Over time?
- > What is the worst UI you every used? Which design principles did it violate?
- > What’s the worst web site you’ve used recently? How would you fix it?



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