



next
work is fun

www.uni-saarland.de/next

Fun, Networking & Jobs

Die Campus-Messe der Universität des Saarlandes

Donnerstag, 11. Mai 2017

10 bis 15 Uhr

Universität des Saarlandes | Campus Saarbrücken
Geb. E1 3 - E1 5

fit Firmen-
informationstag

**Aus fit
wird next!**

Die Campus-Messe der Universität des
Saarlandes – **auch für Informatiker!**



next
work is fun

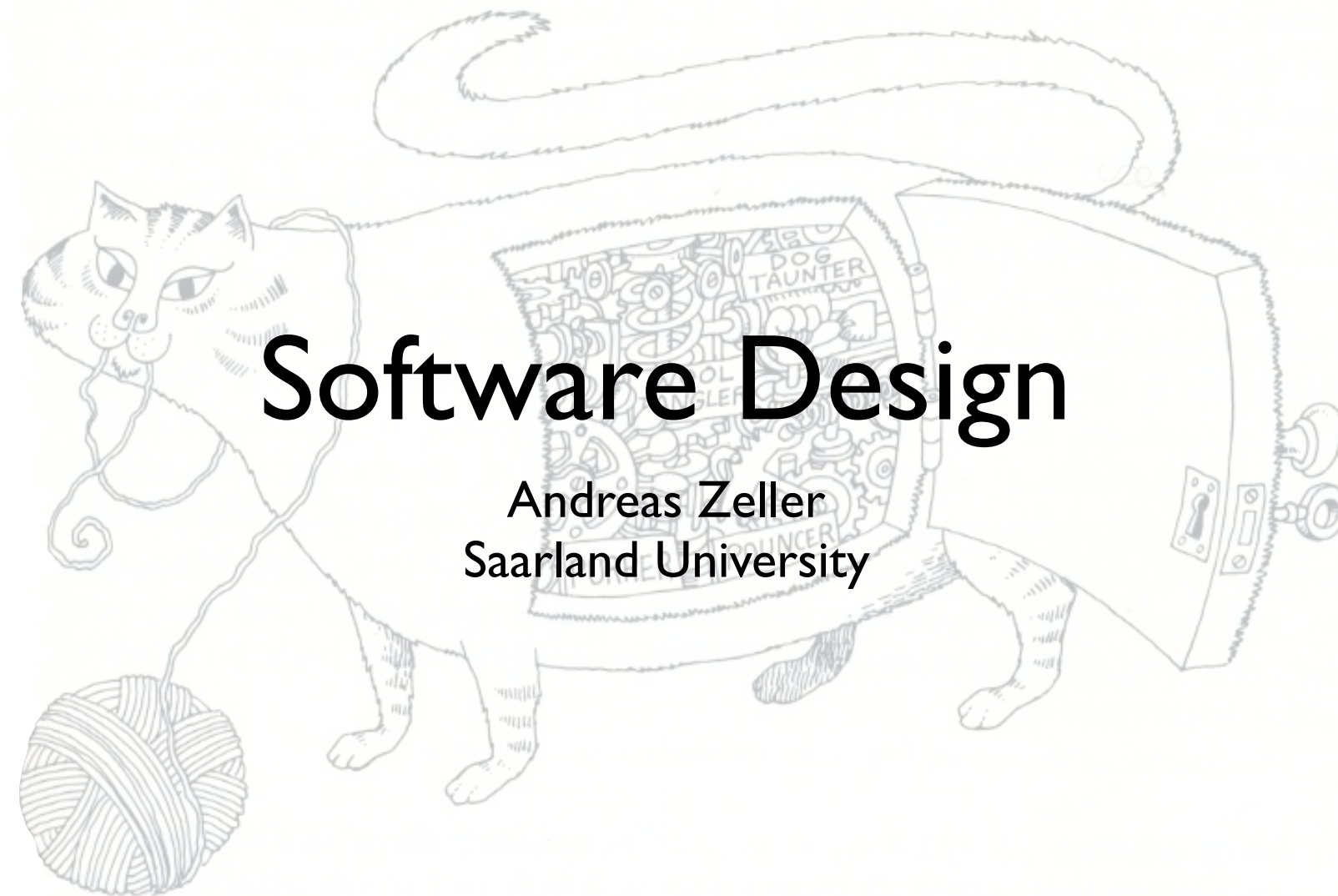
User Interface Design and Usability

Software Engineering

Rahul Premraj + Andreas Zeller • Saarland University

Credits: Robert Miller, MIT
Mary Czerwinski, MSR

Next Tuesday



Software Design

Andreas Zeller
Saarland University

Recaps material from BSc studies at Saarland

User Interface Design and Usability

Software Engineering

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WE INTERVIEWED
HUNDREDS OF USERS
AND TURNED ALL OF
THEIR SUGGESTIONS
INTO FEATURES.



What we expect

1. A set of *requirements*

contract style • ≤ 4 pages

2. A set of *use cases*

Pressman style • $\sim 10\text{--}20$ pages

3. A GUI design

covering *all* “must-have” and *most* “may-have” use cases

4. Architectural models and data models

covering *all* “must-have” and *most* “may-have” use cases

5. An executable *prototype*

covering all “must-have” use cases

User Interface Design and Usability

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What is good design?

Top Navigation Bar:

- schneider aufpassen !!!!
- HOME
- Motorvacht zu verkaufen!
- 00:00:00.00
- ingenfeld@t-online.de
- meine
- zurück
- 000045313
- 00000523 18
- Solei

Header Section:

- Tagesdatum: 27.11.2007
- Datum und Uhrzeit am PC richtig eingestellt?
- Atomuhrzeit
- alte Navigation
- 009999
- Aufklappmenü
- klick mich an

Main Content Area:

- Herzlich Willkommen
- Dein PC / ist so schnell
- Es wird noch besser !!!
- Meine
- einfach klicken**
- YCH Yachtüberführungen Captain HARRY
- Europa Übersee
- RheinSchPat - BinSchPat
- sicher - schnell - seemännisch
- Tel.: 0 20 64 / 60 14 71
- www.yacht-ueberfuehrungen.de
- www.yacht-sailingnet / .eu
- E-Mail: info@yacht-ueberfuehrungen.de
- E-Mail: info@yacht-sailingnet / .eu
- Jastrunk (Morse/Navy)

Bottom Section:

- NEU Bad-Renov
- Verkaufe PC + Zubehör
- unsere Motoryacht**
- 150.000,- € VB- Preis
- zu verkaufen
- 0049 (0)208 603101
- Atlantic 37 mit Liegeplatz
- klick hier
- 852
- len
- 800 x 600
- ken!

Other Elements:

- Ich bin am abnehmen !
- Nochmal hören? siehe unten rechts!
- appmenü - Navigation - alle Seiten - mit info - Menü 1024 - Home+Spiel - Stichworte - ein/aus
- verkaufte bei: AutoScout.de, Wagen.de, autoanzeiger24.ch, autorola.de

Don't go to the right?



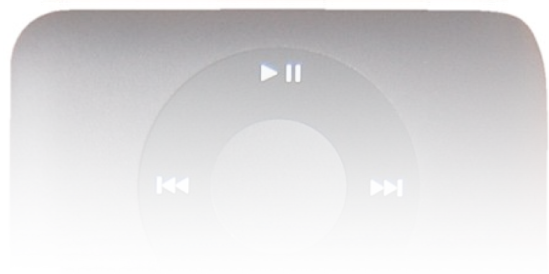
What do these symbols mean?



How much is the gas?



Interface



Interface



Interface

definition

interface

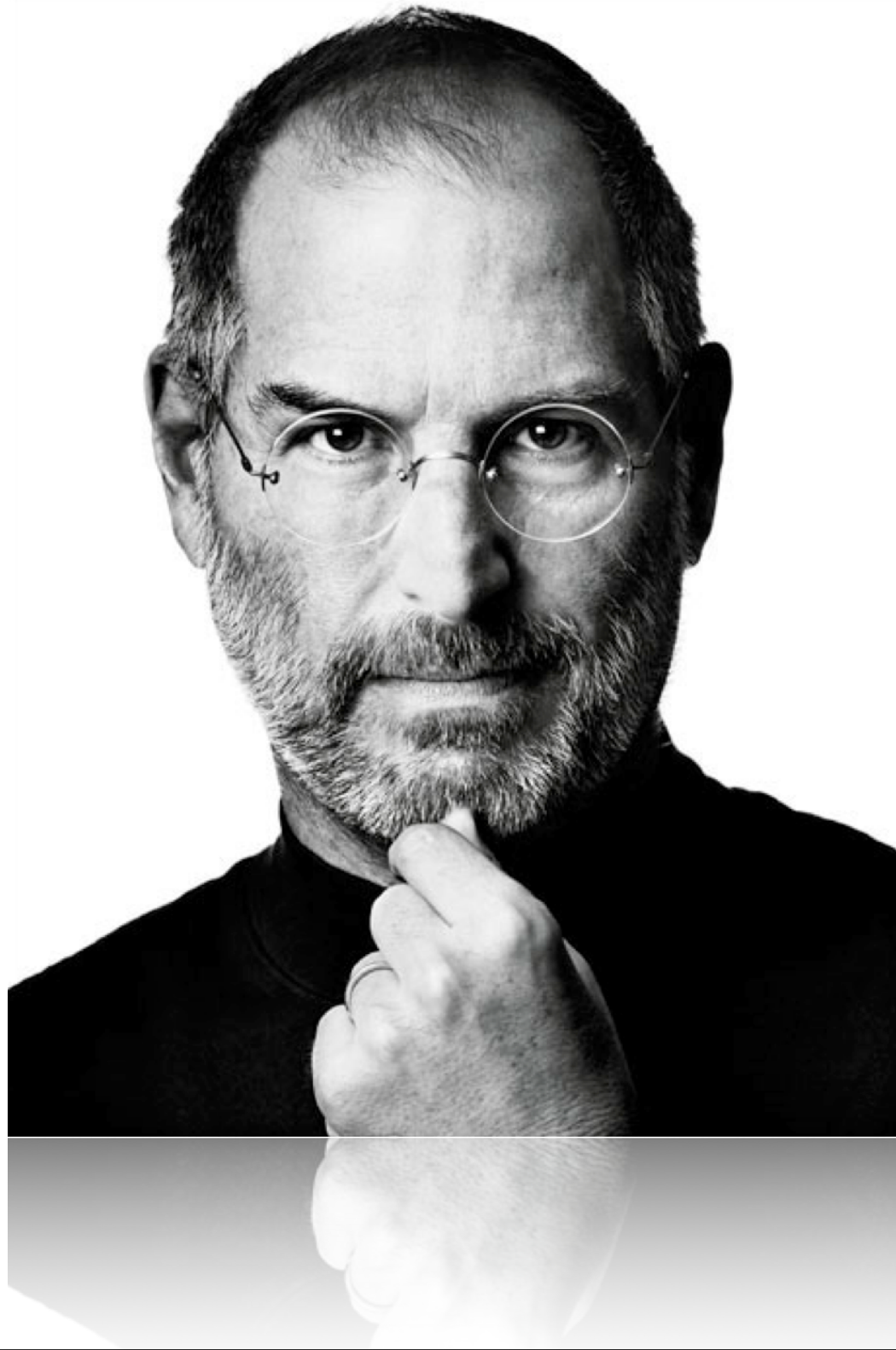
n. Computer Science

- The point of interaction or communication between a computer and any other entity, such as a printer or human operator.
- The layout of an application's graphic or textual controls in conjunction with the way the application responds to user activity: an interface whose icons were hard to remember.

What is Design?



What is Design?



Design is not just
what it looks like and
feels like.

Design is how it
works.

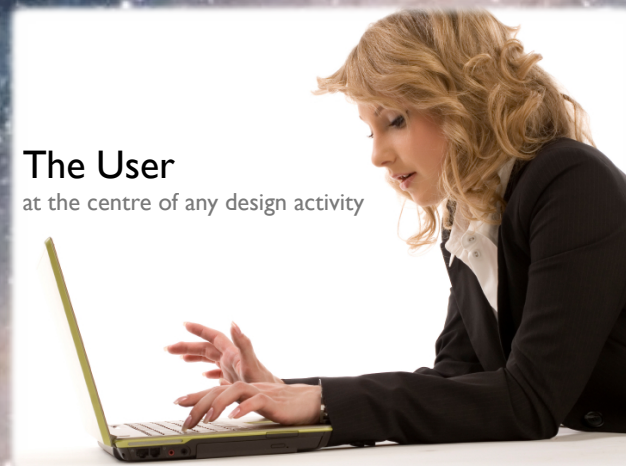
What is Design?



What is Design?



2007
Balenciaga Collection



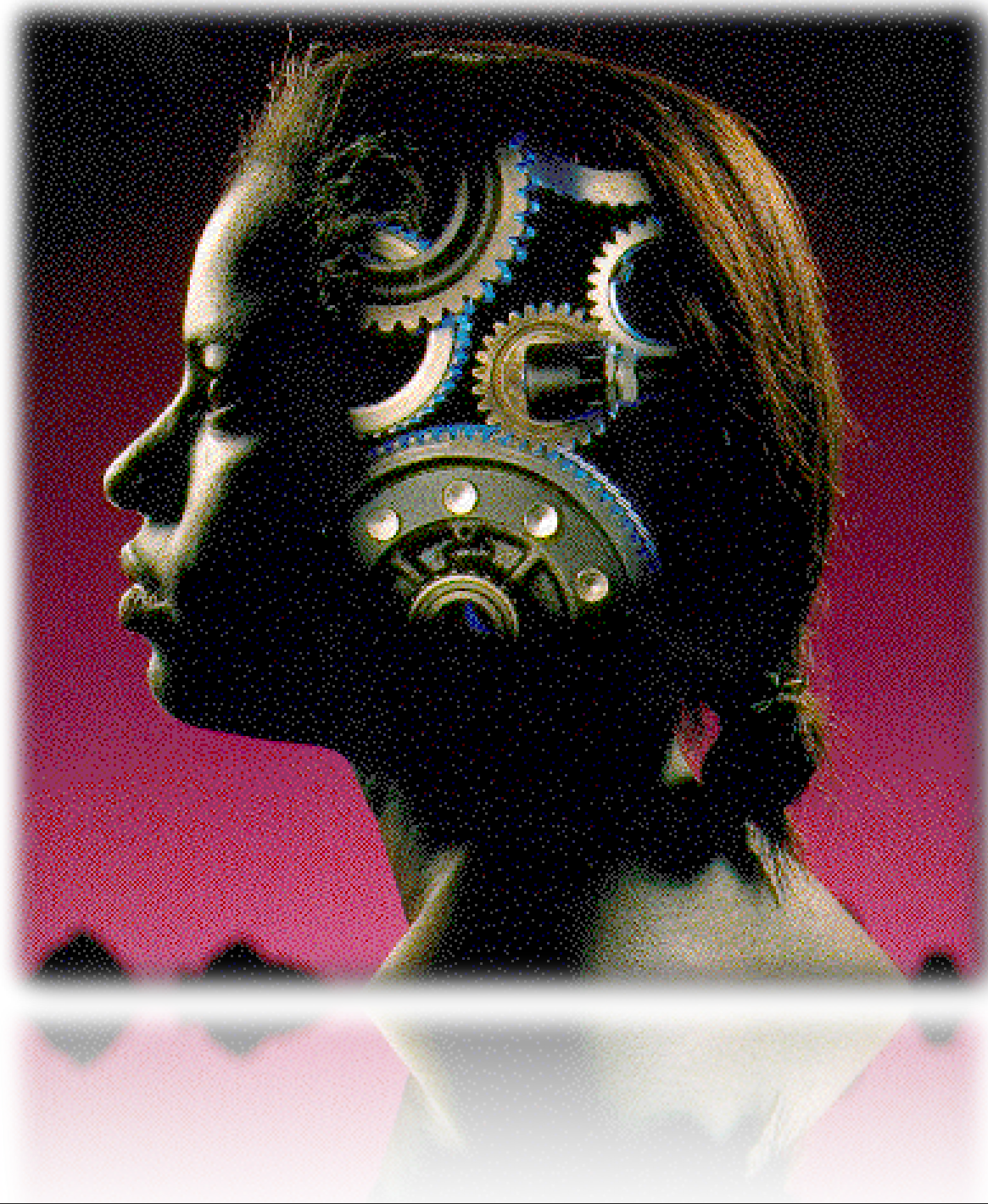
User-Centric Design

- Cost saving!
- Competitive market - user expectations.
- Political demands
- Is Help always helpful?

Human Capabilities

- Memory
- Attention
- Visual Perception
- Learning
- Color
- Language + Communication
- Ergonomics

Memory



- Associations are built by repetition.
- Scaffold model (more likely to remember items that have many associations).
- Recognition is easier than recall.
- Working memory has small capacity.
- Long-term memory has large capacity.

Attention



- Attention is a resource – gets divided amongst tasks.
- Automatic well-learnt processes not need much attention.
- Important to get (for you as a designer).

Visual Perception



- We excel at pattern recognition.
- We automatically try to organize visual displays and look for cues.
- Motion, grouping, contrast, color can make different parts of a display more or less salient.

Learning



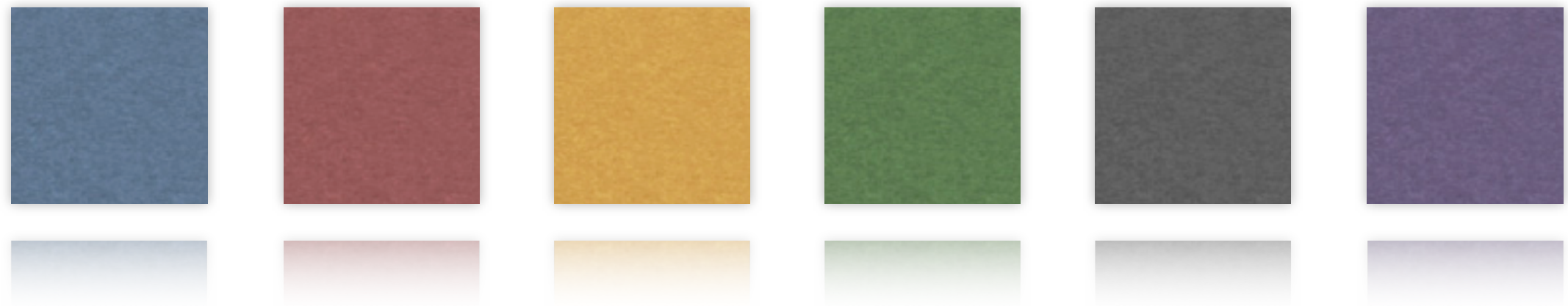
- Learning is improved by organization.
- Consistency and mnemonics improve learning.
- Targeted feedback facilitates learning.
- Learning occurs across people and organizations.

Learning

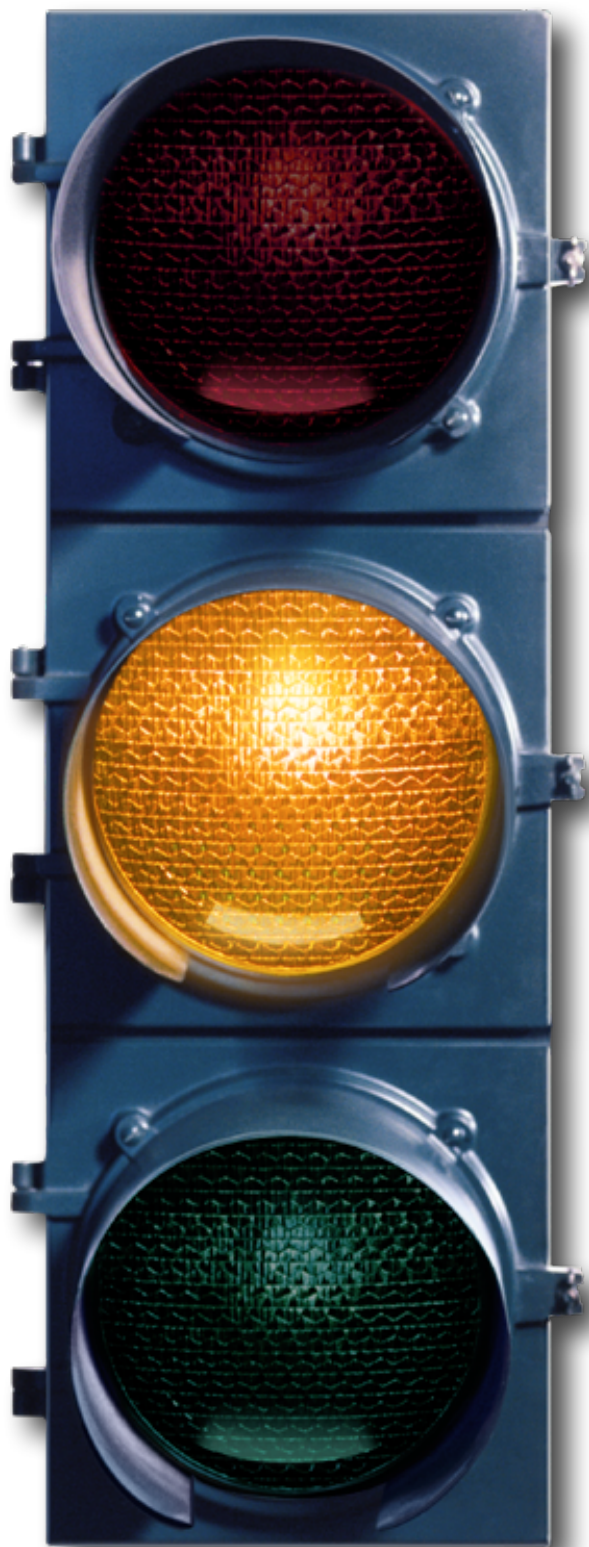
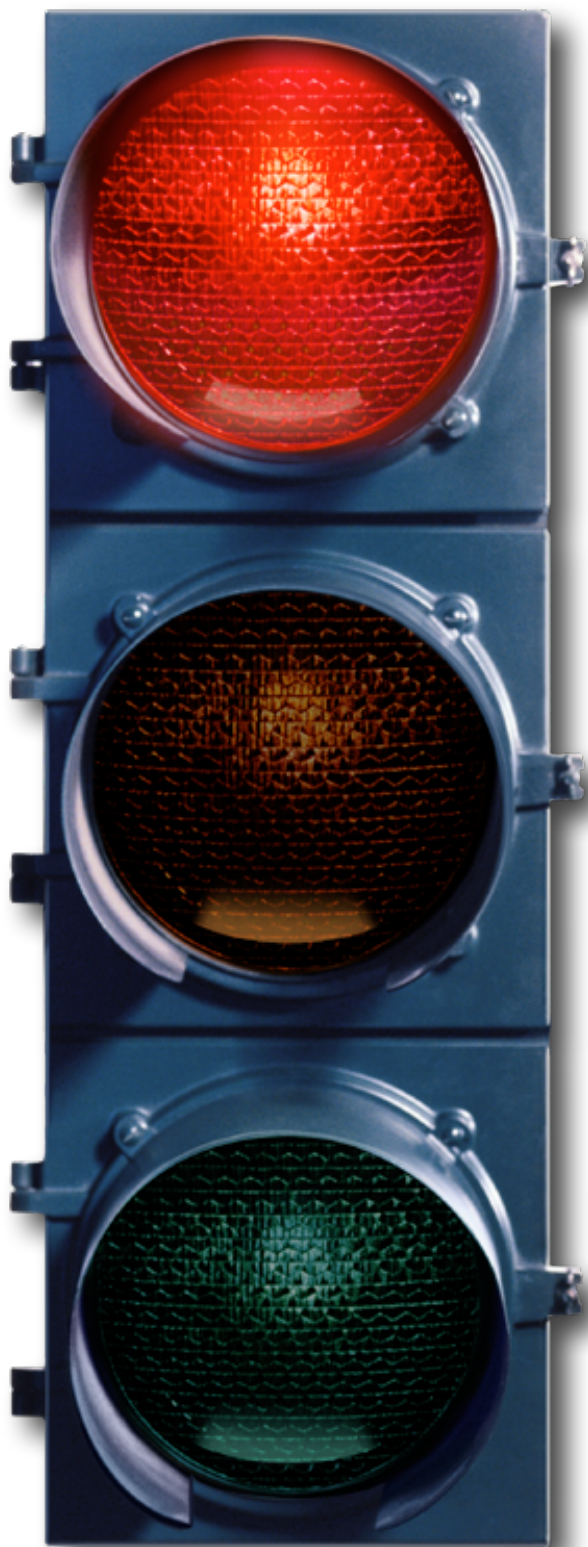


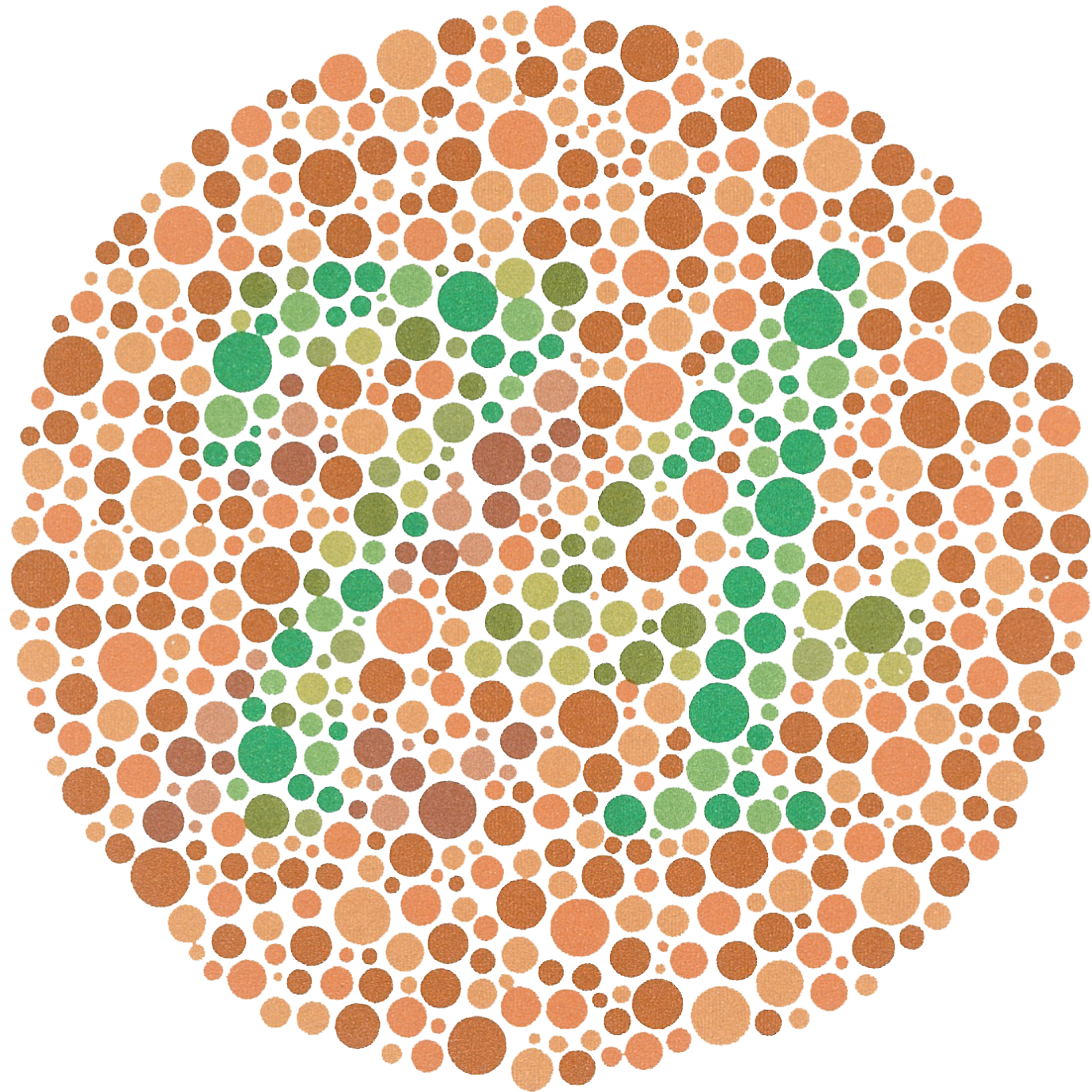
- Incrementally presented information accelerates learning.
- Some users like to explore systems to learn; others will not.
- Workers focus on accomplishing tasks, not learning software.

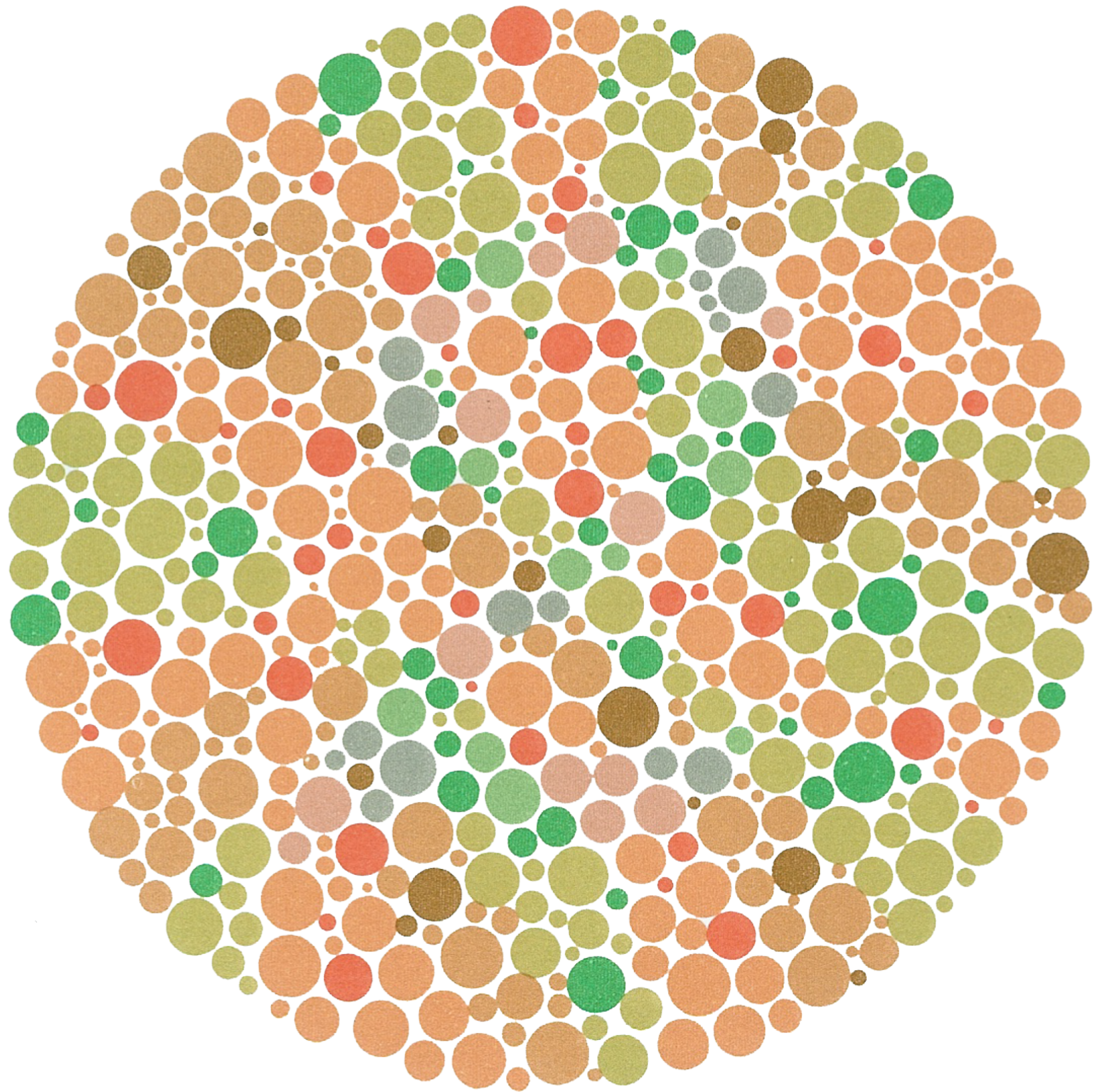
Color



- Red-green color blindness (protanopia & deuteranopia)
 - 8% of males
 - 0.4% of females
- Blue-yellow color blindness (tritanopia)
 - Far more rare
- Guideline: don't depend solely on color distinctions
 - use redundant signals: brightness, location, shape







Language + Communication



syntax, semantics, pragmatics;
conversational interaction,
specialized languages

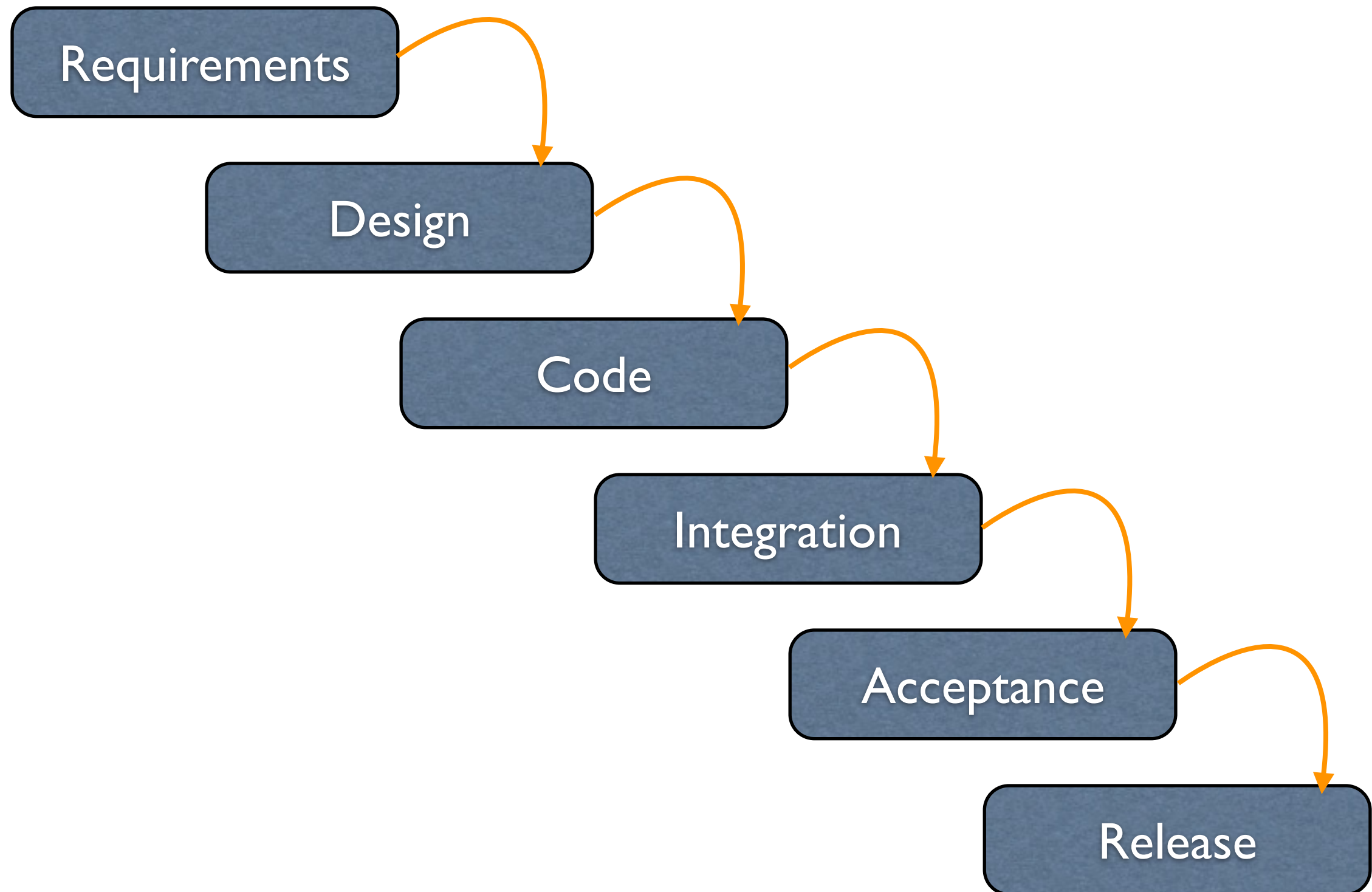
Ergonomics



arrangement of displays and controls; cognitive and sensory limits; effects of display technology; fatigue and health; furniture and lighting; design for stressful and hazardous environments; design for the disabled...

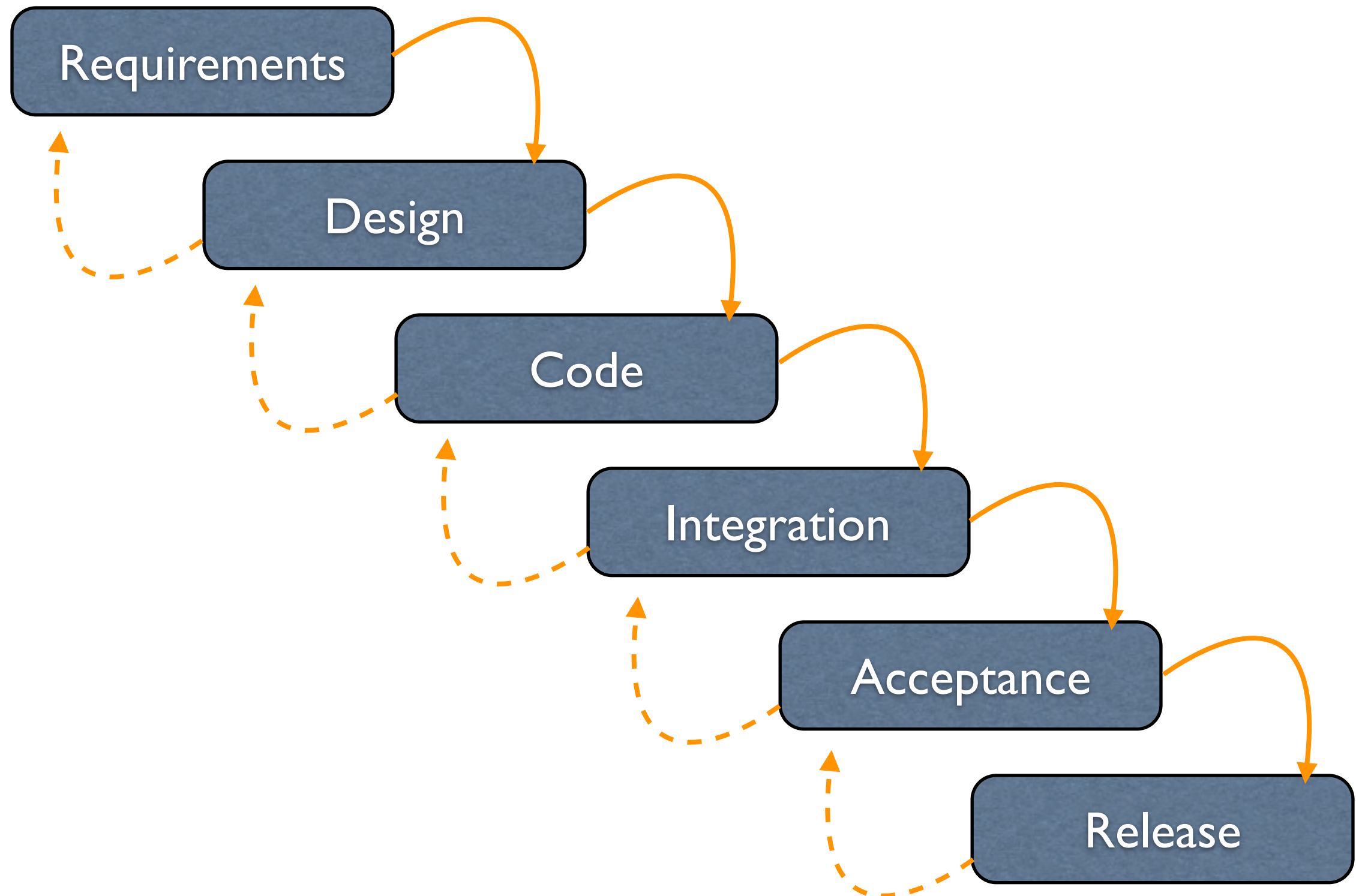
Where does
user-centered design
fit into the
development process?

Traditional Waterfall Model



Traditional Waterfall Model

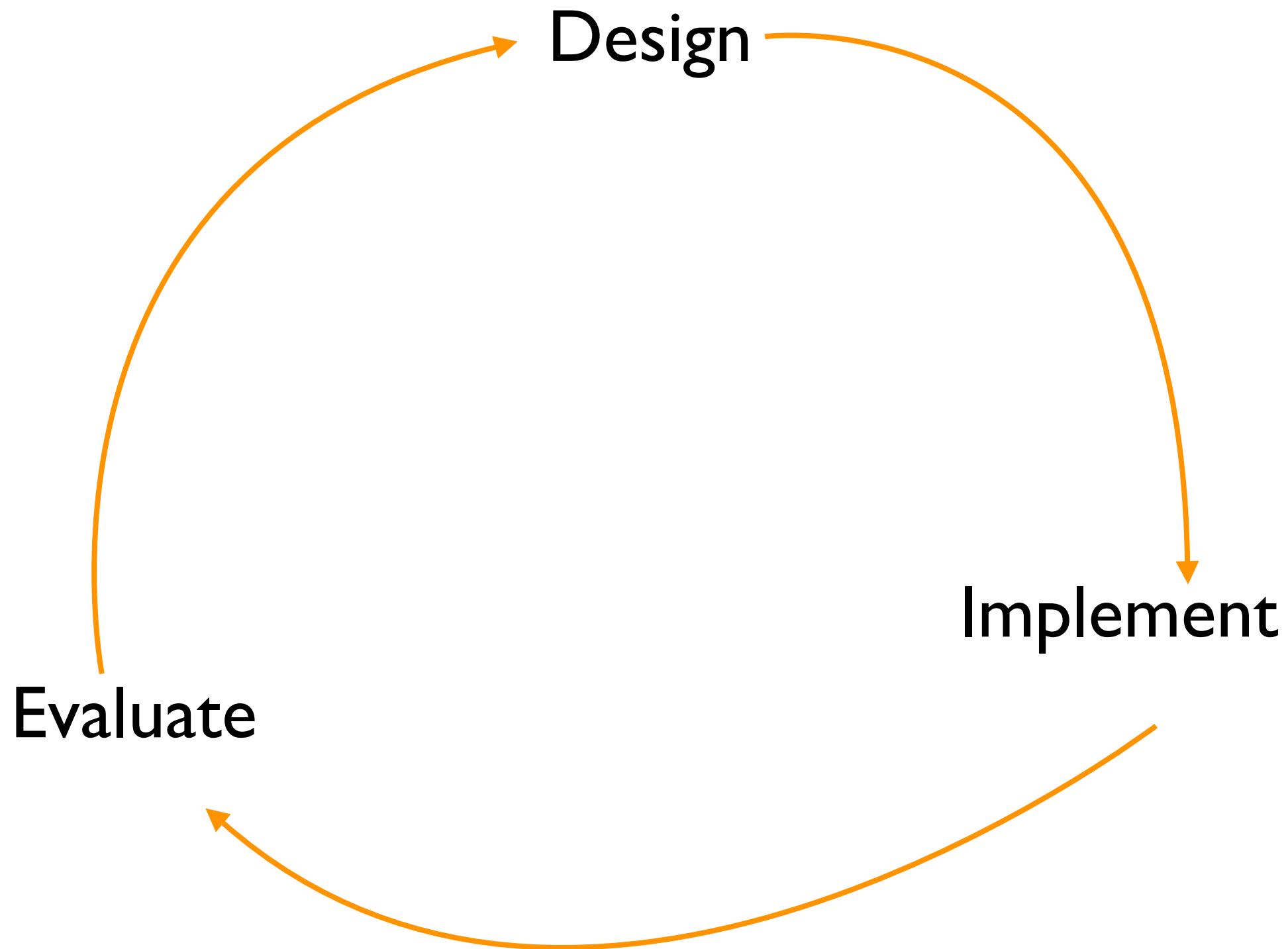
with Feedback



Waterfall Model Poor for UI Design

- UI design is risky.
 - So we are likely to get it wrong.
- Users are not involved in validation until acceptance testing.
 - So we won't find out until the end.
- UI flaws often cause changes in requirements and design.
 - So we have to throw away carefully written and tested code.

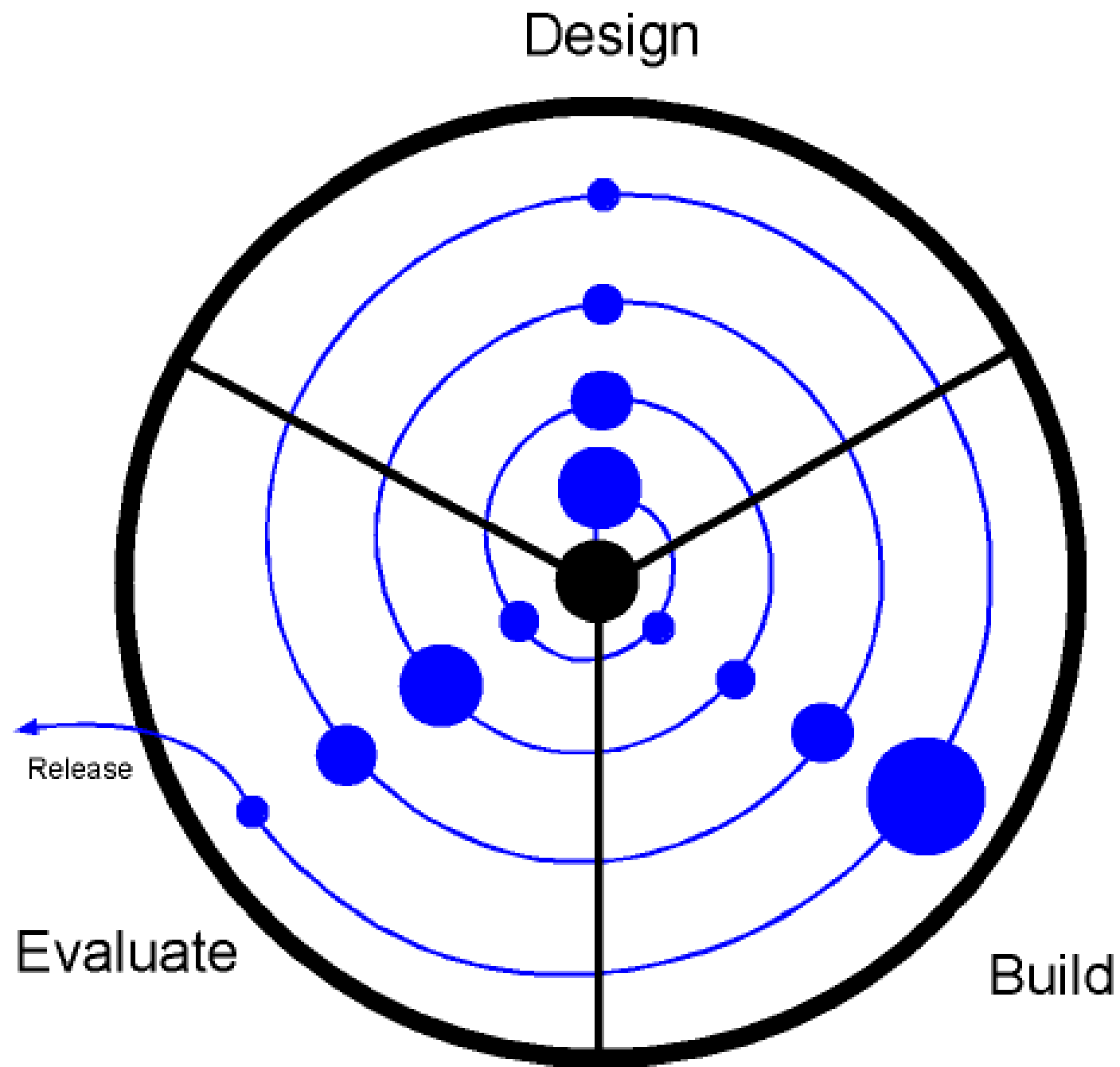
Iterative Design



Why NOT Iterative Design?

- Every iteration corresponds to a release
 - Evaluation (complaints) feeds back into next version's design
- Using your paying customers to evaluate your usability
 - They won't like it
 - They won't buy version 2

Spiral Model



Spiral Model Iterations

- Early iterations use cheap prototypes (paper prototyping).
- Later iterations have richer implementations.
- More iterations generally means better UI.
- Only mature iterations are seen by the world.

Paper Prototyping

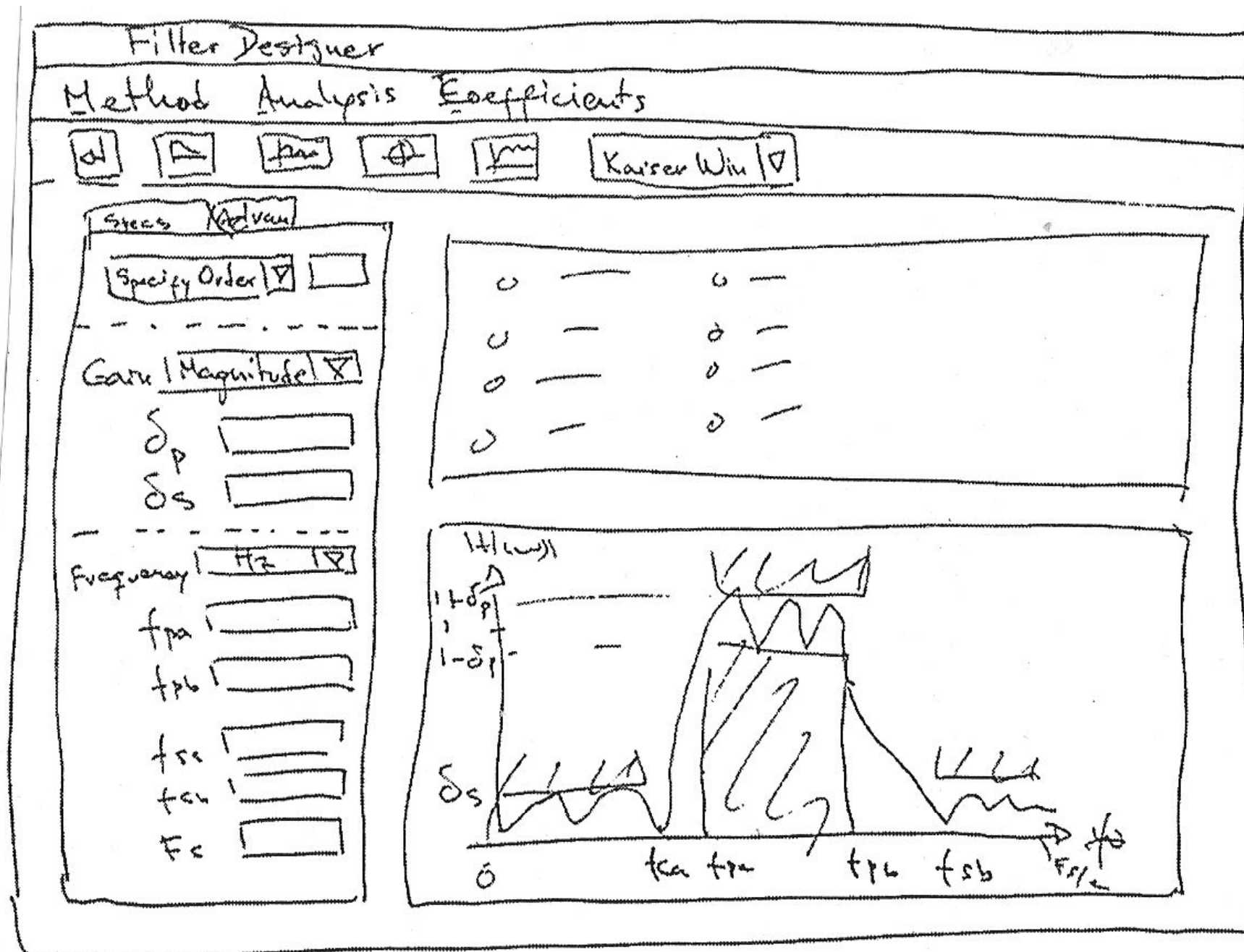
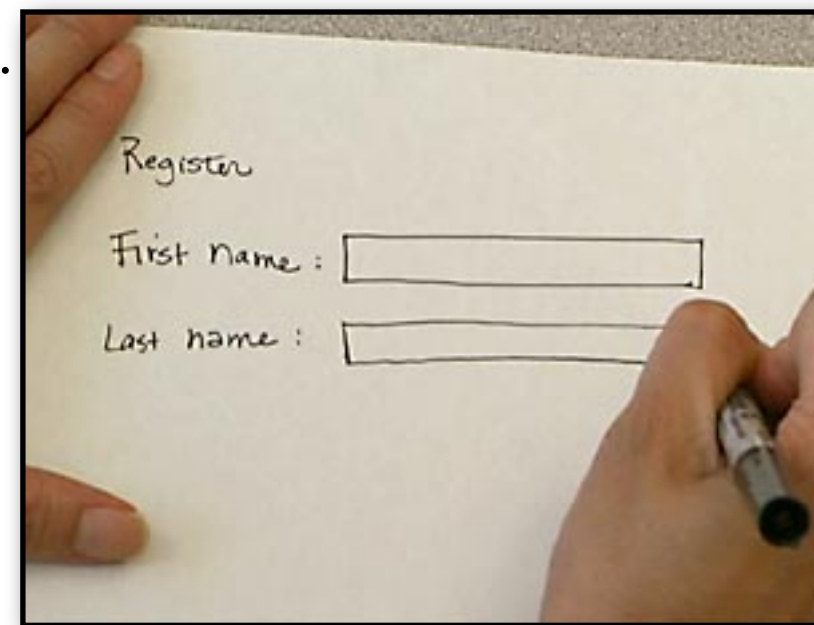


Figure 1.1 A hand-drawn paper prototype of a screen from an application used to design filters for scientific data.

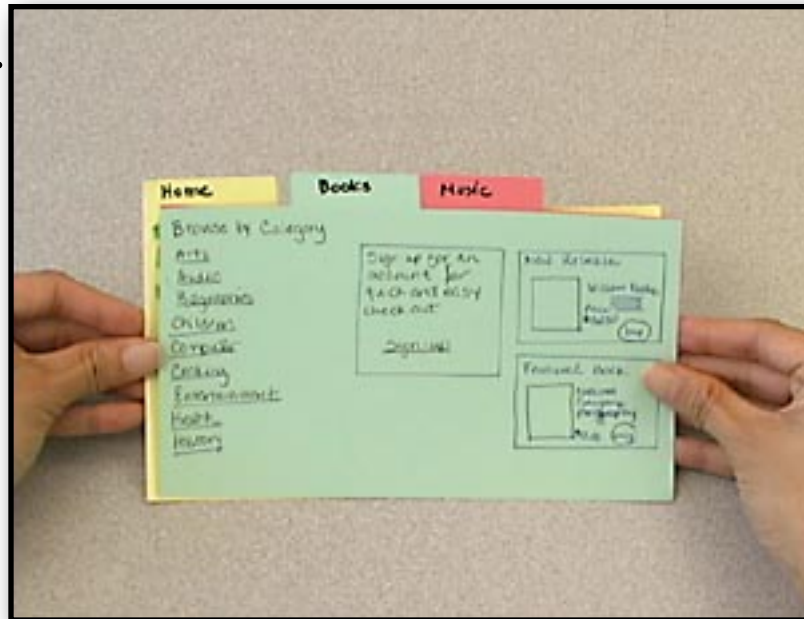
Paper Prototyping

Credits: Nielsen Norman Group

1.



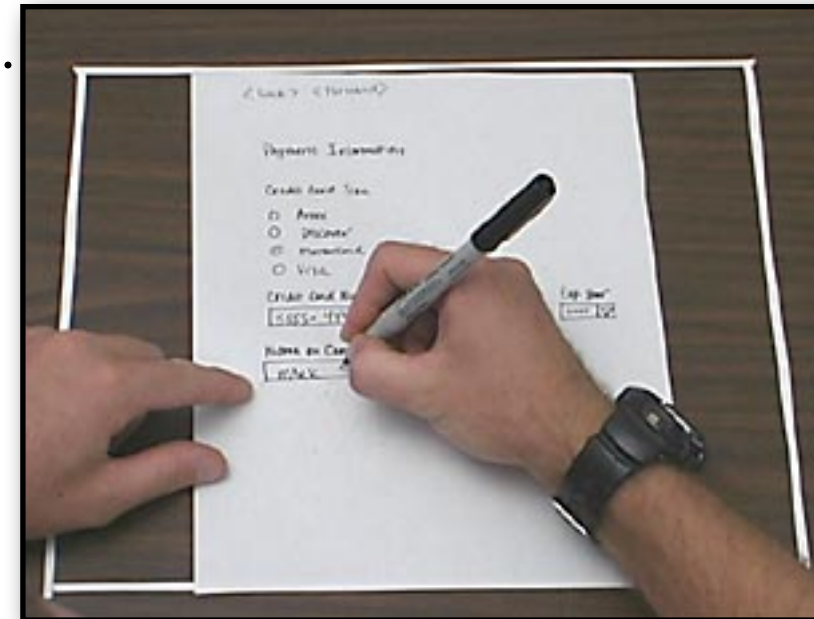
2.



3.



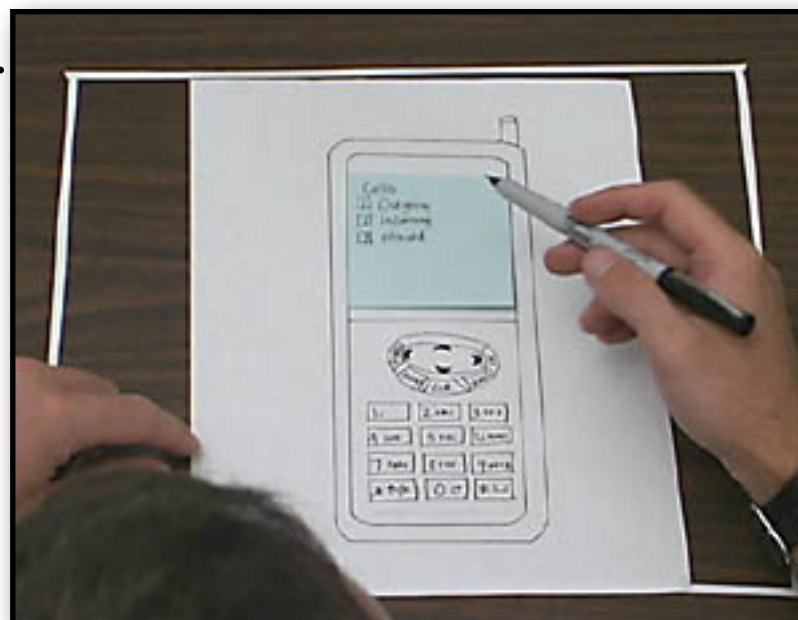
4.



5.



6.



7.



Register

First Name :

Last name :

Home

Books

More

Credits: Nielsen Norman Group

Browse by Category

Arts

Books

Business

Children

Comics

Cooking

Environment

Fiction

History

Sign up for our newsletter for quick and easy check-out

Sign Up

Quick Checkout



Sign Up
Now



Featured Books



Sign Up
Now





2. Name of the Merchant

Payment Information

Credit Card Type

- ☐ Amex
- ☒ Discover
- ☐ Mastercard
- ☐ Visa

Credit Card No.

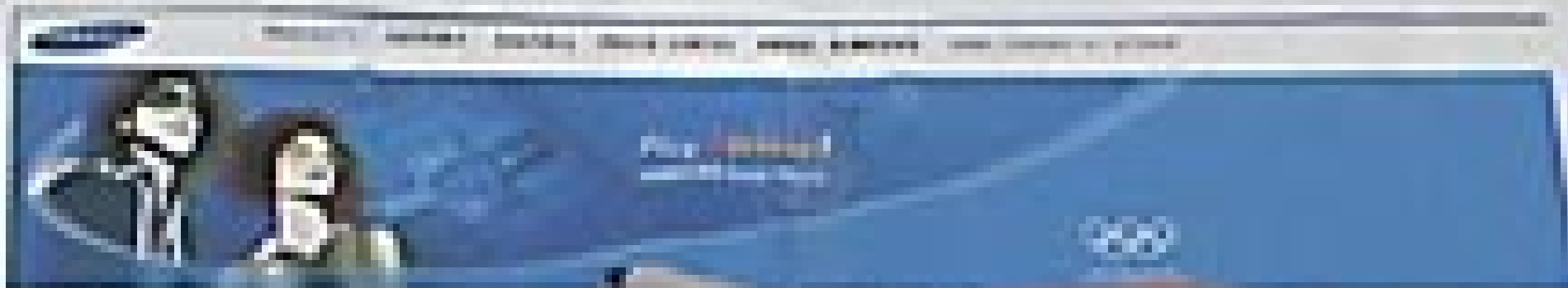
1234 5678 9010 1112

Pincode on Card

1234

Exp. Date

12/12/17



News

Beijing 2008
The 29th Summer Olympic Games will be held in Beijing, China, from August 8 to August 24, 2008. The Games will be the first to be held in Asia and the first to be held in a country that is not a member of the International Olympic Committee.

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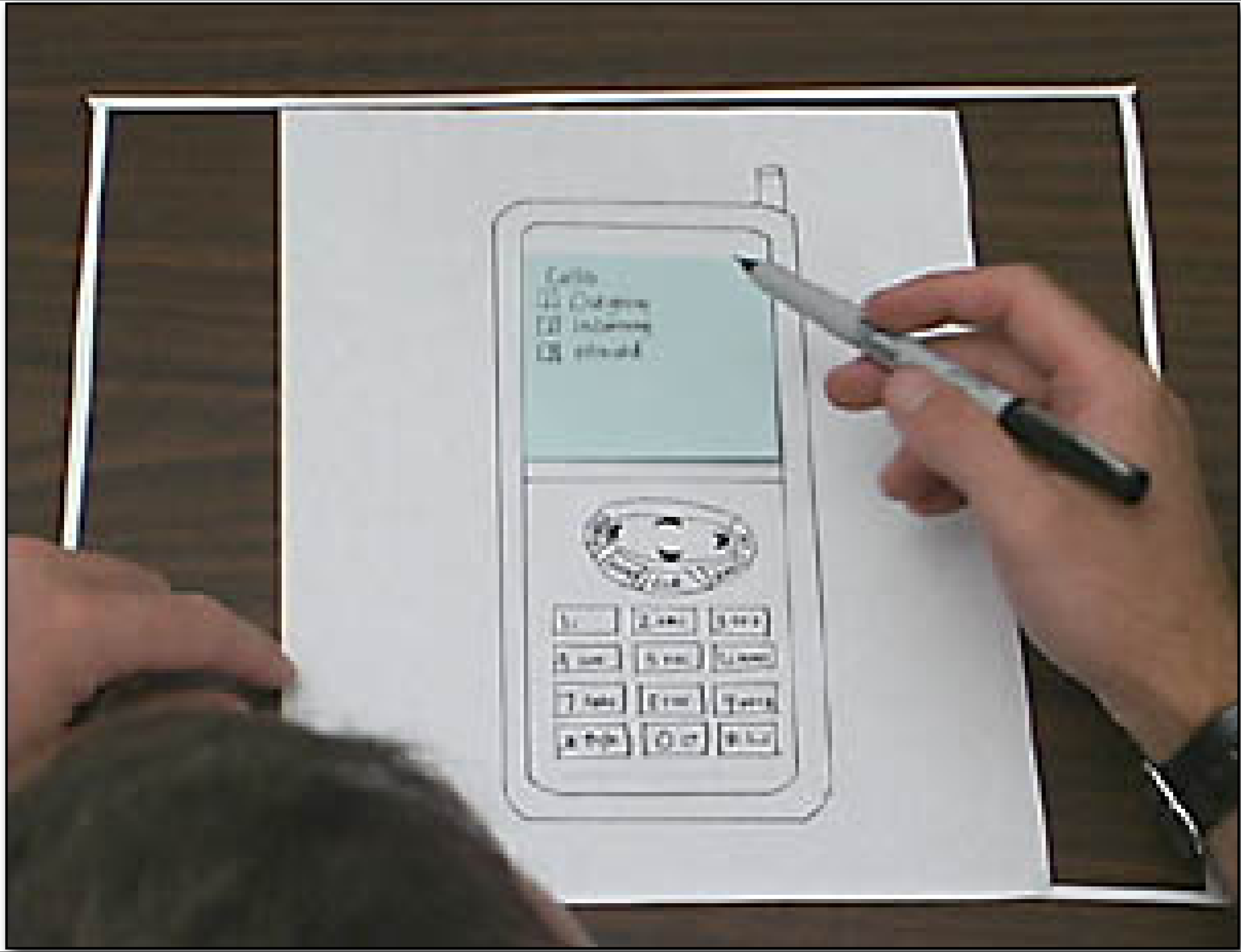
Beijing 2008



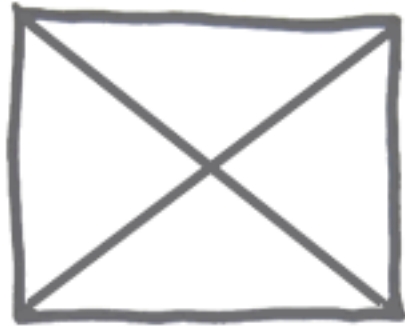
Beijing 2008



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Profile Name

245 Blackfriars Road

Ludgate House

London, SE1 9UY

Email: firstname@surname.com

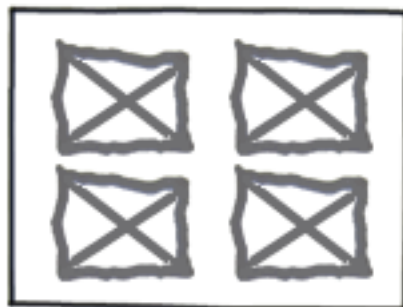
Telephone: 0207 955 3705

Categories





Lorem ipsum
dolor sit
amet
dolor sit

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi consectetur nibh feugiat urna elementum facilisis. Nullam diam arcu, lobortis ut tincidunt vel, suscipit quis lectus. Praesent interdum sapien in nisi tempor vestibulum. Mauris nec mauris sapien. Nam laoreet nisi non magna iaculis vitae convallis lorem porttitor.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Morbi consectetur nibh feugiat urna elementum facilisis. Nullam diam arcu, lobortis ut tincidunt vel, suscipit quis lectus. Praesent interdum sapien in nisi tempor vestibulum. Mauris nec mauris



Attachments

-  [Lorem ipsum dolor sit amet.](#)
-  [Lorem ipsum dolor sit amet.](#)
-  [Lorem ipsum dolor sit amet.](#)
-  [Lorem ipsum dolor sit amet.](#)

Wireframing

Benefits

- Fast way to mock up an interface - no coding required.
- Finds a variety of problems with the interface.
- Allows an interface to be refined based on user feedback before implementation begins.
- A multidisciplinary team can participate.
- Encourages creativity from the product team and users alike.

Disadvantage

- Doesn't produce any code.
- Does not find all classes of problems with an interface.
- Can affect the way users interact with the interface.
- Users might think it is unprofessional.
- Has stronger benefits in some situations than in others.

UI Analysis & Design

- Iterative Design using a Spiral Model.
- Early focus on users and tasks.
 - ▶ User analysis: who the users are.
 - ▶ Task analysis: what they need to do?
 - ▶ Involve users as evaluators, consultants and sometimes designers.
- Constant Evaluation

Know Your User

- Novice
- Knowledgeable, intermittent user
- Knowledgeable, frequent user
- Age, gender, ethnicity
- Physical abilities
- Domain experience
- Application experience
- Work environment
- Communication patterns

Know Your User

- Techniques
 - Questionnaires
 - Interviews
 - Observations
- Obstacles
 - Artificial barriers between developers and users.
 - Some users are expensive to talk to.

User Design Principles



Usability Principles

Jakob Nielsen



Nielsen's 10 Principles Of UI Design

Nielsen's Principles

1. Match the real world
2. Consistency and Standards
3. Help and Documentation
4. User Control and Freedom
5. Visibility of System Status
6. Flexibility and Efficiency
7. Error Prevention
8. Recognition, not Recall
9. Error Reporting, Diagnosis, Recovery
10. Aesthetic and Minimalist Design



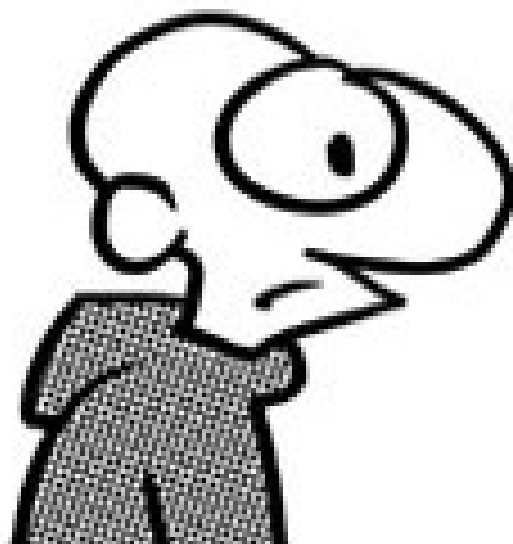
Match the Real World



THE PROBLEM IS YOUR MODEM CAN'T INTERFACE WITH
YOUR ISP BECAUSE YOUR RJ 11 CABLE NEEDS UPGRADING

WILL IT
COST
MUCH?

THAT DEPENDS ON WHETHER
YOU KNOW I JUST SAID "YOU
NEED A LONGER PHONE CORD"



Match the Real World

- Examples
 - Desktop
 - Trashcan
- Dangers of metaphors
 - Often hard for designers to find
 - Deceptive
 - Constraining
 - Breaking the metaphor
- Use of a metaphor doesn't excuse other bad design decisions

Direct Manipulation

- User interacts with visual representation of data objects
 - Continuous visual representation
 - Physical actions or labeled button presses
 - Rapid, incremental, reversible, immediately visible effects
- Examples
 - Files and folders on a desktop
 - Scrollbar
 - Dragging to resize a rectangle
 - Selecting text
- Visual representation and physical interaction are important

Affordances

of direct manipulation

- Perceived and actual properties of a thing that determine how the thing could be used
 - *Chair* is for sitting
 - *Knob* is for turning
 - *Button* is for pushing
 - *Listbox* is for selection
 - *Scrollbar* is for continuous scrolling or panning
- Perceived vs. actual

Natural Mapping

- Physical arrangement of controls should match arrangement of function
- Best mapping is direct, but natural mappings don't have to be direct
 - Light switches
 - Stove burners
 - Turn signals
 - Audio mixer



Feedback / Responsiveness

- Actions should have immediate, visible effects
 - Push buttons
 - Scrollbars
 - Drag & drop
- Kinds of feedback
 - Visual
 - Audio
 - Haptic (conveyed by sense of touch)

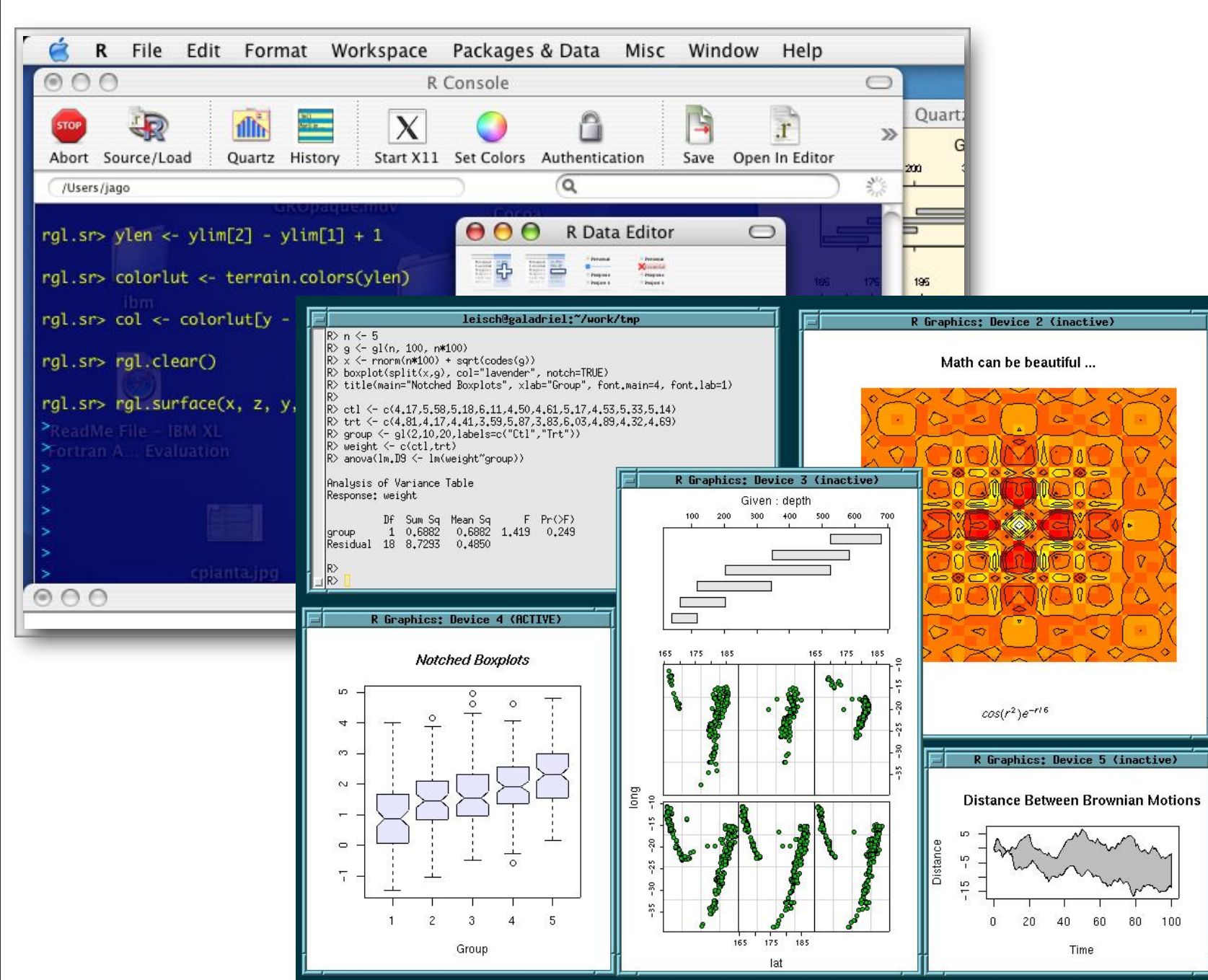


Consistency and Standards

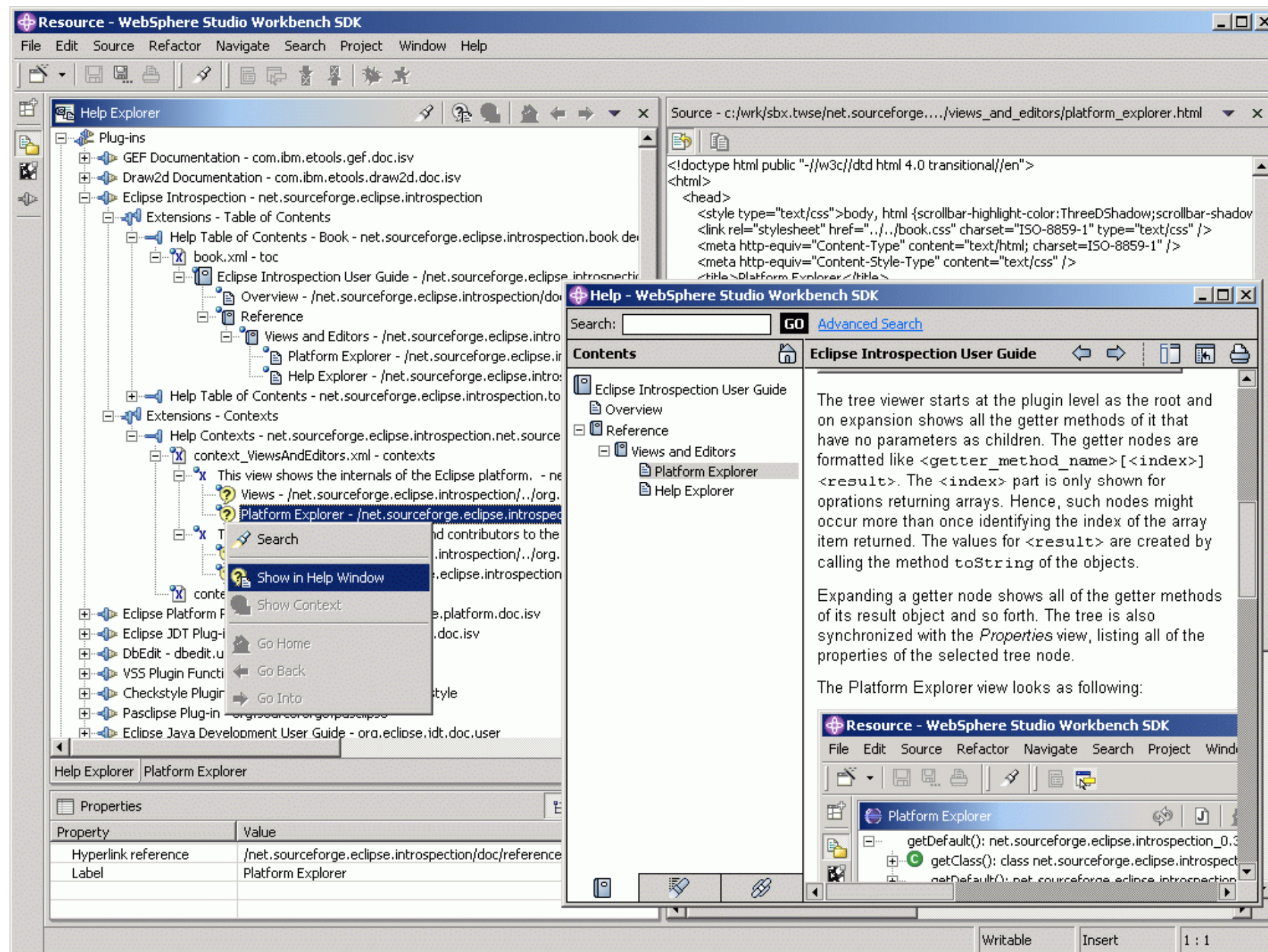
2

Guidelines for
Mac, Windows,
Gnome, KDE,
Android, iOS...

UI *and* writing!



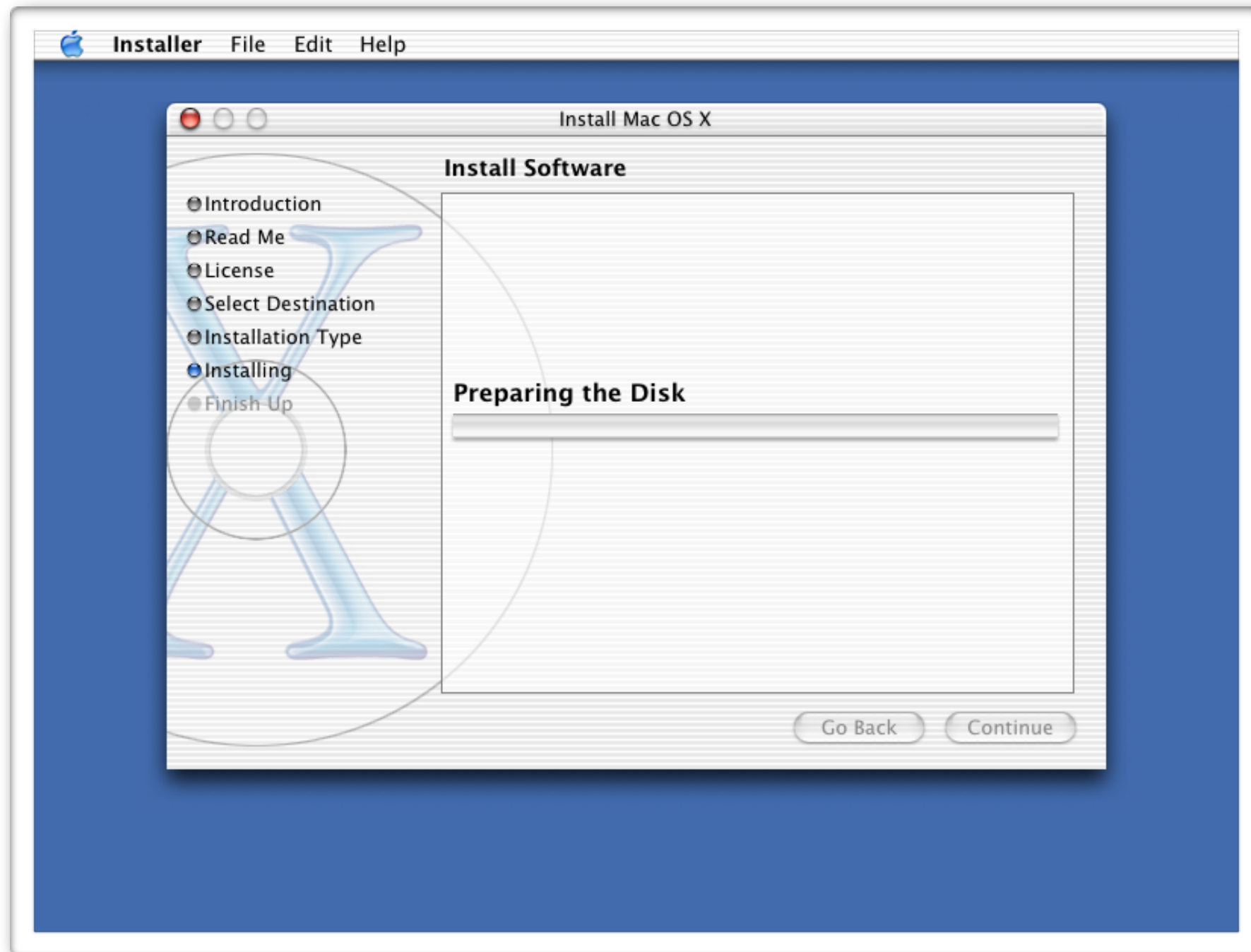
Help and Documentation



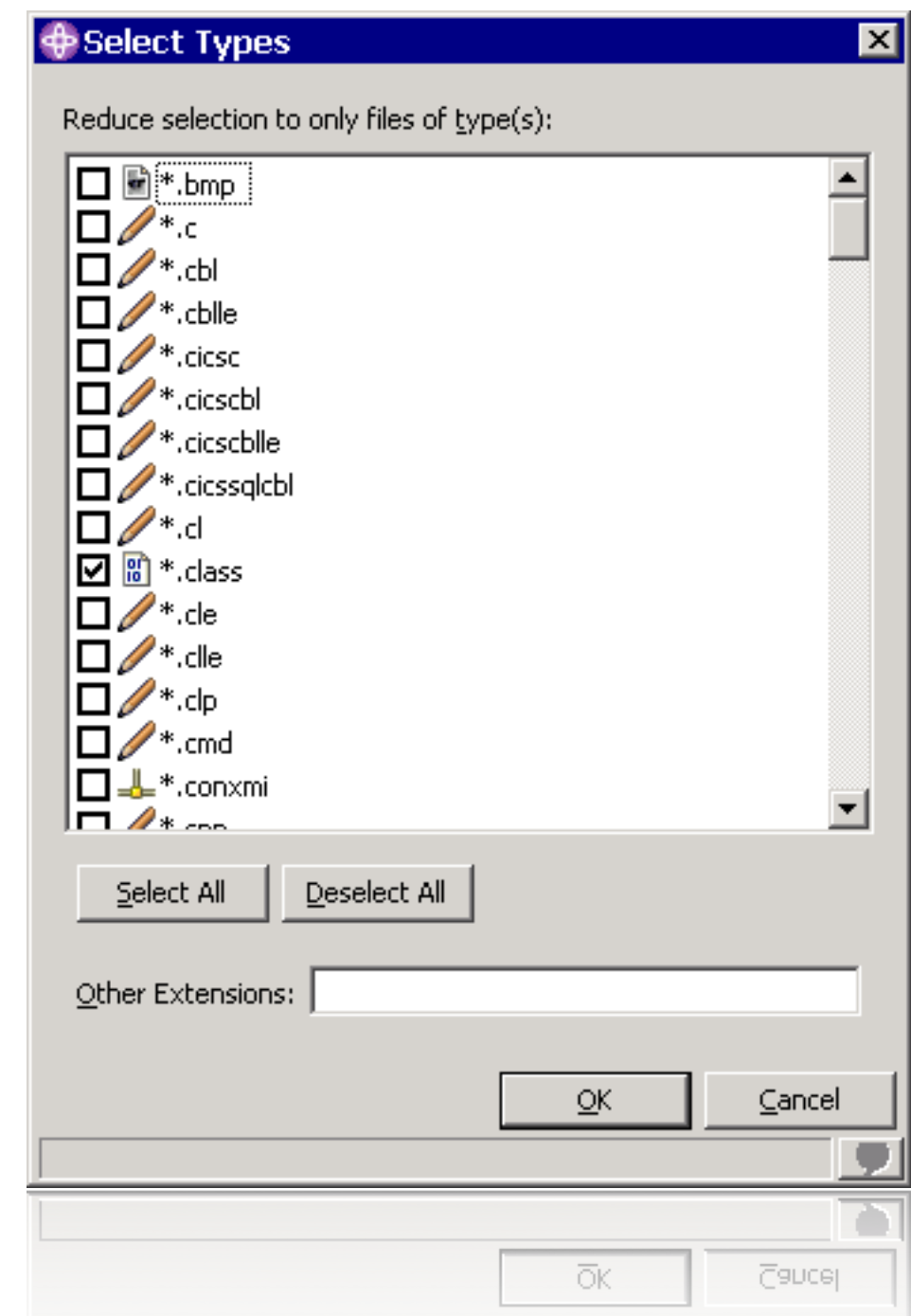
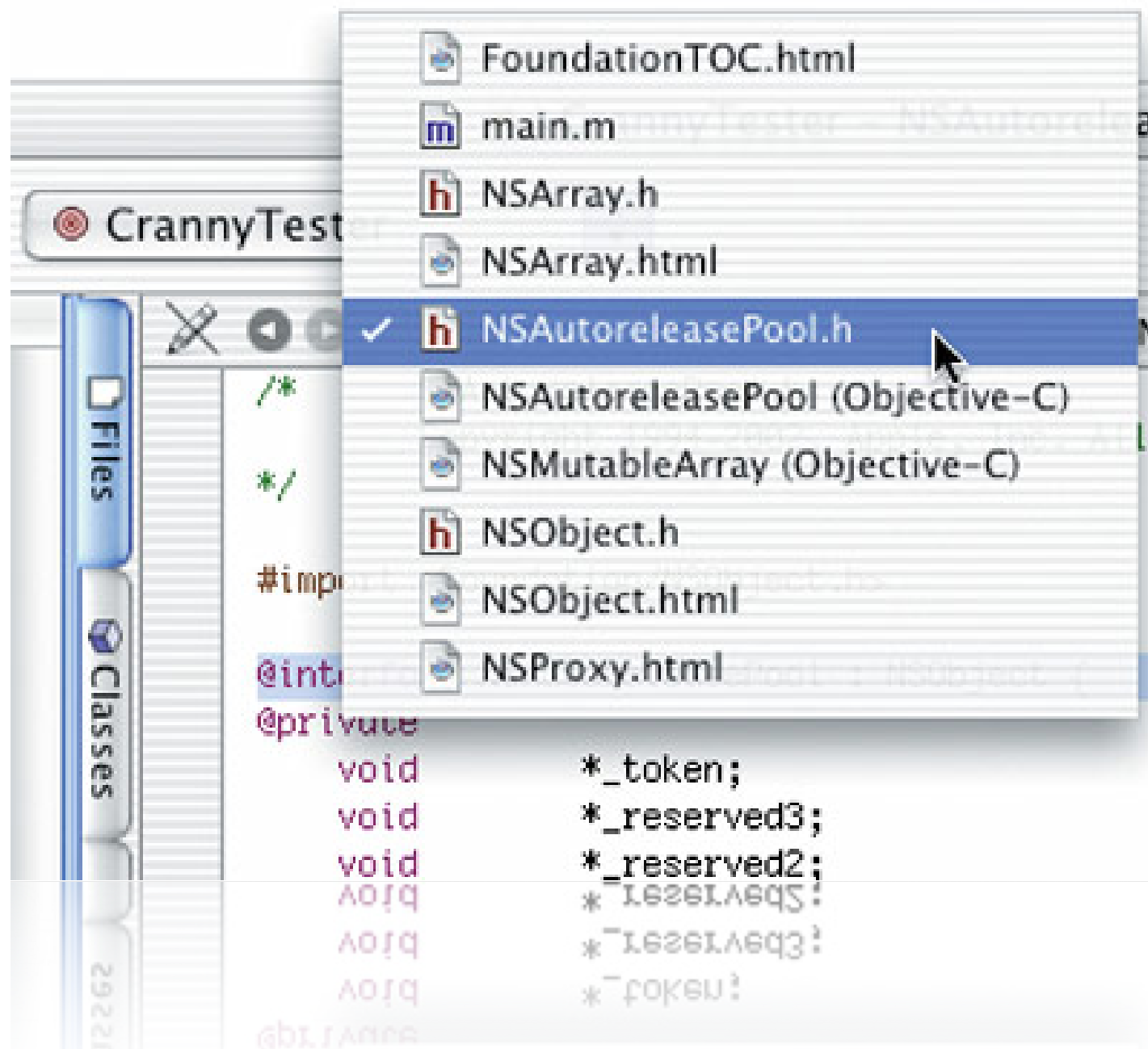
User Control and Freedom



Visibility of System Status



Flexibility and Efficiency



Error Prevention

Movie Information for: Predator

Movie Collection	
MovieID	32
Title	Predator
Genre	Science Fiction
Region	2
Sound	5.1
Comments	

Actors
Arnold Schwarzenegger
Carl Weathers
Bill Duke
Bill Duke
Charles S Dutton
Robert Duvall
Christopher Eccleston
Dakota Fanning
Will Ferrell

Record: 3

Directors
John McTiernan

Record: 1

Movie 27 of 40

Close

Recognition, not Recall

8



Error Reporting, Diagnosis, Recovery

9



Aesthetic and Minimalist Design

10



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Google Search

I'm Feeling Lucky

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Microsoft designs the iPod package



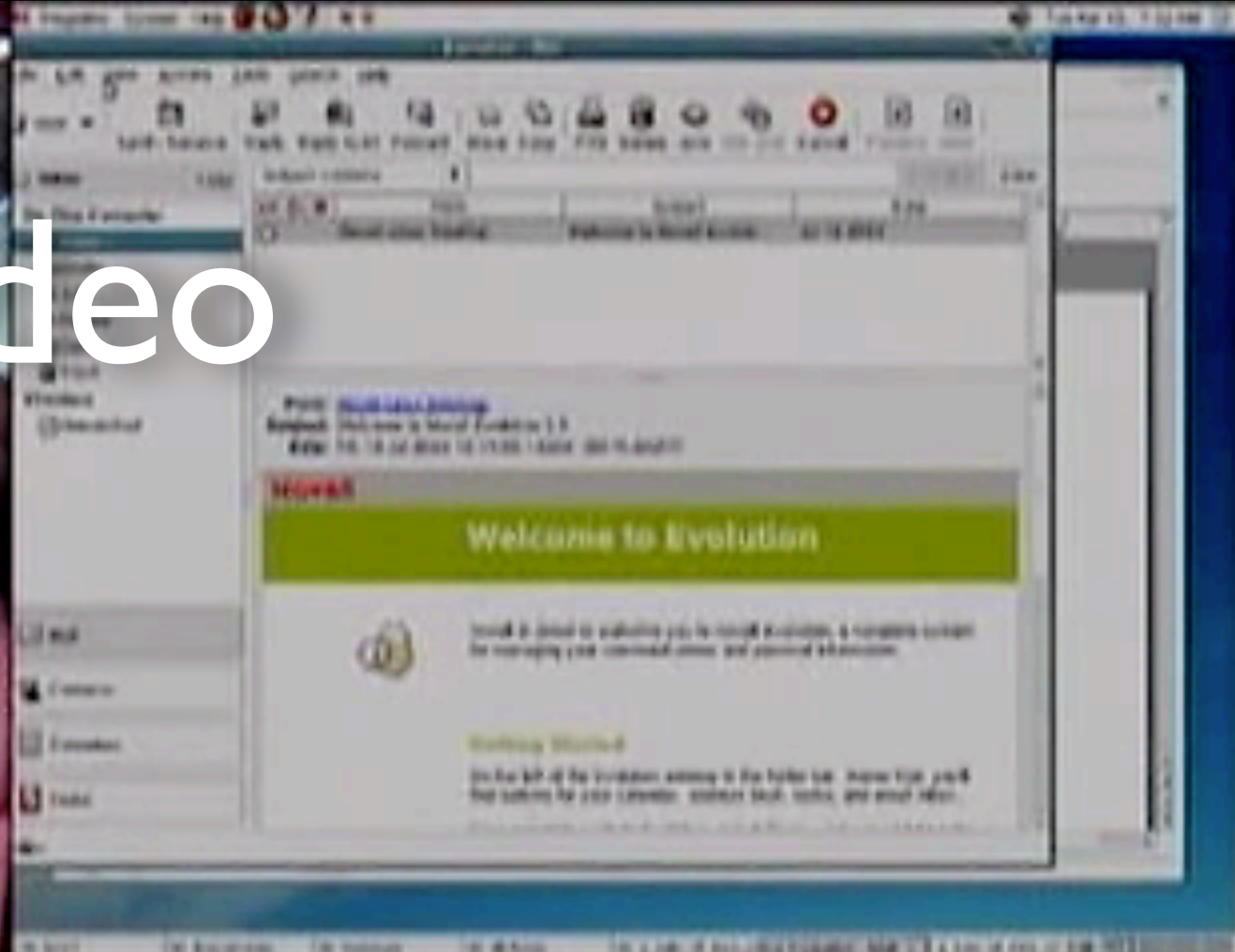
User Interface Testing

- How do you know you did everything well?
- Only way: Have real users test it!

Email "A Tale of Two Cities"

This task was performed using Suse 9.3 in a Portable Lab on the GNOME desktop. The test was administered in English. The following is a description of the task:

Your friend Arthur loves "A Tale of Two Cities". Please email the electronic book to him. His email address is arthur@ximian.com.



VIDEO LOSS
26/03/28
02:26:44

Issues Encountered

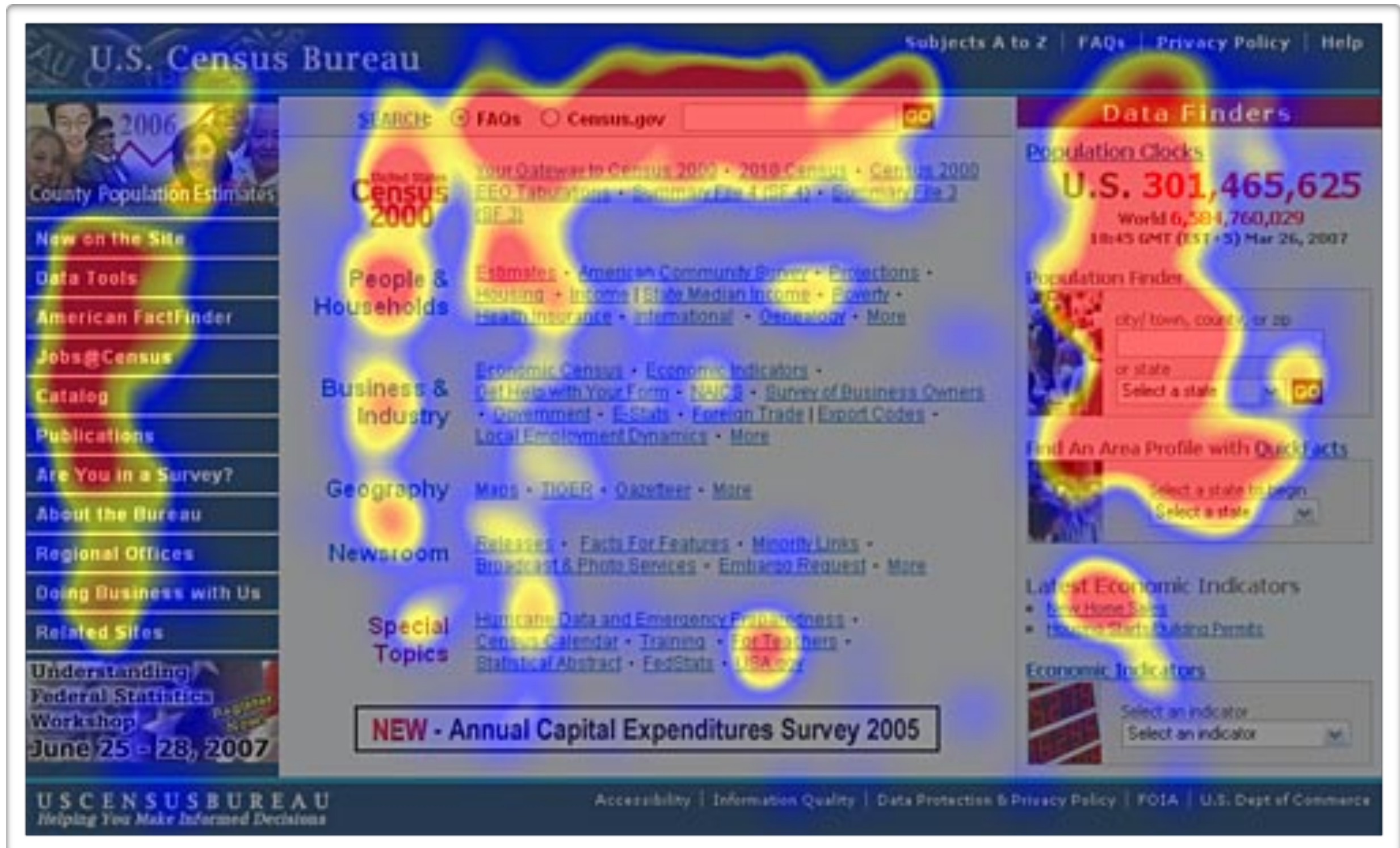
- Mail Client is referred to as “Evolution” (not “Mail” or similar)
- “Send/Receive” Button does not compose mail (but syncs with server)
- Attachment list hidden by default
- 20% of users failed to send mail
- Average *successful* time was 4:23 minutes

Reaction

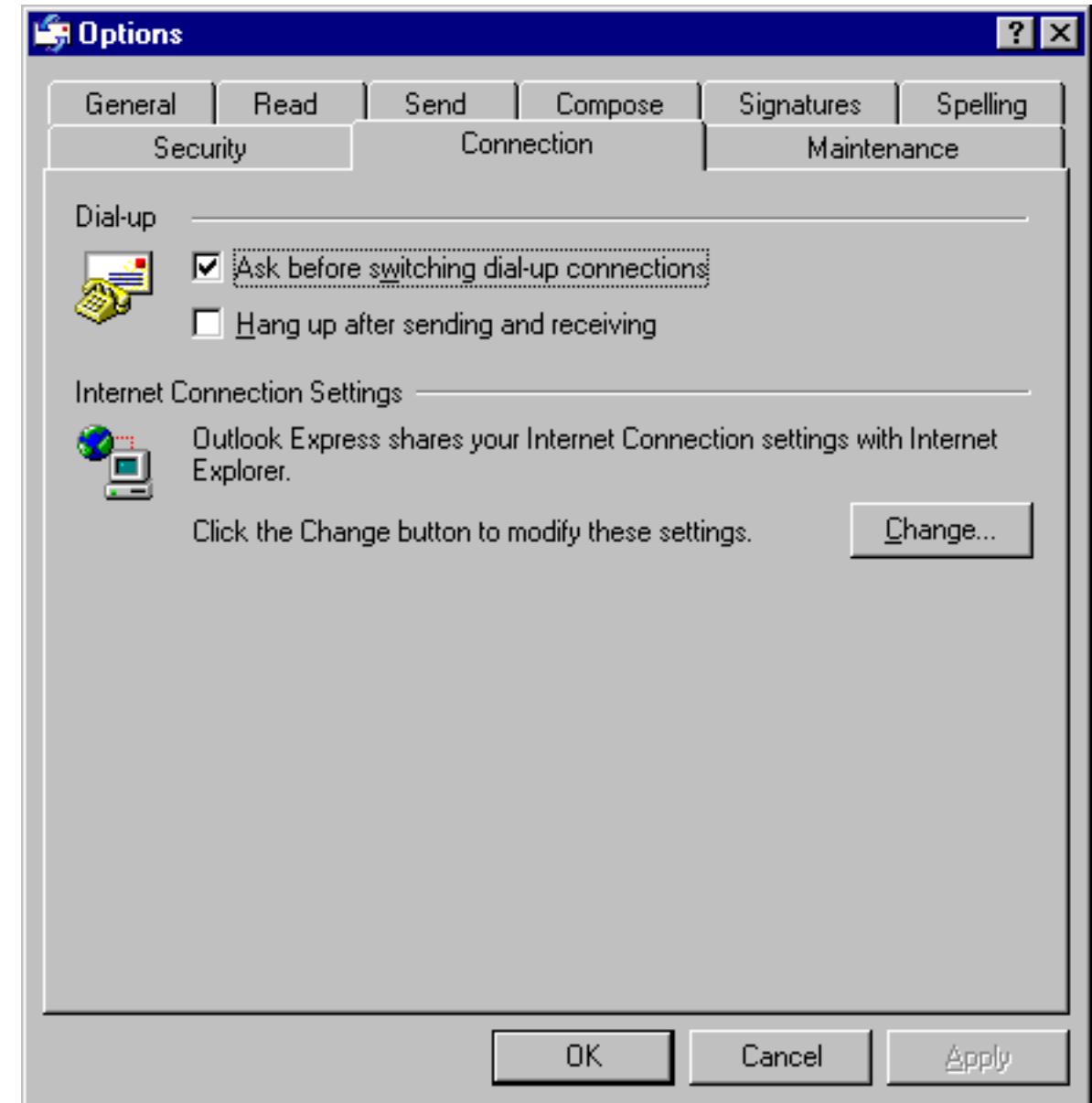
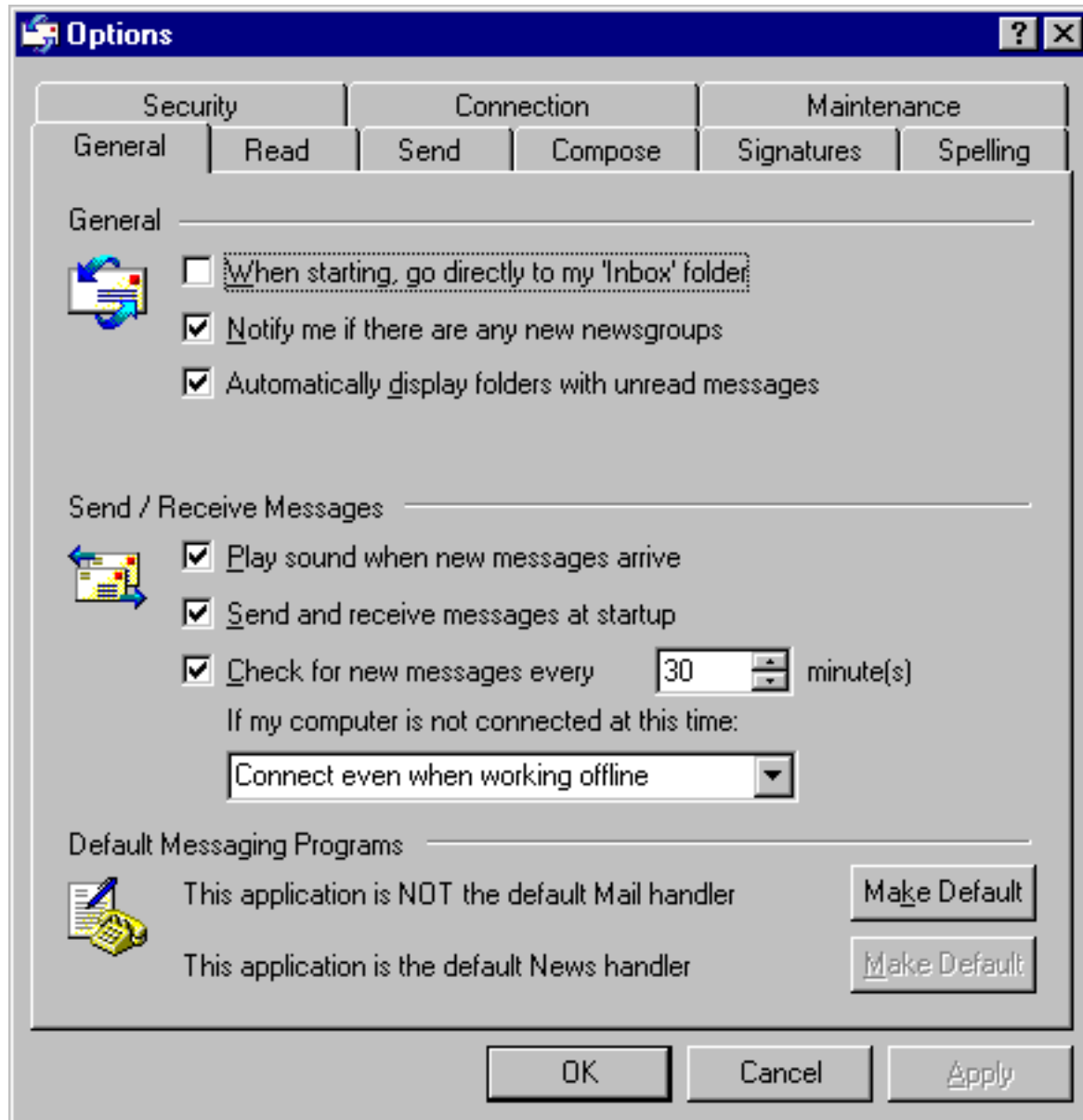
- Typically, when project managers observe their design undergoing a usability test, their initial reaction is:

Where did you find such stupid users?

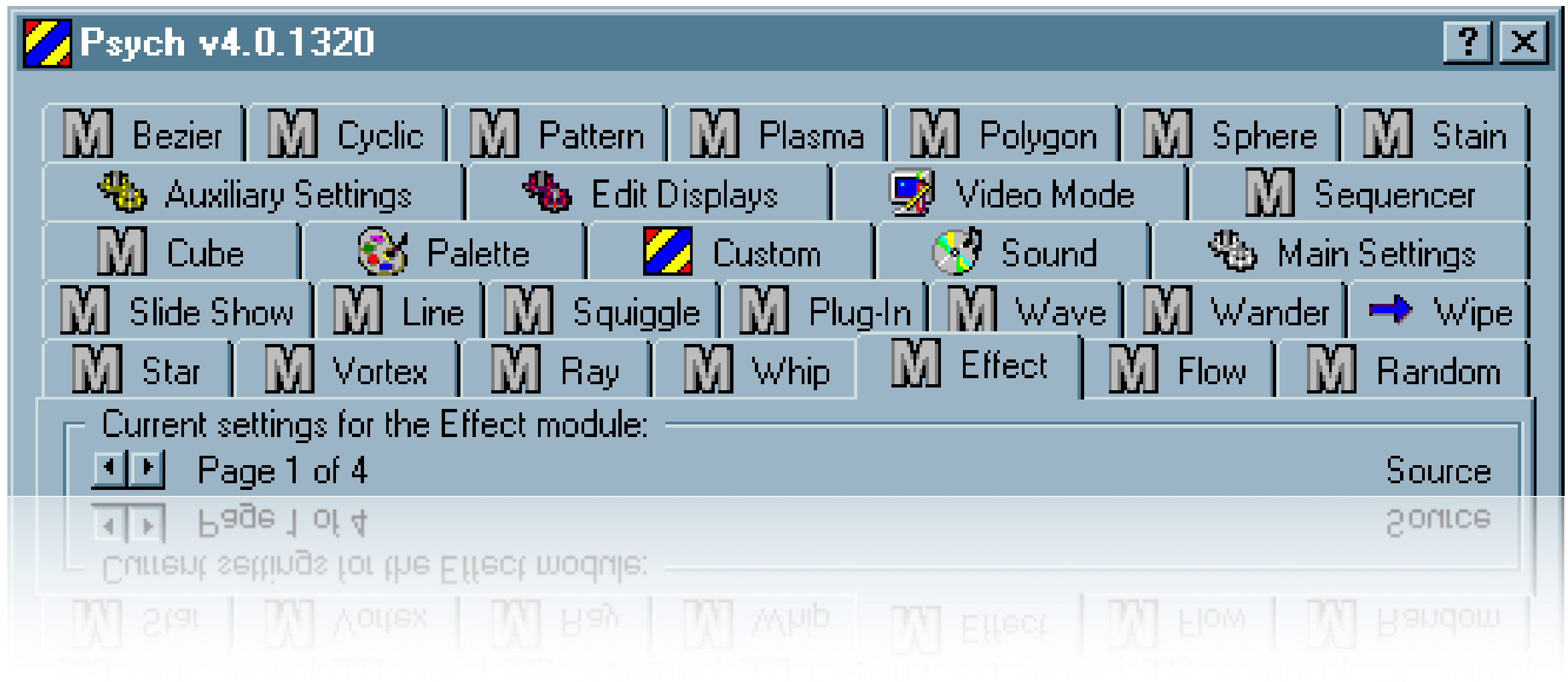
Eye tracking



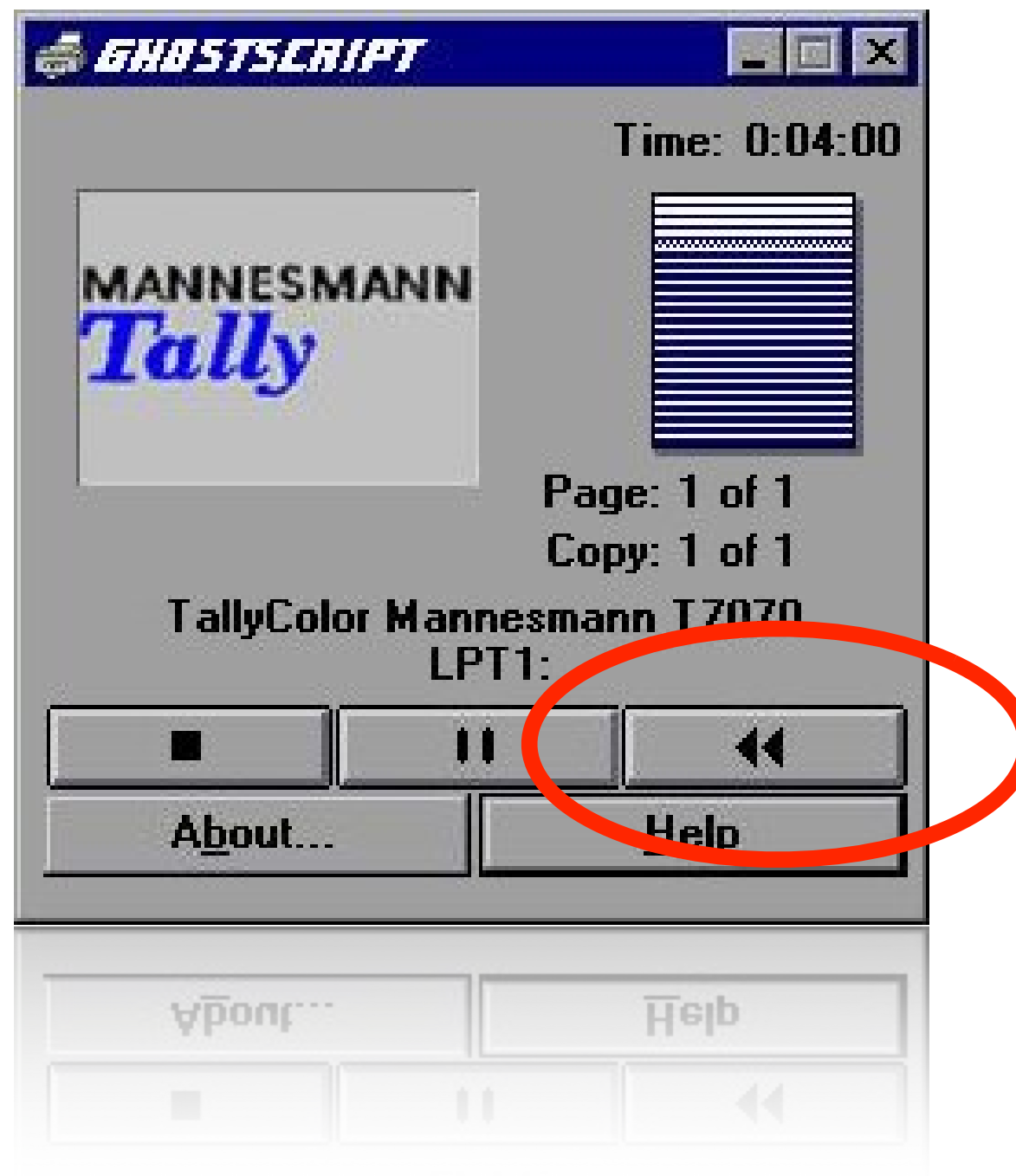
GUI Hall of Shame



Tabs



Rewind



Help



In Microsoft Assistant Killed in Denver, it was reported that Microsoft program managers demonstrated a technique to kill the assistant to a crowd attending a development conference.

Options

Effects

☐ Strikethrough

☒ Double strikethrough

☐ Superscript

☒ Subscript

☐ Shadow

☐ Outline

☐ Emboss

☒ Engrave

☒ Small caps

☐ All caps

☐ Hidden

☐ 20p2cubf

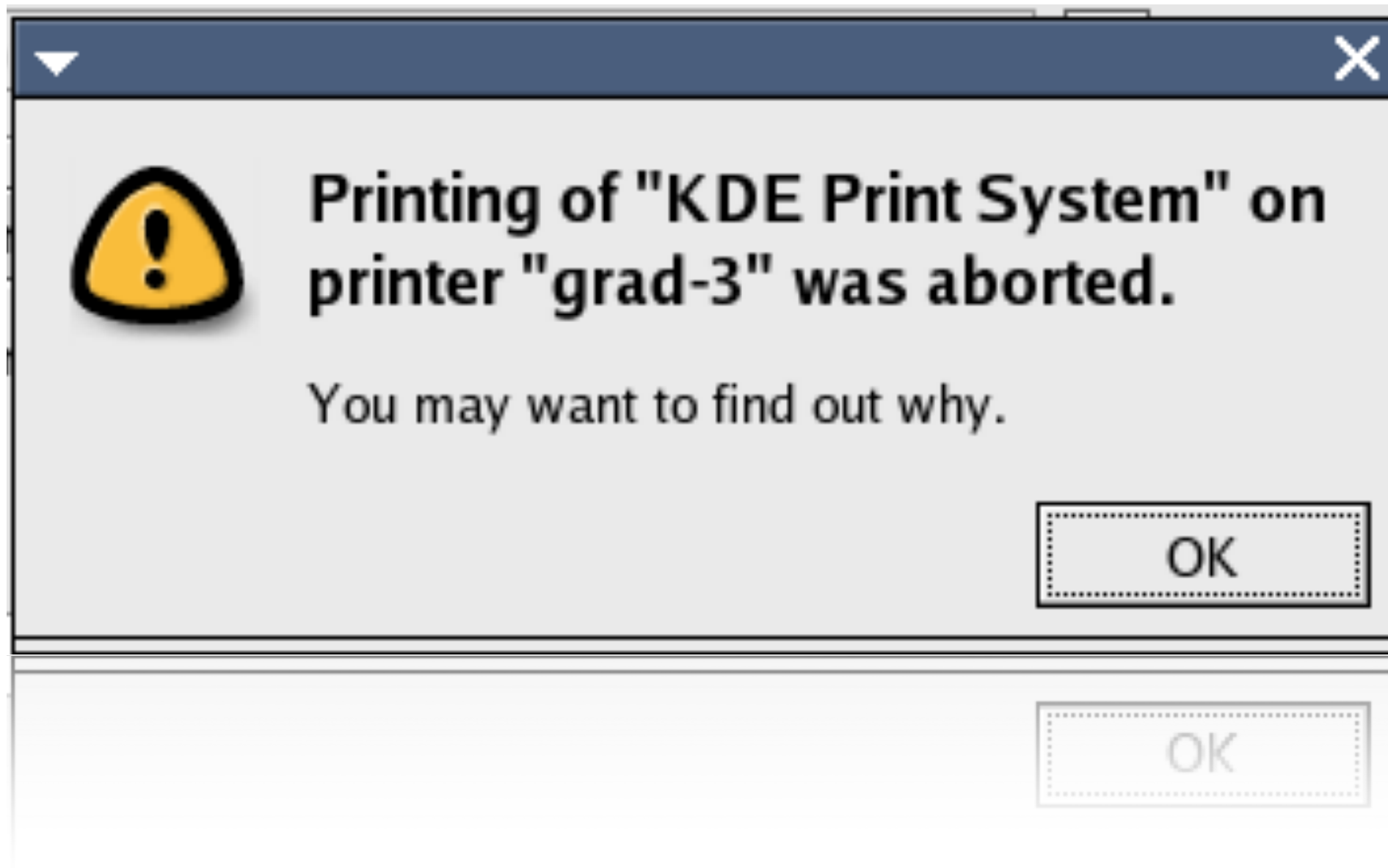
☐ 20p2cubf

☐ 20p2cubf

☐ 20p2cubf

☐ 20p2cubf

Puzzle



503 Polite People



Type “Mismatch”



10:18

10.11.15

VIDEOSTEUERUNG



Beamer

Audio

Funk-
mikro

Licht

Raum

System
aus

Bildquellen Medienwagen

VGA1

S-Video

VGA2

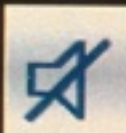
Video

VGA3

auto
adjust

Projektor
AUS

Zuspieler



Projektor 3

Standby

Projektor 2

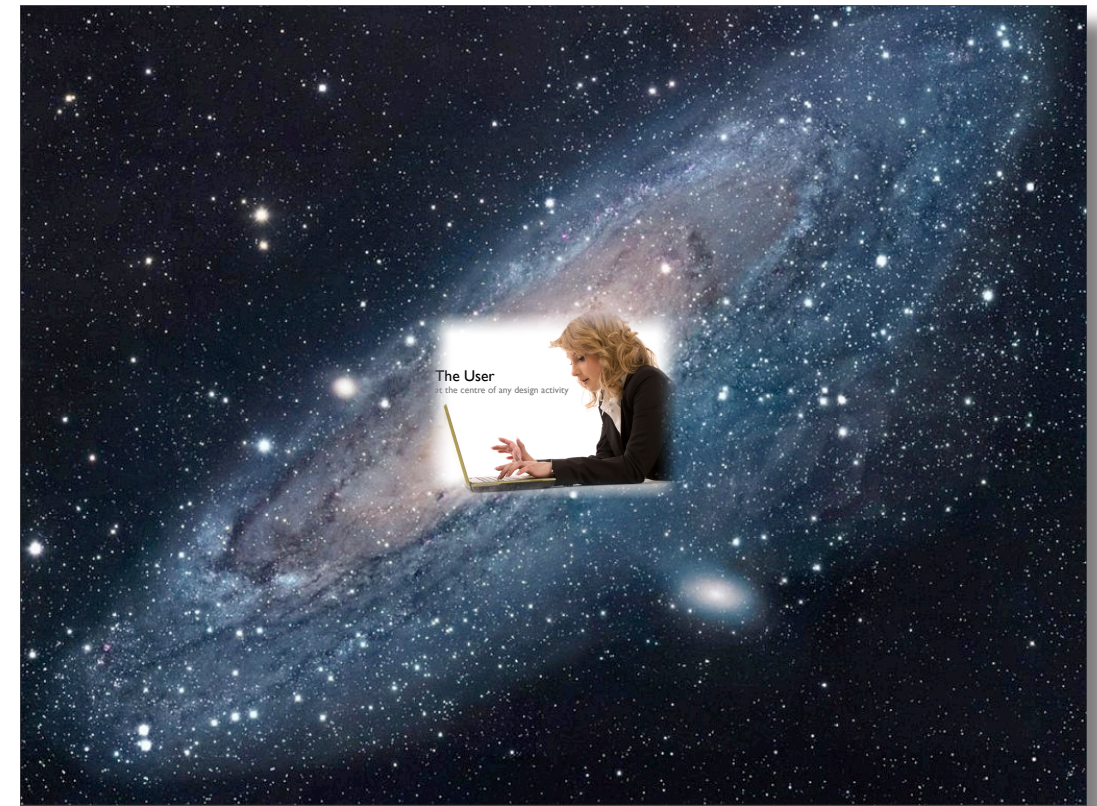
Power On

Projektor 1

Standby

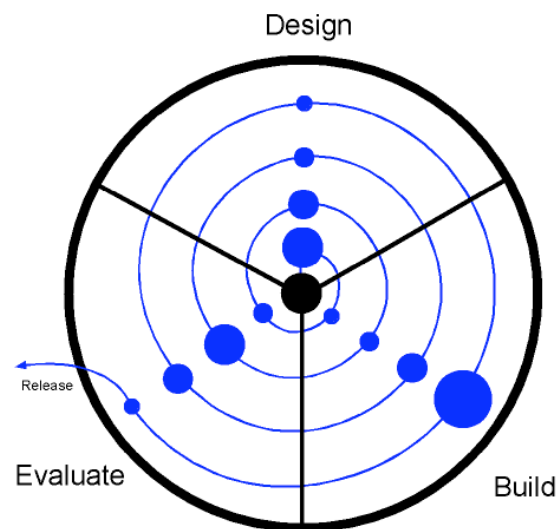
Bild
Dunkel

Interface



Summary

Spiral Model



Nielsen's Principles

1. Match the real world
2. Consistency and Standards
3. Help and Documentation
4. User Control and Freedom
5. Visibility of System Status
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