# CSEN909: Human Computer Interaction

# Lecture 2
# (BI)

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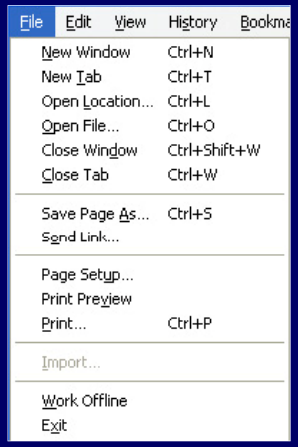
# Nielson's Heuristics

- H7: Flexibility and efficiency of use
  - Allow users to quickly do frequent actions




**Shortcuts**

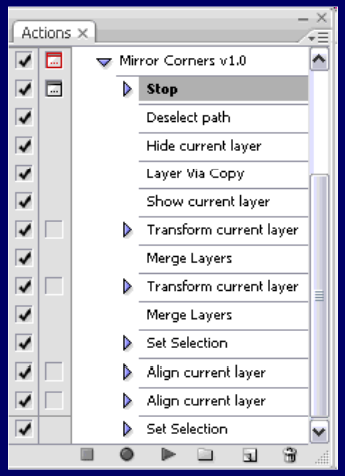
# Nielson's Heuristics

- H7: Flexibility and efficiency of use
  - Allow users to tailor frequent actions (e.g., macros)


**Word Macros**

# Nielson's Heuristics

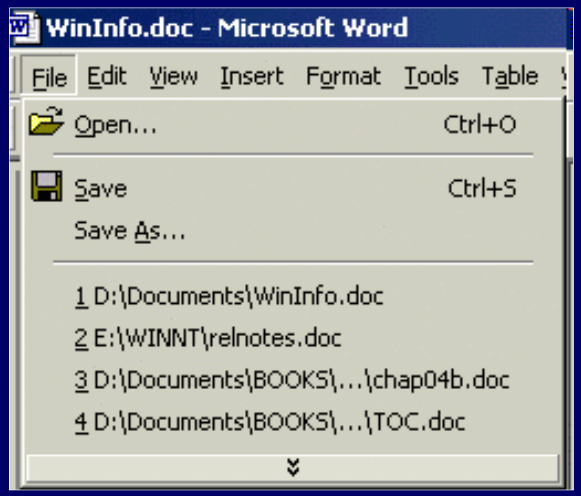
- H7: Flexibility and efficiency of use
  - Allow users to see actions history




Photoshop actions

# Nielson's Heuristics

- H8: Aesthetic and minimalist design
  - Rule: less is more.



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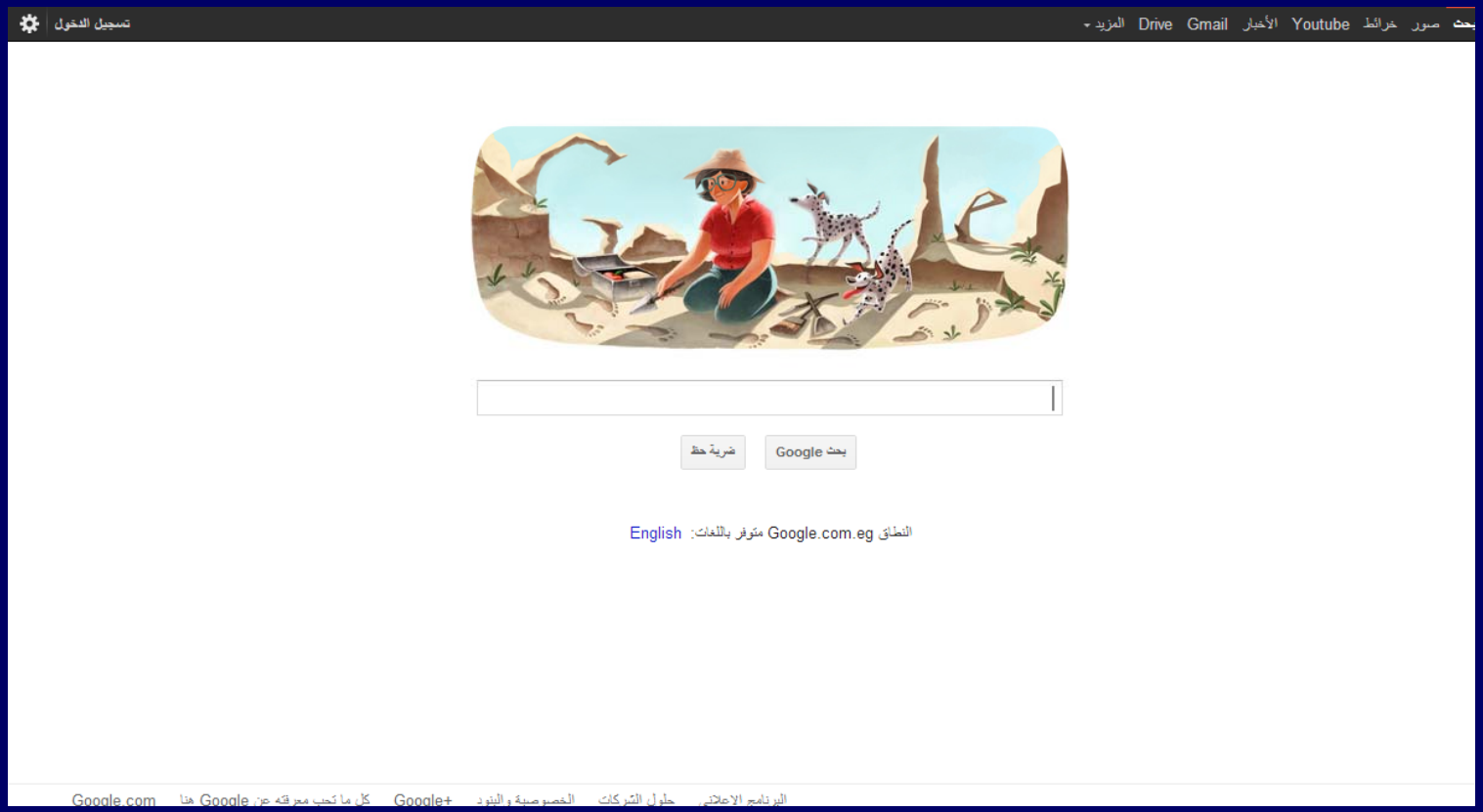

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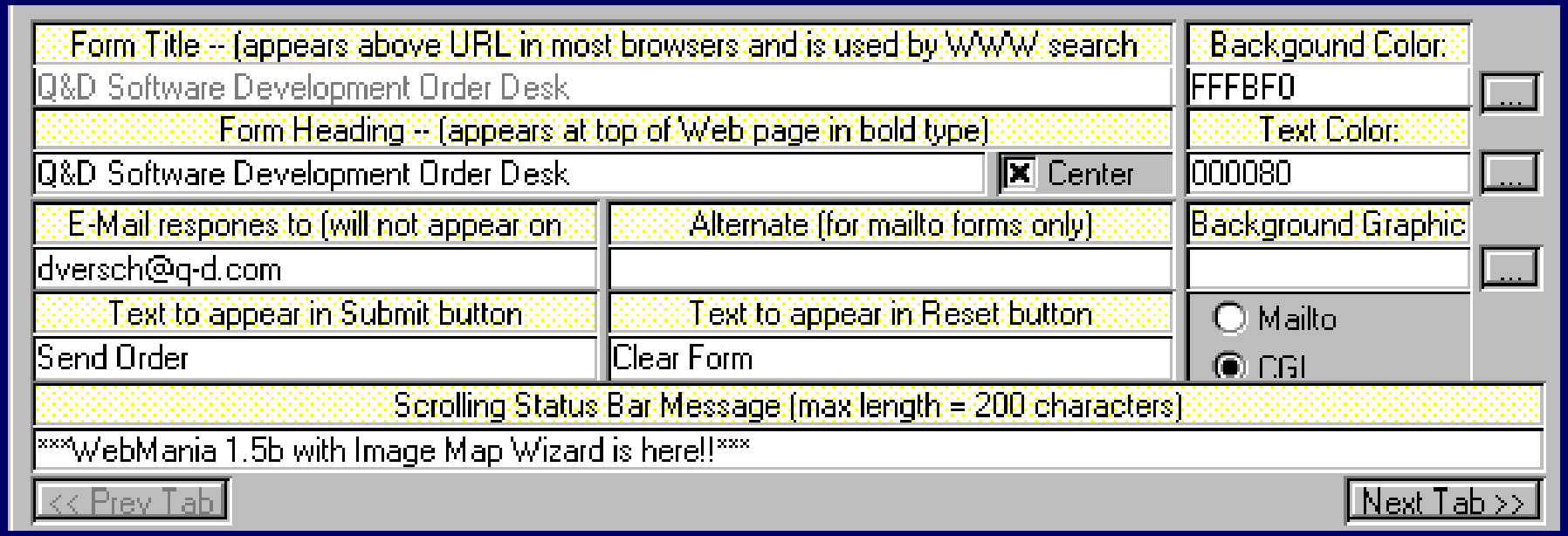
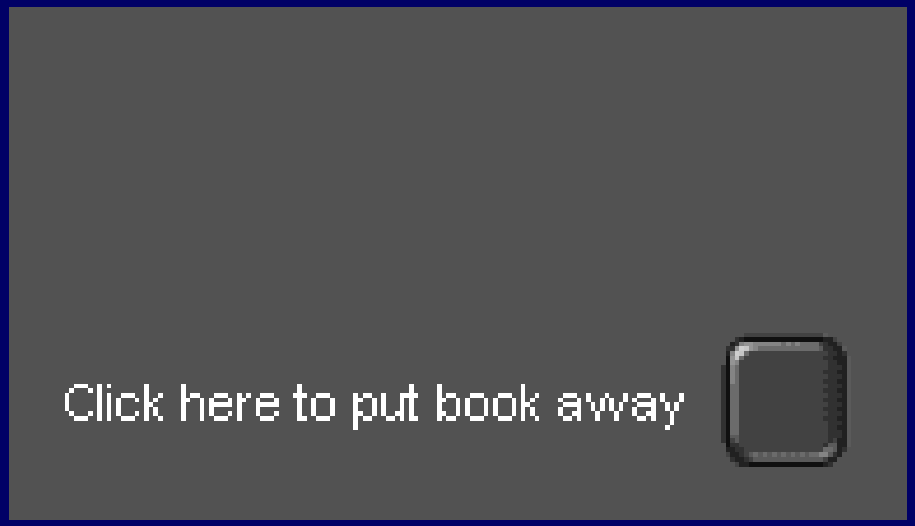


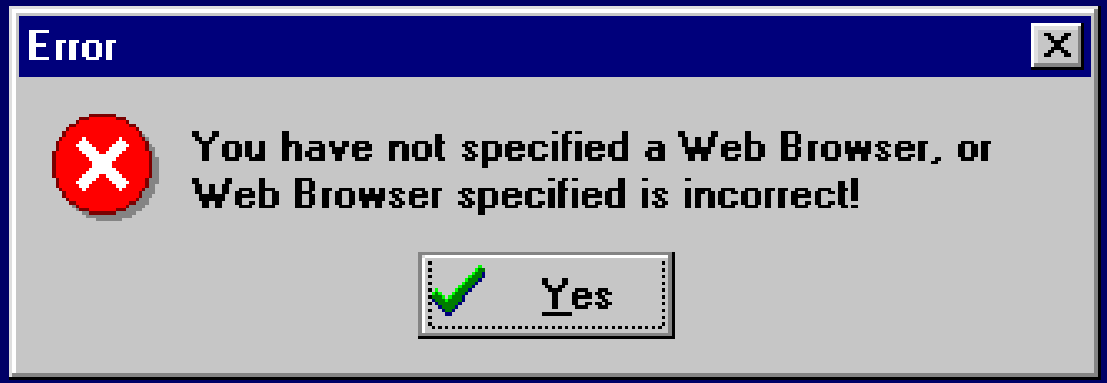
# Nielson's Heuristics

- H8: Aesthetic and minimalist design
  - Few, well-chosen colors and fonts



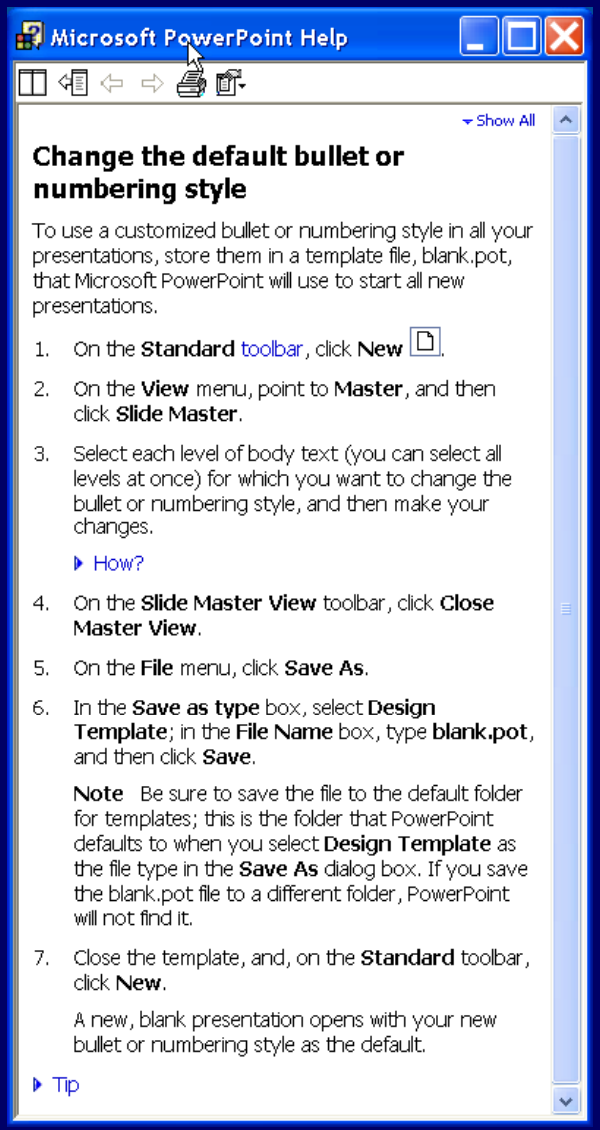
# Nielson's Heuristics

- H9: Help users recognize, diagnose and recover from errors
  - error messages in plain language
  - precisely indicate the problem
  - constructively suggest a solution



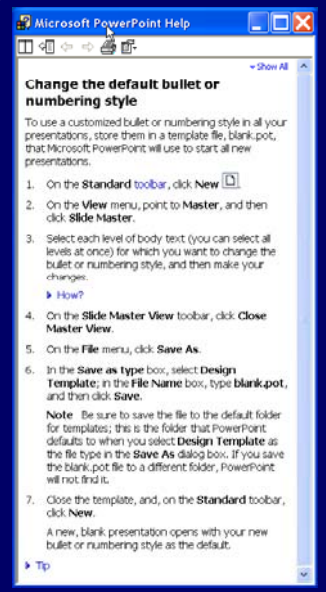
# Nielson's Heuristics

- H10: Help and documentation
  - Users do not read manuals!
  - Context sensitive
  - Searchable
  - Task-oriented
  - Concrete steps
  - Short



# How to Write a Good Help?

- Taxonomy of questions in help (Baecker, Small & Mander 1991)
  - Identification: What is this?
  - Transition: Where have I come from & gone to
  - History: What have I done?
  - Orientation: Where am I?
  - Choice: What can I do now?
  - Demonstration: What can I do with this?
  - Explanation: How do I do this?
  - Feedback: What is happening?
  - Interpretation: Why did that happen?
  - Guidance: What should I do now?



# Phases of Heuristic Evaluation

1) Pre-evaluation
   - give evaluators needed domain knowledge and information on the scenario
2) Evaluation
   - individuals evaluate and then aggregate results
3) Severity rating
   - determine how severe each problem is (priority)
     - do this first individually and then as a group
4) Debriefing
   - discuss the outcome with design team

# How to Perform Evaluation

- At least two passes for each evaluator
- 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 and list each problem separately

# Severity Rating

- Used to allocate resources to fix problems
  - Estimates of need for more usability efforts
- Combination of
  - frequency
  - impact
  - persistence (one time or repeating)

# Severity Rating

**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

# HE Example

1. [H1-4 Consistency and standards] [Severity 3]

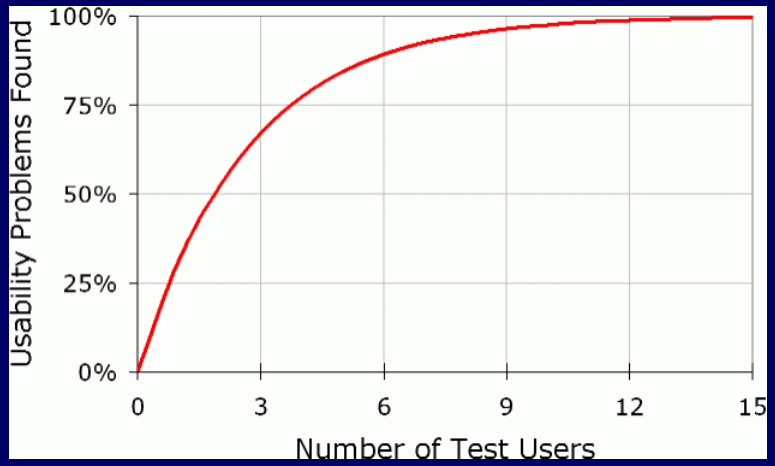
The interface used the string "Save" on the first screen for saving the user's file, but used the string "Write file" on the second screen. Users may be confused by this different terminology for the same function.

# HE vs. User Testing

- HE is much faster
  - 1-2 hours each evaluator vs. days-weeks
- HE doesn't require interpreting user's actions
- User testing is far more accurate (by def.)
  - takes into account actual users and tasks
  - HE may miss problems, why ?
- Good to alternate between HE & user testing
  - find different problems
  - don't waste participants

# How Many Evaluators are Enough?

- Landauer-Nielsen Model
  - Every tested user finds a fraction L of usability problems (typical L= 31%)
  - If user tests are independent, then n users will find a fraction $1 - (1-L)^n$
  - So, 5 users will find 85% of the problems!




From http://www.nngroup.com/articles/why-you-only-need-to-test-with-5-users/

# How Many Evaluators are Enough?

- Criticism of Landauer-Nielsen Model
  - Spool & Schroeder study of CD-purchasing website found L=8%, so 5 users will only find 35% of problems.

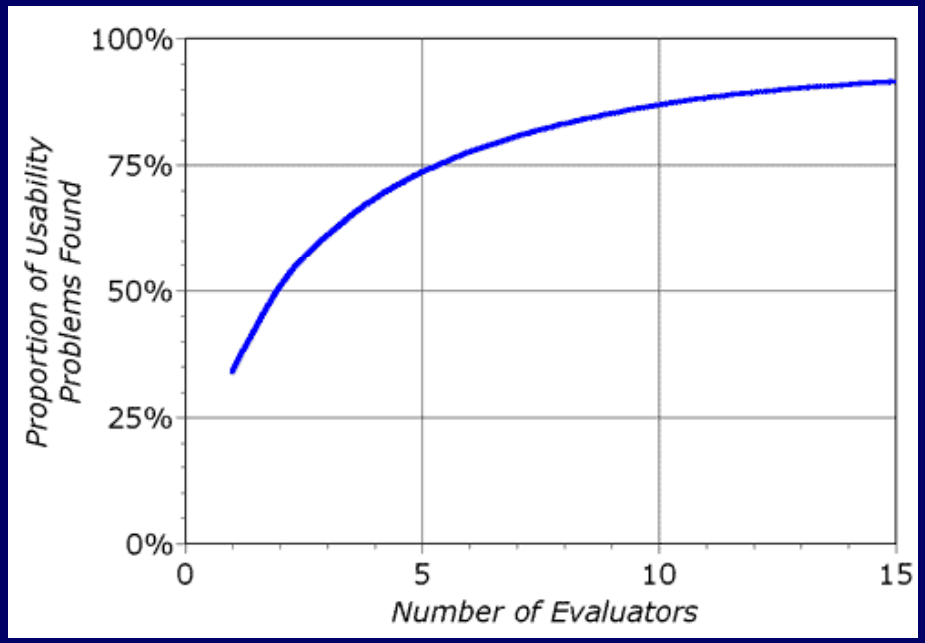
- Take-home lesson: you can't predict with confidence how many users may be needed

# Still Using HE is Beneficial

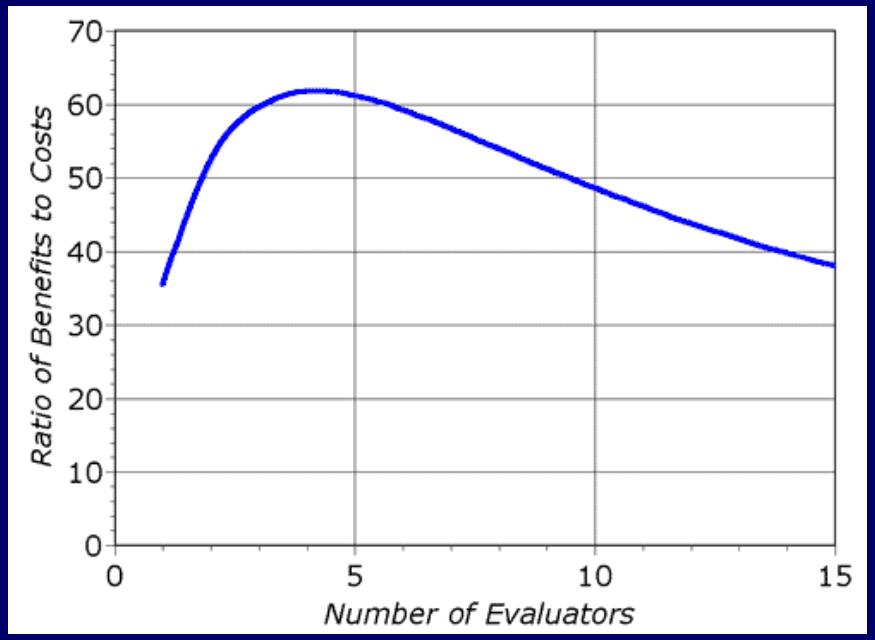
- Benefit-cost ratio (*Usability Eng,* Nielsen 94)
  - cost was $10,500 for benefit of $500,000
  - how was this calculated?
    - in-house -> productivity;
    - open market -> sales
    - customer calls to your customer service center
- Correlation between severity & finding w/ HE

# Still, Don’t Over do it! Decreasing Returns

## problems found




## benefits / cost



# Interaction Design

# History of Design in HCI

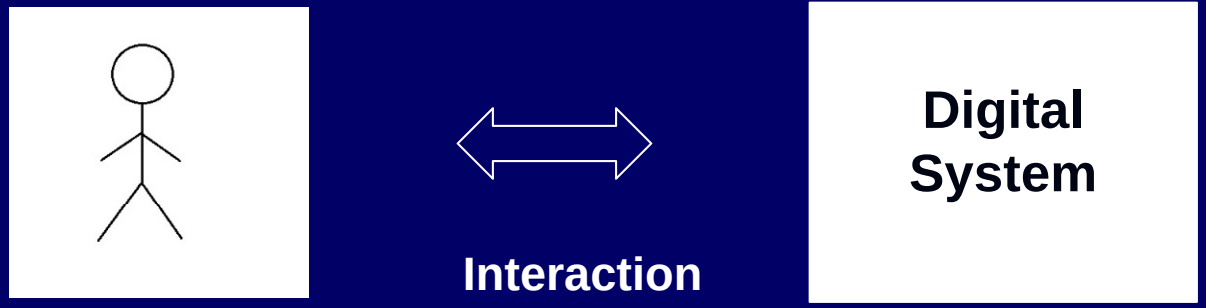
- Ergonomics (mechanical engineering)
- System Analysis and Design
- Interface Design
- Interaction Design

# What is Interaction Design (IxD)?

- Designing how users interact with a system!
- Shaping digital things for people's use
- Synthesis and imagining things as they might be, more so than focusing on how things are
- Like many other design fields interaction design also has an interest in form but its main focus is on behavior

# What is Interaction Design (IxD or UX) ?

Interface Design

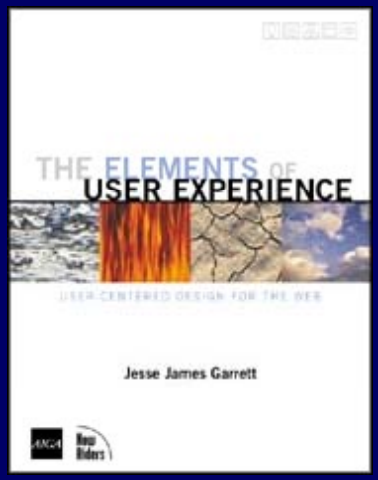

Interaction Design

# Interaction Design: a layered approach

# 1) Layered Design

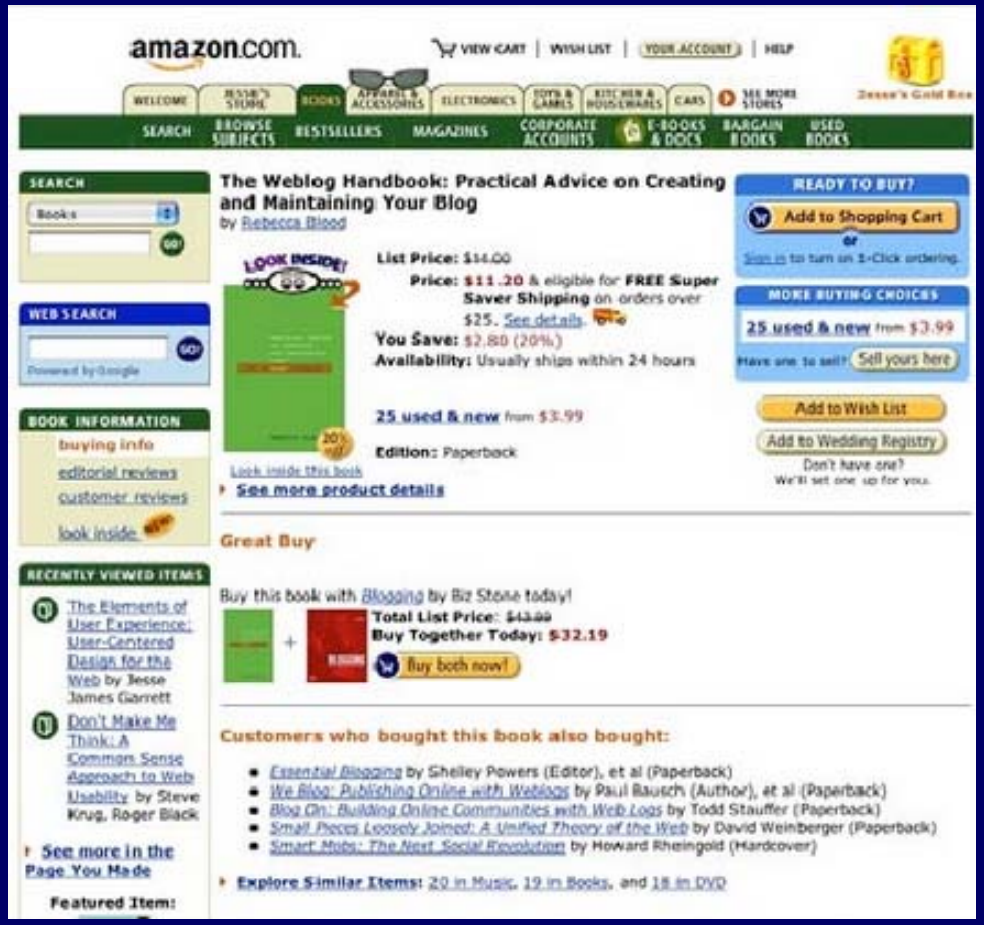
- Applicable to traditional interfaces
  - Desktop
  - Cell phone
  - Web

- Made famous by *Elements of User Experience* by James Garnett
  - Focus on User experience not interface design



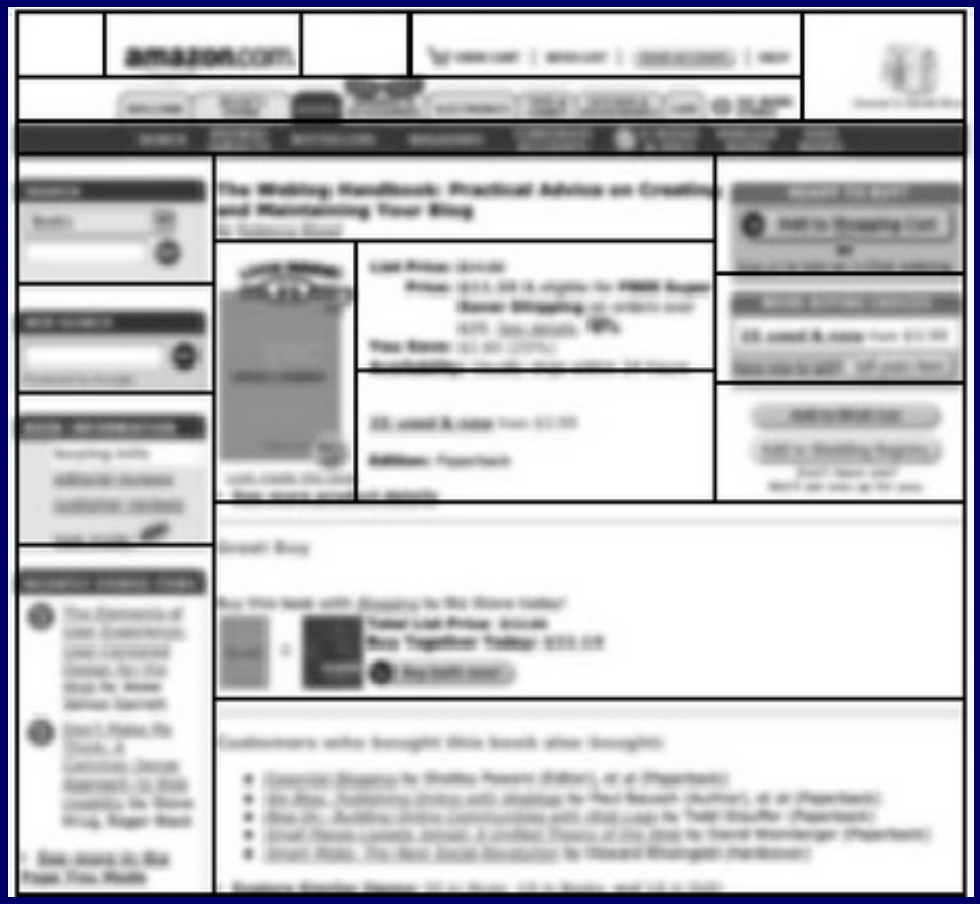
# GUI Front-end Layers

- Surface



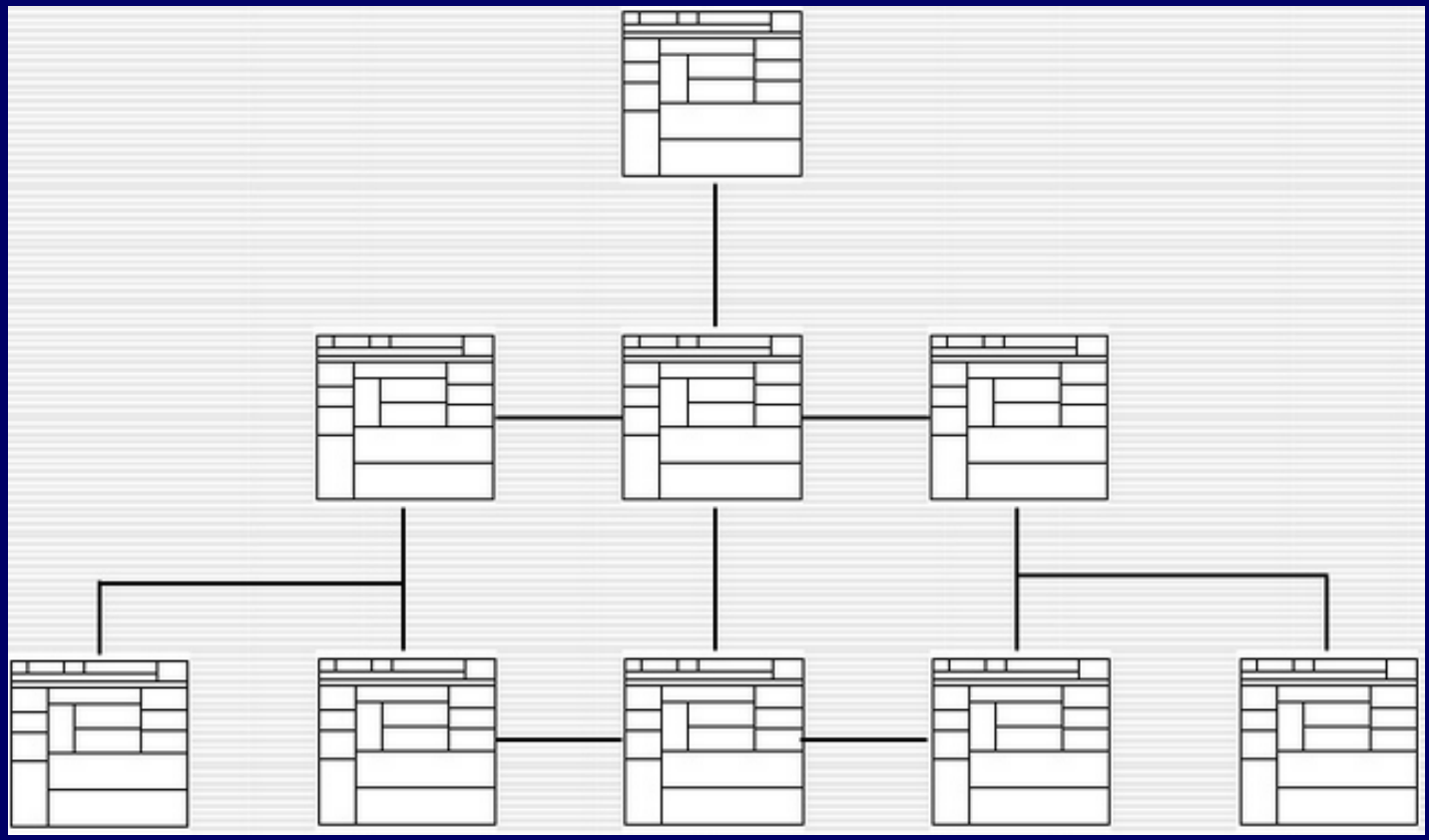
# GUI Front-end Layers

- Skeleton



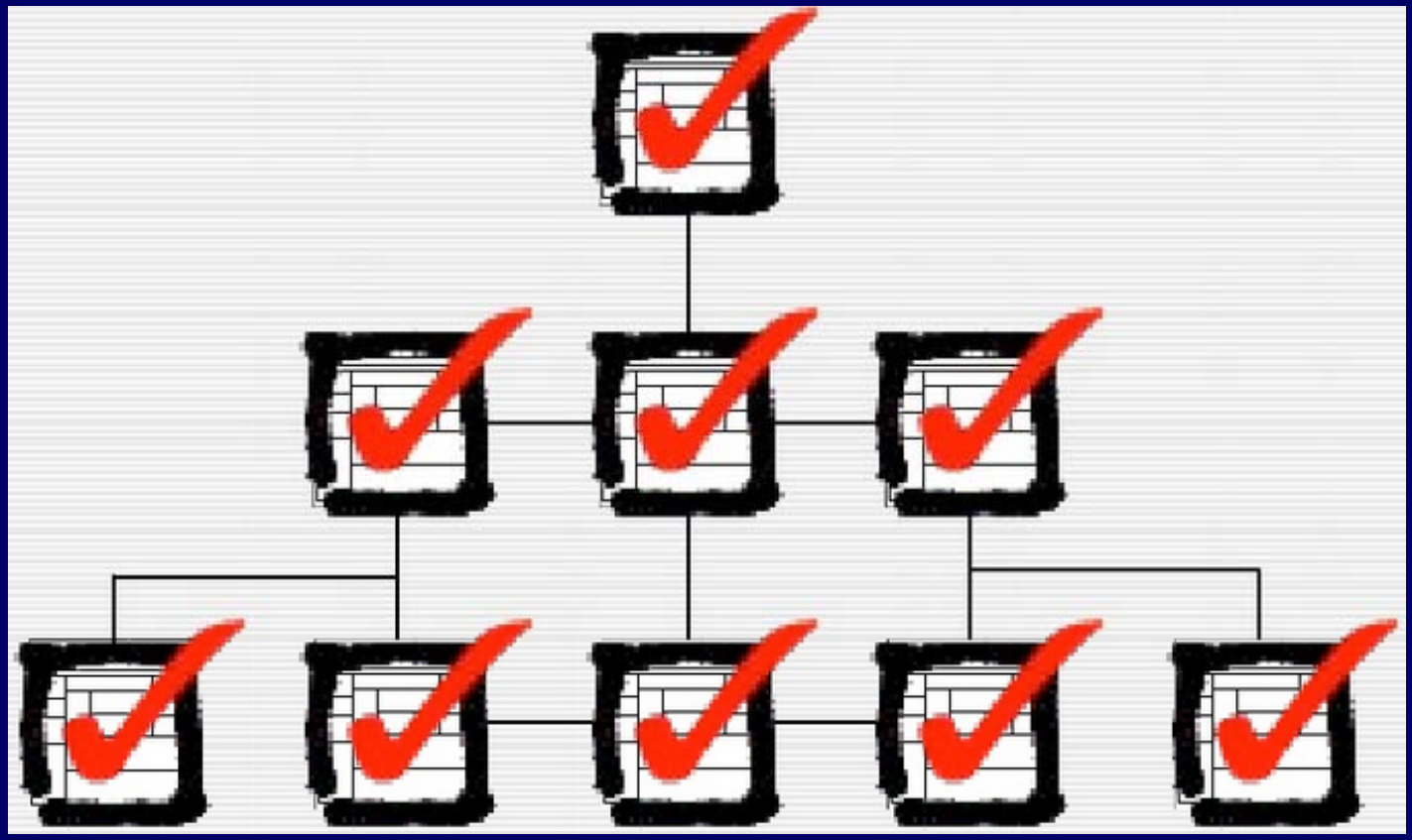
# GUI Front-end Layers

- Structure



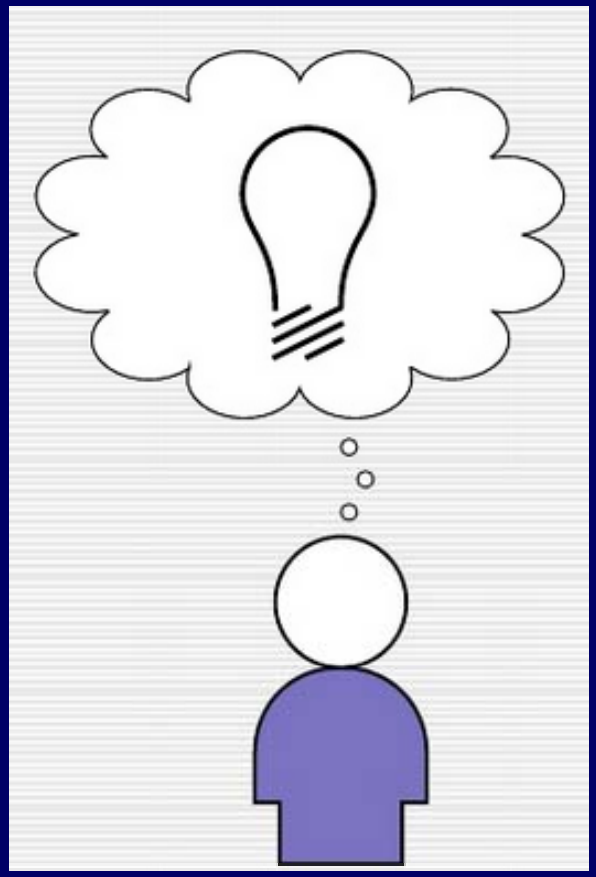
# GUI Front-end Layers

- Scope

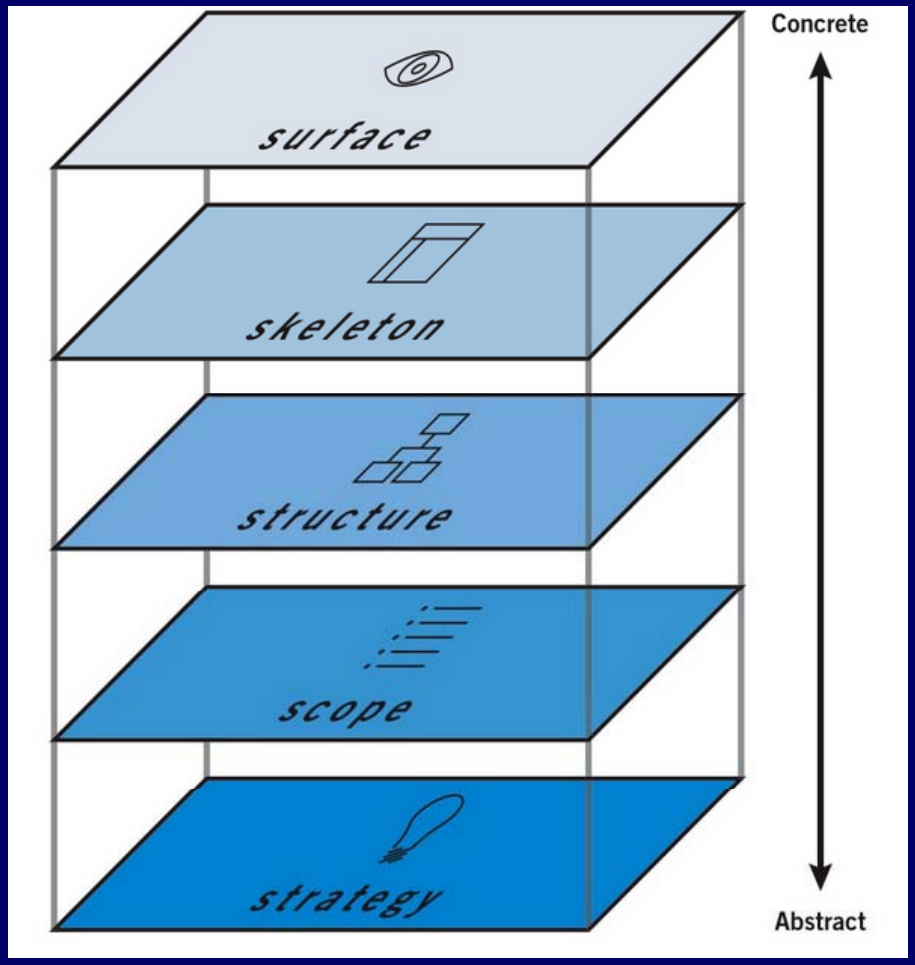


# GUI Front-end Layers

- Strategy



# 5-level approach



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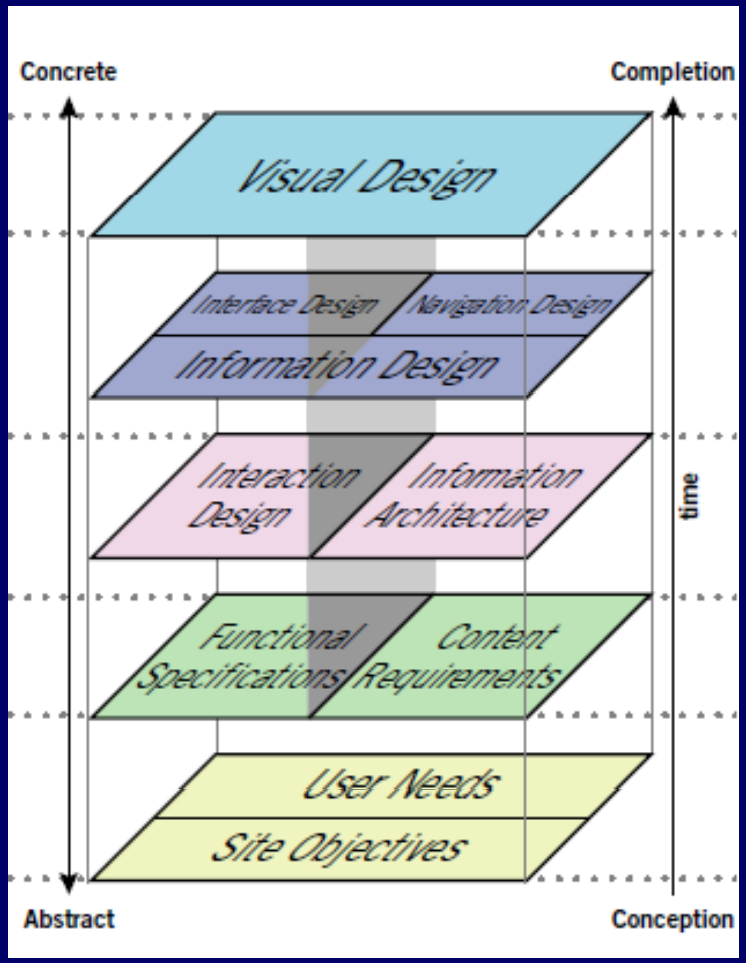


# Strategy-Level

- **Main question: Why are we making this GUI?**
  - a) User Needs ?
  - b) GUI Objectives ?

# Strategy-Level: User Needs

- **Common Ones;**
  - a GUI that works (effective)
  - a GUI they can use
  - a GUI that meets their expectations

- **Project specific**

# Strategy-Level: User Research to Find Needs

| Qualitative questions | Quantitative questions |
|---|---|
| • Tell me about the experience with…?<br>• Could you describe how you…?<br>• What did you feel when…?<br>• How was it possible that…?<br>• What are your thoughts about…?<br>• Can you give me an example of…?<br>• What do you mean by…?<br>• Can you tell me more about…? | • How would you rate the quality of the image on a scale from 1 to 5 (1: poor, 5: very good)<br>• Have you ever written a book (y/n)?<br>• What is your age?<br>• How many coffees do you drink during a normal working day (none, 1, 2, 3-4, more than 4)? |

# User Research Methods

- **Quantitative Approach**

  - Goal: answer the question of how many…?

  - Discover trends in a large group of people

  - Methods
    - Online Questionnaires
    - Log-File Analysis of Webserver
    - A/B testing (testing of two design versions)
    - Sentiment Analysis (automatic analysis of e.g. blogs, Twitter, Facebook to determine attitudes and moods)

# User Research Methods

- **Quantitative Approach on the web**
  - Typical measurements
    - Conversion rate
    - Time on page
    - Bounce rate
      (# of visits leaving page immediately)

# User Research Methods

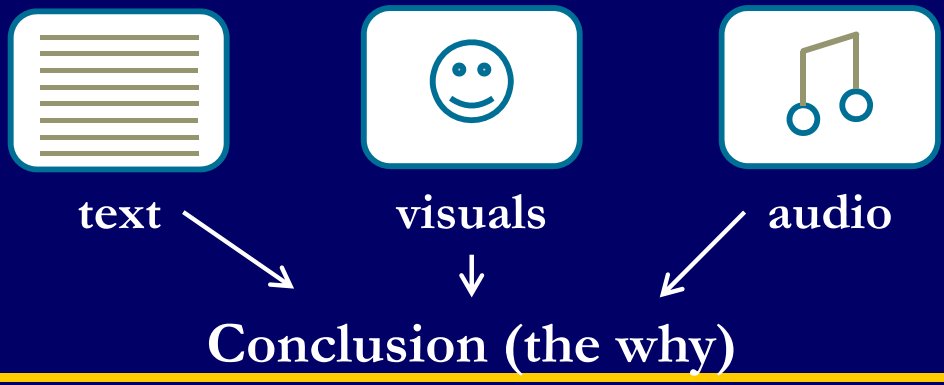
- **Qualitative Approach**

  - Goal: understand the “how”, the “why” and meanings

  - Discover concepts, flows and relationships

  - “being there”, get immersed

  - Methods (Triangulation)
    - Interviews
    - Observations
    - Visual, audio methods



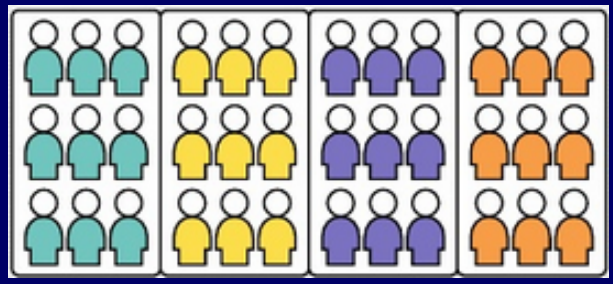
# Steps to Identifying User Needs

1) *Segment* User base

2) *Document* Interaction Scenarios

# User Segmentation - Personas

- **What is it?**
  - Generalized representation of user group



- **How is it done ?**
  1) Interview representative number of members of user group
  2) Extract most important characteristics
  3) Describe Persona

# User Segmentation - Personas

- **The Persona contains a character sketch**
  1) Name, Age, Location
  2) Photo
  3) Quote
  4) Goals
  5) Motivations
  6) Lifestyle

# User segmentation - Personas

## Janet

*"I don't have time to sort through a lot of information. I need quick answers."*

Janet is frustrated with working in a corporate environment and wants to start her own accounting practice.

**Age:** 42
**Occupation:** Accounting firm vice president
**Family:** Married, two children
**Household income:** $180,000/year

**Technical profile:** Fairly comfortable with technology; Dell laptop (about one year old) running Windows; 5 Mbit Internet connection; 15-20 hours/week online
**Internet use:** 75% at home; news and information, shopping

**Favorite sites:**


WSJ.com


Salon.com


Travelocity.com

# User segmentation - Personas

## Frank

*"This stuff is all new to me. I want a site that will explain everything."*

Frank is interested in learning how he can turn his hobby of making furniture into a business.

**Age:** 37
**Occupation:** School bus driver
**Family:** Married, one child
**Household income:** $60,000/year

**Technical profile:** Somewhat uncomfortable with technology; Apple iMac (about two years old); DSL Internet connection; 8-10 hours/week online
**Internet use:** 100% at home; entertainment, shopping

**Favorite sites:**

ESPN.com

moviefone.com

eBay.com

# Scenarios

- **Formal Definition:** “a narrative or story that describes the activities of one or more persons, including information about goals, expectations, actions, and reactions” (Rosson & Carroll)

- Informally; a scenario consist of
  - An abstract user
  - Using a specific set of computer facilities
  - To achieve a specific outcome
  - Under specified circumstances
  - Over a certain time interval

# Scenarios

- **A Scenario contains;**
  1) Name, Age, Location
  2) Every detail necessary to understand the user's current situation
     - 2.a) Emotional context
     - 2.b) Constraints
     - 2.c) General external conditions

# Scenarios

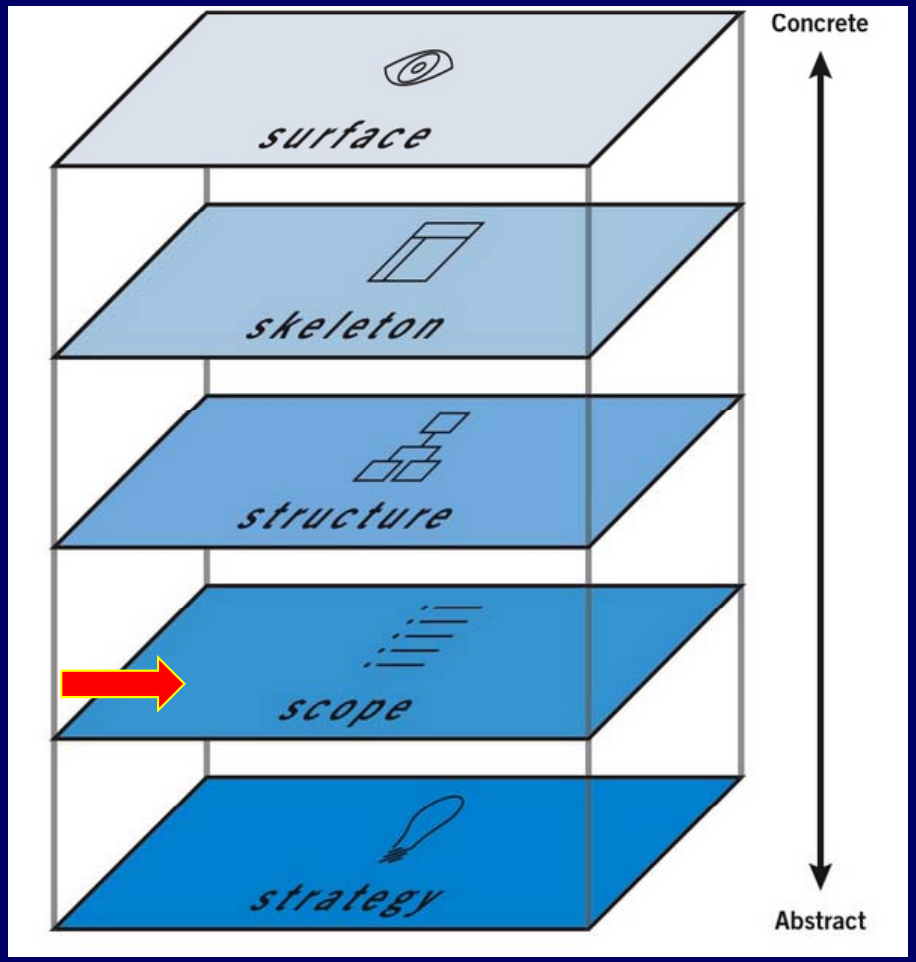
- **Example**

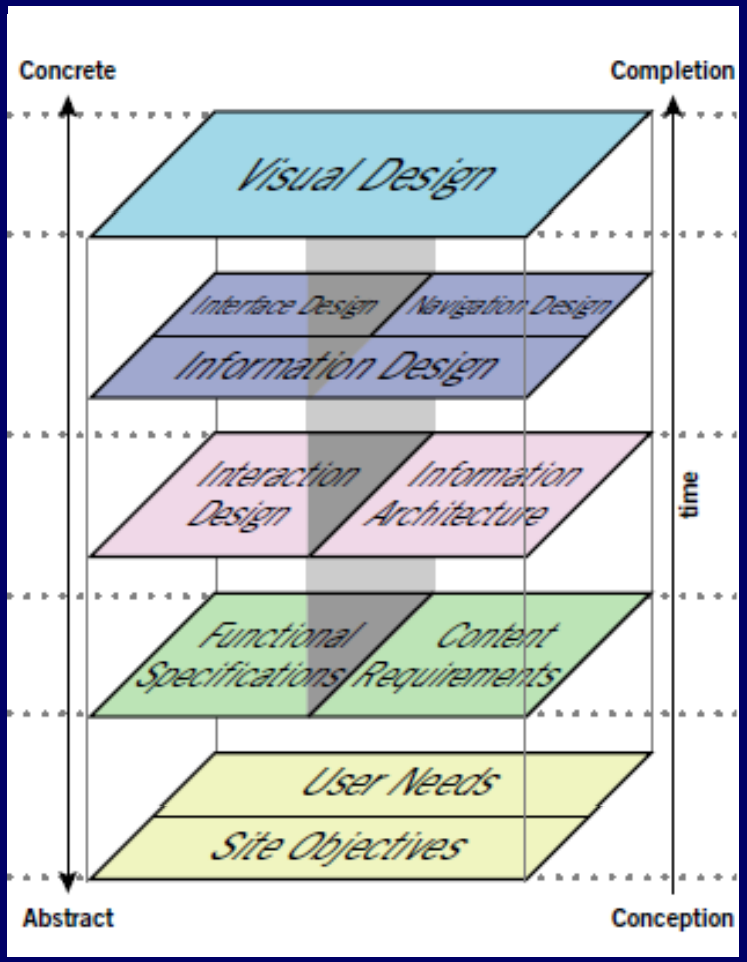
The 37-year old Frank needs to go urgently from Munich to Hamburg. His mother had an accident and is in the hospital. The train is the only possibility due to the current weather conditions. A prior reservation of the train is necessary. He opens the webpage and…

# GUI Objectives

- Business goals
- Business requirements
- Success Metrics

# 5-level approach



# Scope-Level: Content Requirements

- What information will users need/want ?
- What form should it take?

# Scope-Level: Functional Specification

- **3 Steps;**
  1) Focus on the primary action
  2) Identify your (social) objects
  3) Choose your core feature set

# Scope-Level: Primary Action

- Word processor
- Calendar
- Music player
- Photo editor

# Scope-Level: (Social) Objects

| Service | Object |
|---|---|
| **Flickr** | Photos |
| **YouTube** | Videos |
| **Twitter** | Messages |
| **eBay** | Auction items |
| **Wikipedia** | Entries |
| **Amazon** | Products |

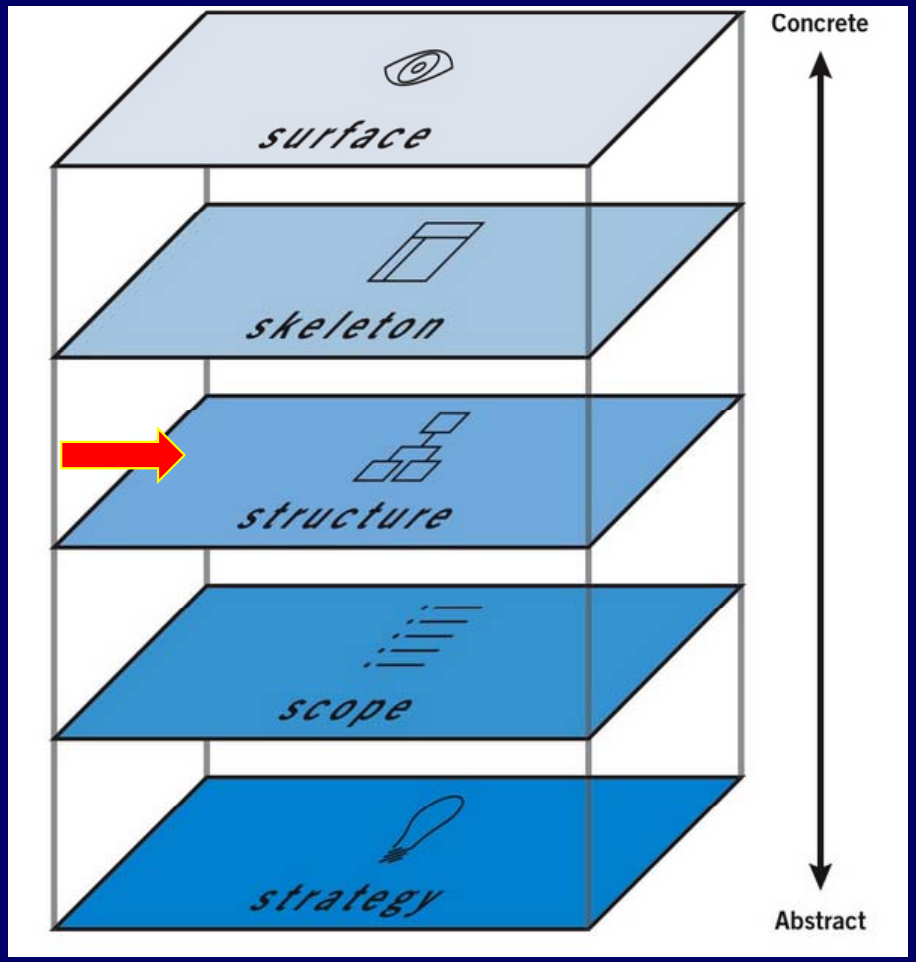
# Scope-Level: Core Feature Set

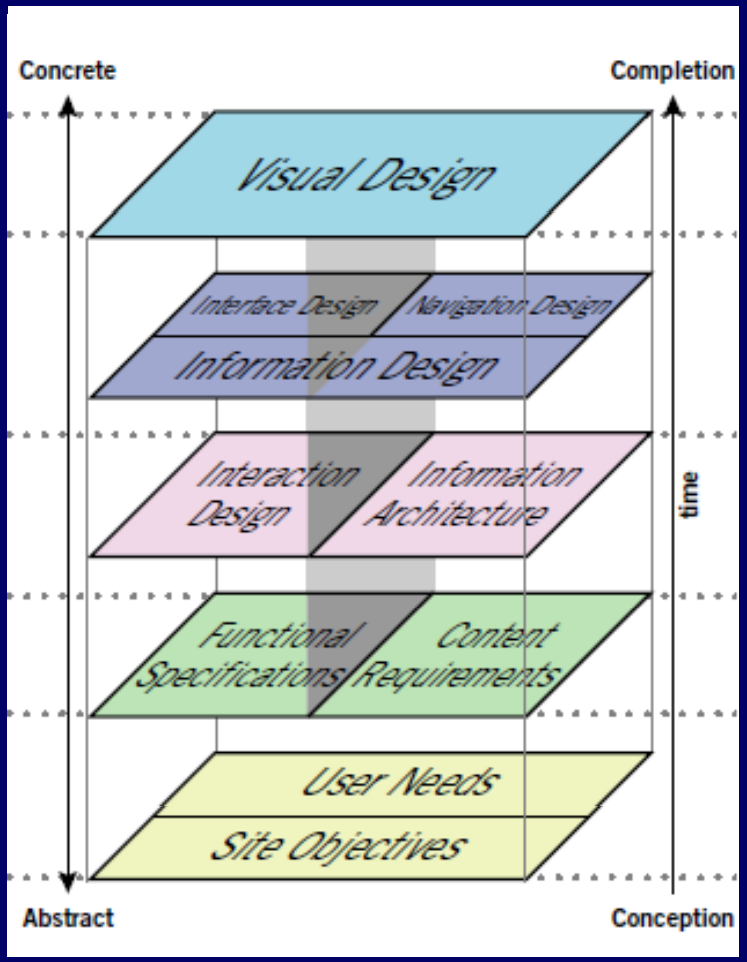
| Objects | Features |
|---|---|
| **Videos** | play, stop, edit, store, upload, share, comment on, embed in blog |
| **Articles** | read, archive for later, quote, link to, share, comment on, annotate |
| **Photos** | store, view, add to favorites, digitally edit, link to, make prints, share, comment on, embed in blogs, tag |
| **Books** | read, add to cart, purchase, add to wish list, share, add to wedding registry, comment on, rate, tag, discuss, review |

# Feature set (e.g. Amazon)

| Objects | Features |
|---|---|
| **Products** | Rate product, tag product, review product, customers who bought xy also bought, submit a product manual, tell a friend, share product image, amazon sales rank |
| **Wish list** | Add items, create new list, share list, make public/private, sort list |
| **Customer reviews** | Add review, comment on review, was this review helpful, sort reviews |

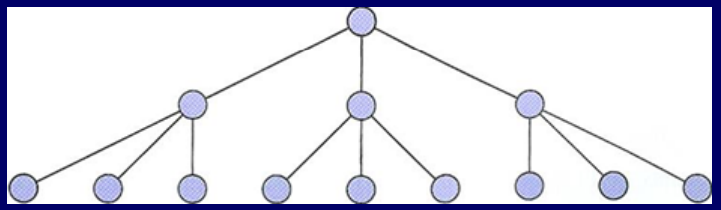
# 5-level approach

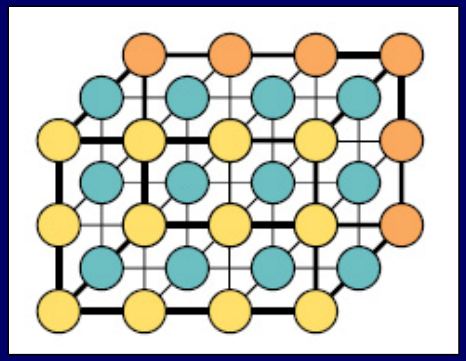


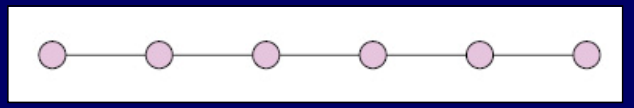



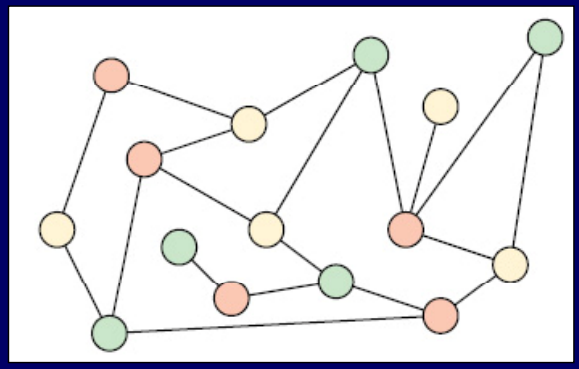
# Structure-Level: Information Architecture

- Plan information out through **Architectural Approaches**
- These approaches are laid out using basic units of information structures called **nodes**
- A node can represent any piece or group of information

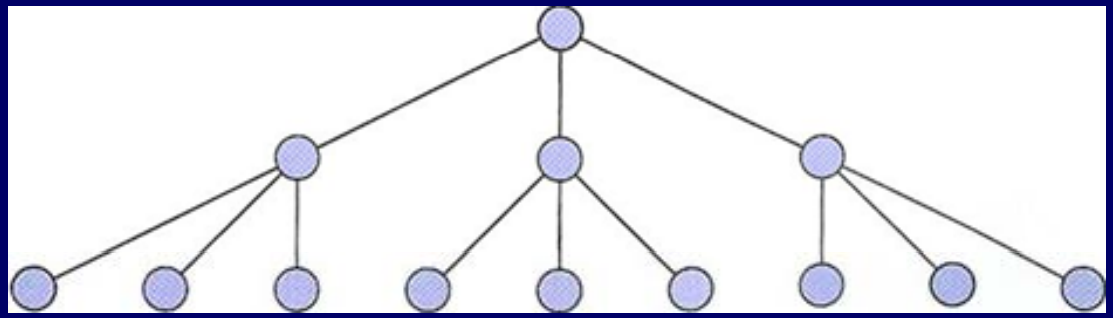








# Structure-Level: Information Architecture

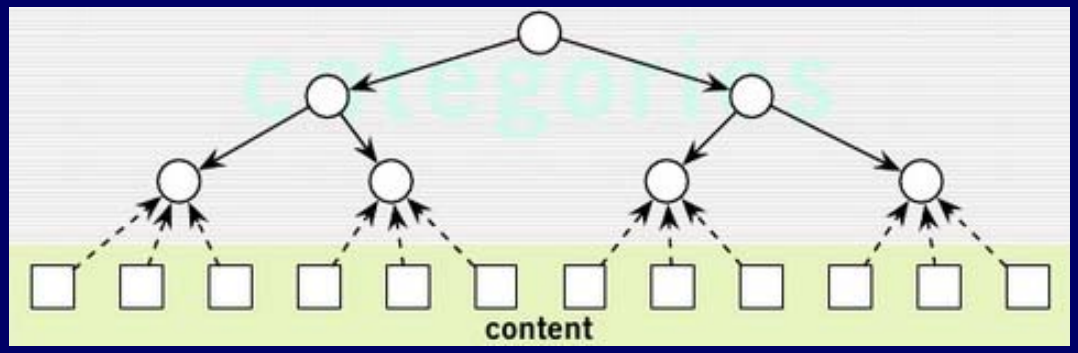


hierarchical

- Tree like
- Parent/child relationships

# Structure-Level: Information Architecture

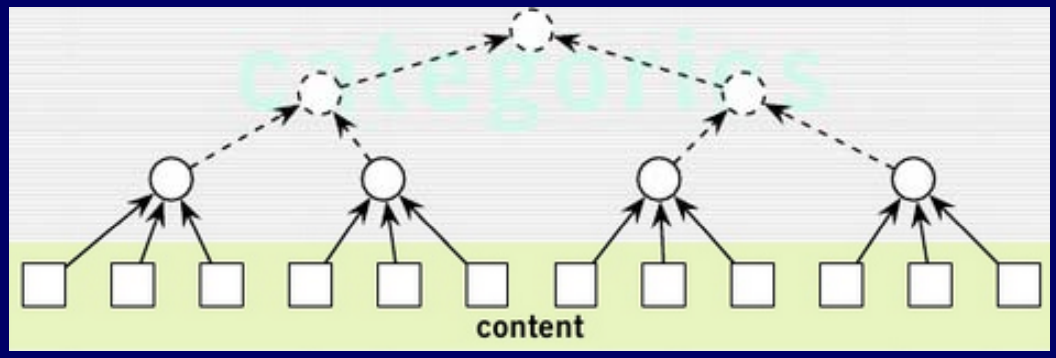
- Top-Down Hierarchical:
  1) Start from functionality and content
  2) Break the categories down into subsections
  3) Now you have an empty shell of containers
  4) Slot the content (and functionality) into the containers




**hierarchical**

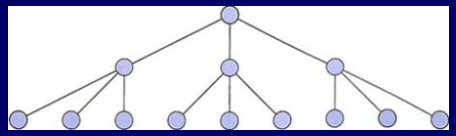
# Structure-Level: Information Architecture

- Bottom-Up Hierarchical:
  1) Using already-existing material and material that will exist on launch:
  2) Items are grouped into categories.
  3) Categories are then grouped into a GUI structure.




**hierarchical**

# Hierarchical IA Example



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Lates

- Prof. J … lean of NSM
- Profs. … e Test of Time Award
- CS De … aculty Members
- Prof. R … REER Award
- Prof. Yanlei Diao Receives NSF CAREER Award
- SIGCOMM Honors Prof. Donald Towsley
- Prof. Eliot Moss' paper chosen as Most Influential

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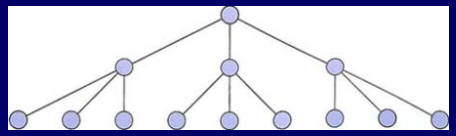
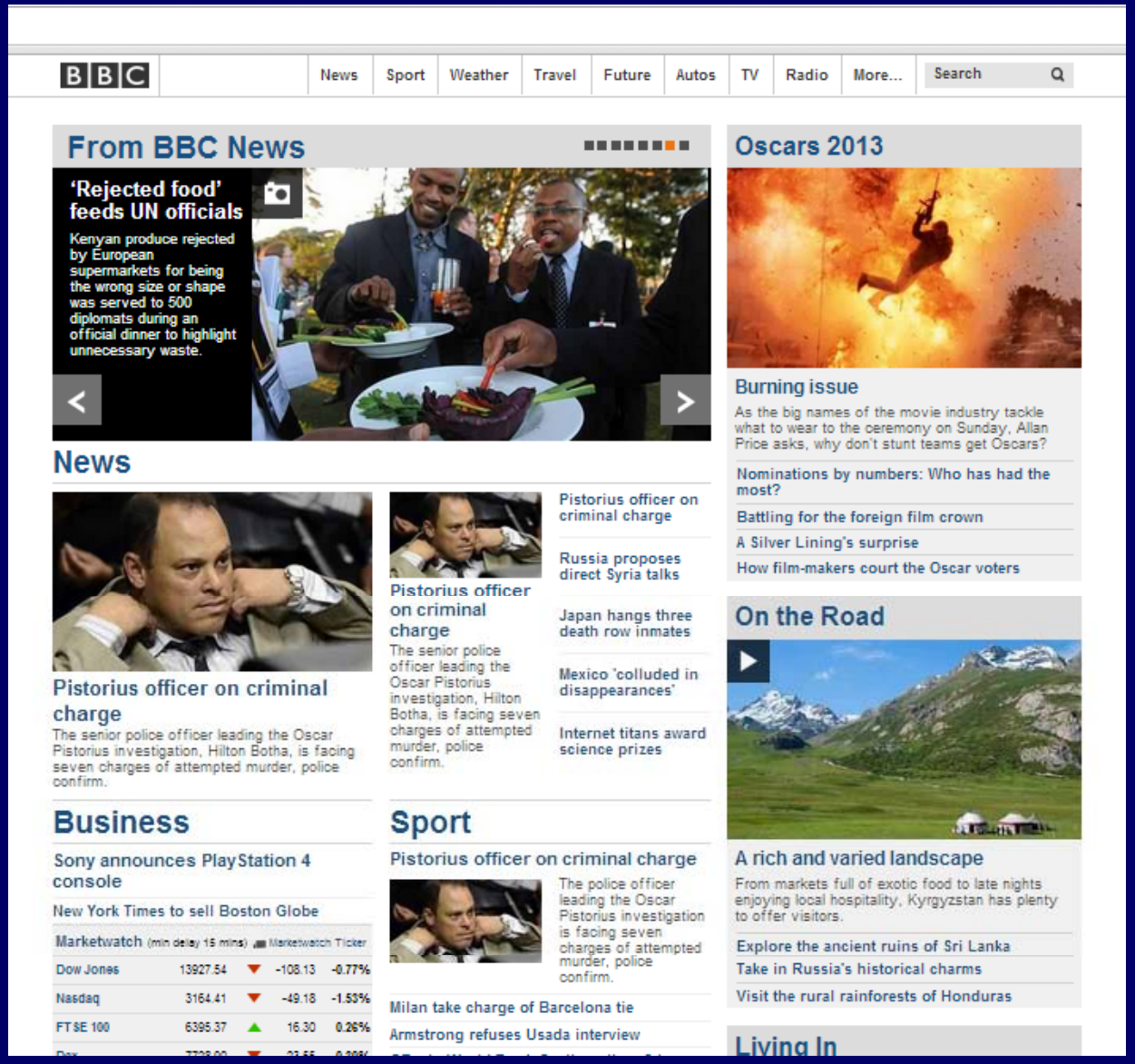
SEP 22 Faculty business meeting with lunch
SEP 22 Ph.d proposal defense
SEP 23 Fellowship meeting for grads
SEP 24 Machine learning and friends lunch
SEP 25 Special event
SEP 25 Special event

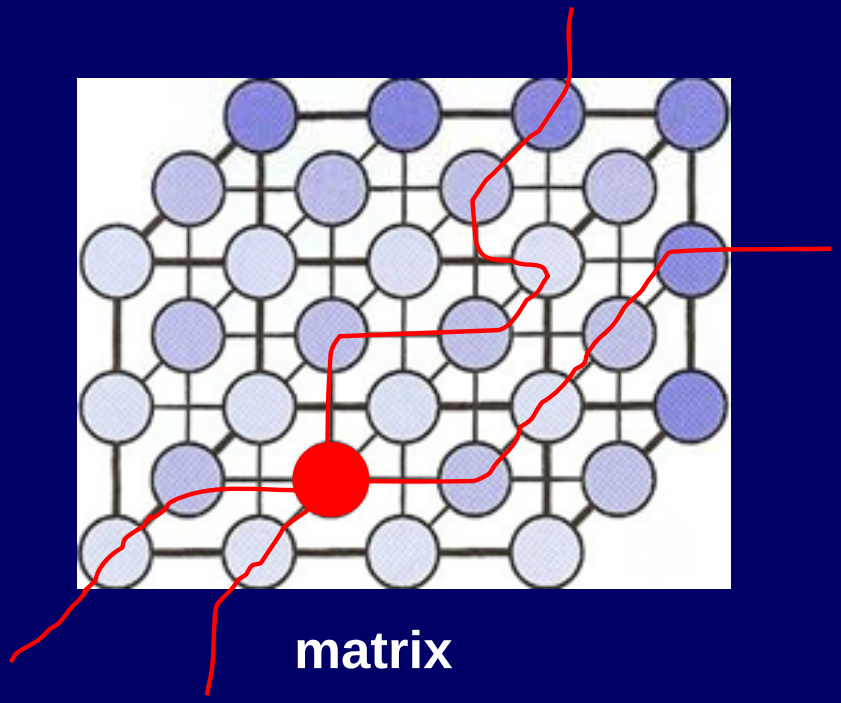
[+] See all events

# Hierarchical IA Example





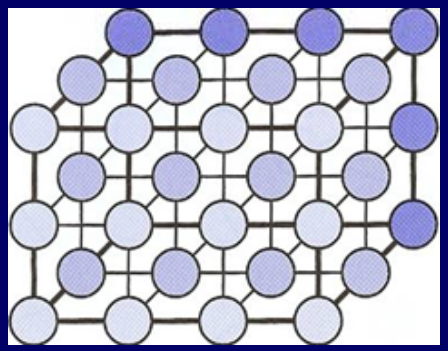
# Structure-Level: Information Architecture

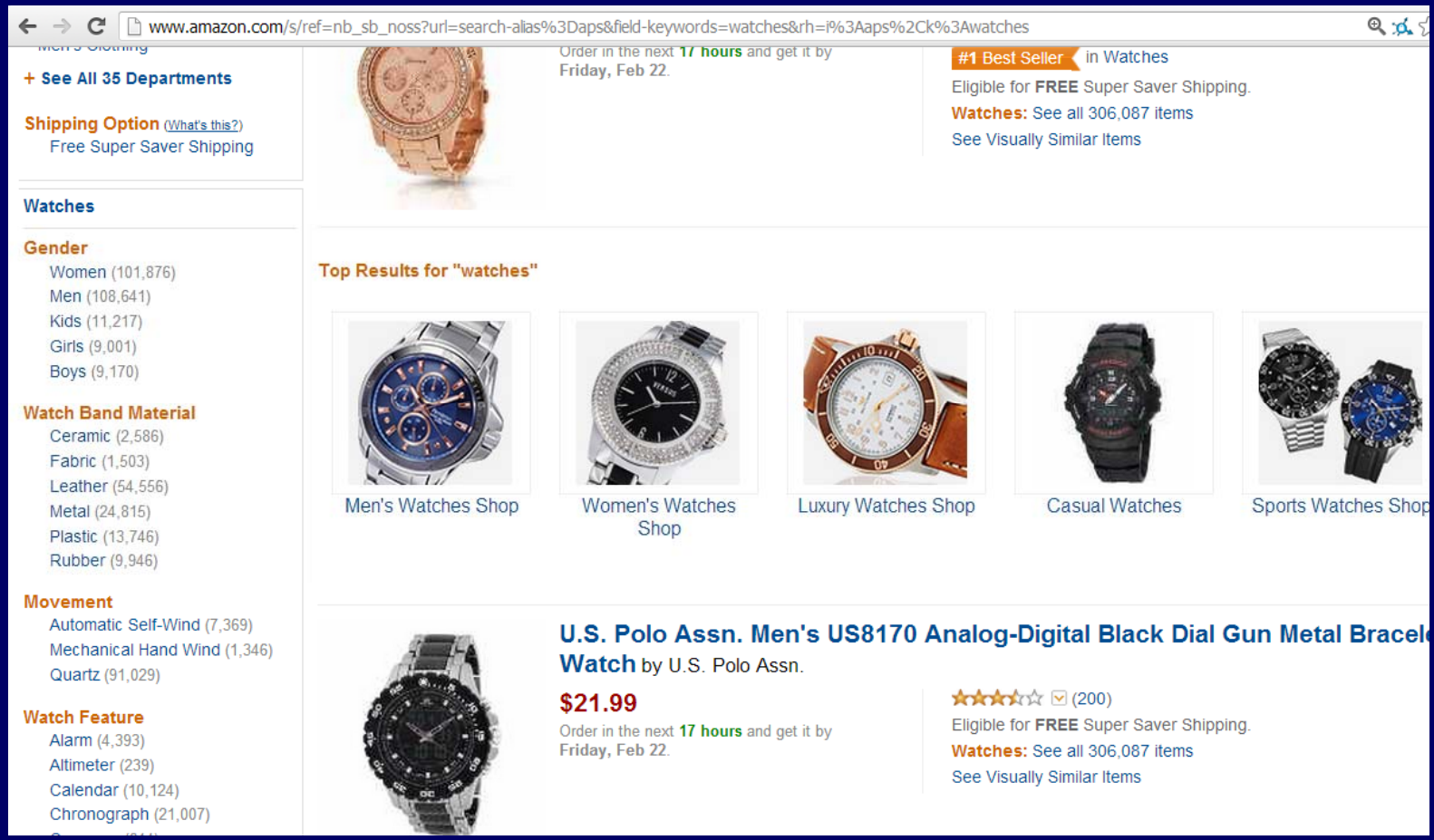


matrix

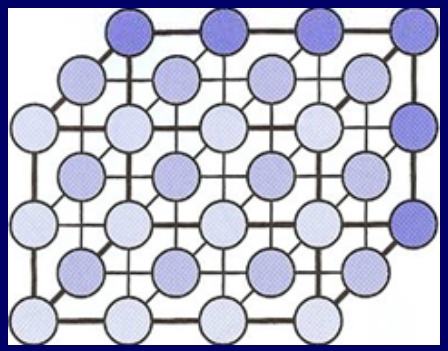
- Helps guests with different needs but navigate through the same information

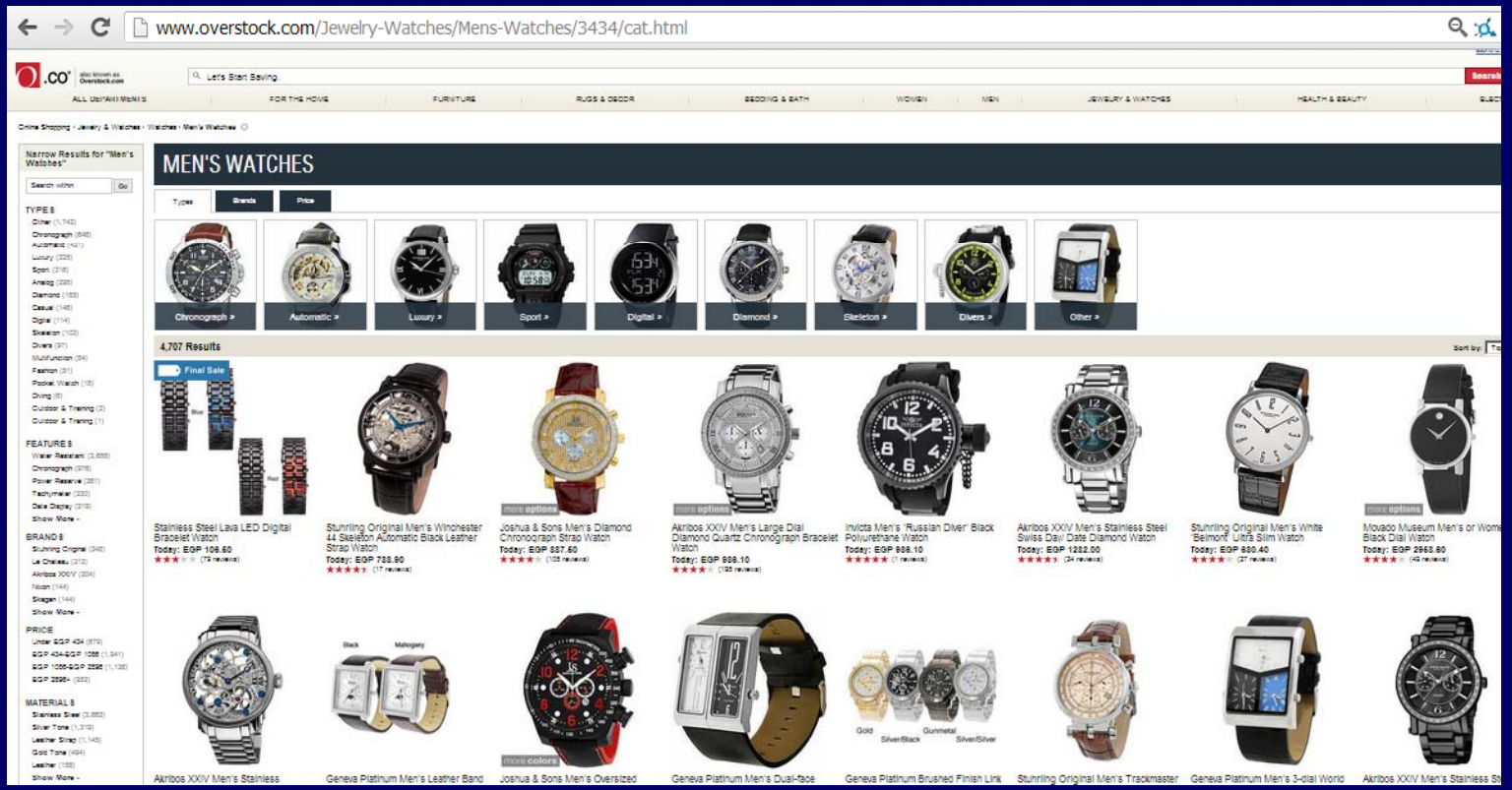
# Matrix IA Example





# Matrix IA Example






http://www.overstock.com/Jewelry-Watches/Mens-Watches/3434/cat.html

- Recall Chunking Theory 7 +/- 2 ….

# References

- **Course Text:**
  - https://www.dropbox.com/s/6ae4njtef07ymxk/elements-of-user-experience.pdf