

# Conceptual Design

- Conceptual design involves
  - Structuring the information space
  - Creating of alternative solutions
  - Determining which design concept to pursue

# Conceptual design: from requirements to design

- Transform user requirements/needs into a conceptual model
- “a description of the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended”
- Don't move to a solution too quickly -  
    Iterate, iterate, iterate
- Consider alternatives

A ***conceptual model*** is a high-level description of how a system is organized and operates.

It specifies and describes:

- \* the major design **metaphors** and **analogies** employed in the design, if any;
- \* the **concepts** the system exposes to users, including the task-domain data objects users create and manipulate, their attributes, and the operations that can be performed on them;
- \* the **relationships** between these concepts;
- \* the **mappings** between the concepts and the *task-domain* the system is designed to support.

# Conceptual Design

- Tools involved in conceptual design:
  - Brainstorming
  - Card sort
  - Semantic networks
  - Personas
  - Scenarios
  - Flowcharts

# Conceptual Design - *Brainstorming*

- Team activity
  - Stream-of-consciousness
  - Semantic networks
  - Storyboarding
- Brainstorming sessions generate a lot of material that must be filtered and organized

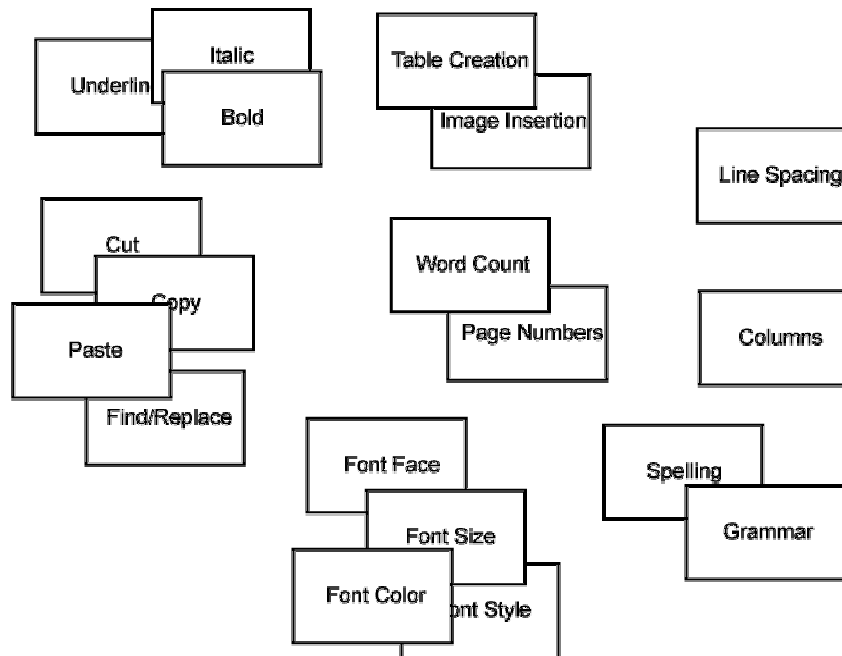
# Conceptual Design – *Card Sort*

**Card Sorting can be used to discover user-centered groupings**

- Card sorting can be used to organize the information collected in the discovery phase
- Used to define groupings for menus, controls and Web page content
- Used to generate labels for menus, buttons and navigation links

# Conceptual Design – *Card Sort*

- Result of a card sort



# Conceptual Design – *Card Sort*

- Advantages of card sorting sessions:
  - They are quick and easy to perform.
  - They can be done before any preliminary designs have been made.
  - They will let you know how people organize information.
  - They will expose underlying structures.

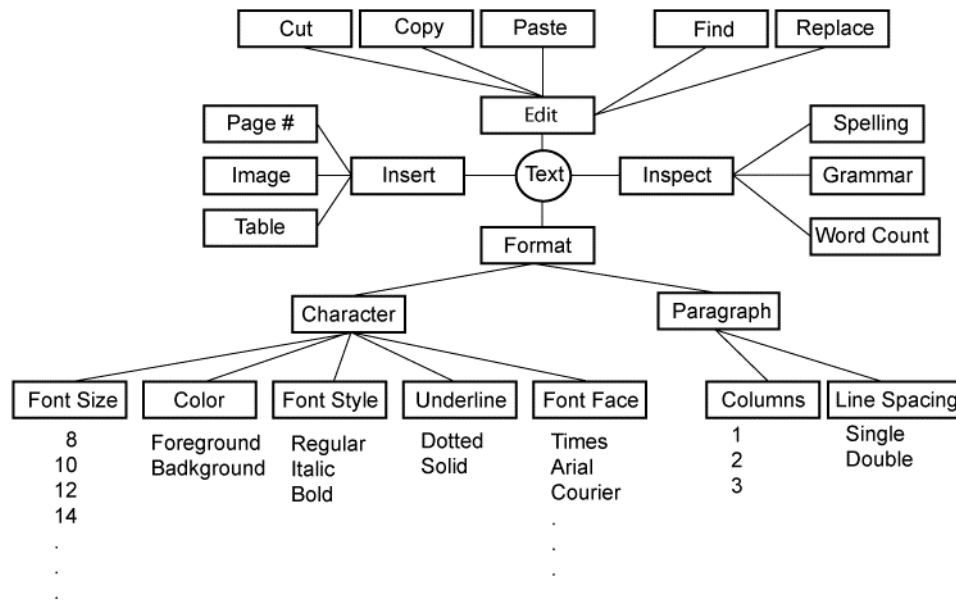


# Conceptual Design – *Card Sort*

- Disadvantages of card sorting sessions:
  - They only involve the elements that you have written on the cards.
  - They suggest solutions that imply structures.
  - They become difficult to navigate with more categories.

# Conceptual Design – *Semantic Network*

- A semantic network is a web of concepts that are linked through association.



# Conceptual Design – *Semantic Network*

- Advantages of semantic networks:
  - They allow an easy way to explore the problem space.
  - They provide a way to create clusters of related elements.
  - They provide a graphical view of the problem space.
  - They resonate with the ways in which people process information.

# Conceptual Design – *Semantic Network*

- Disadvantages of semantic networks:
  - They require knowledge of the problem space.
  - They can lead beyond the problem space.
  - There is no formal semantics for defining symbol meaning.

# Conceptual Design – *Personas*

- Personas are archetypes of actual users, defined by the user's goals and attributes.
- “Personas are derived from patterns observed during interviews with and observations of users and potential user (and sometimes customers) of a product”

# Conceptual Design – *Personas*

- A persona is created by identifying the primary stakeholder and creating an identity based on the stakeholder profiles and other collection activities such as interviews and surveys.
- A persona is a detailed description complete with as many personally identifying attributes as necessary to make it come to life.

# Conceptual Design – *Personas*

*Personas should be a strict reflection of the information derived from the collection activities.*

- If you cannot point to a direct one-to-one relation with an observed user behavior, then that particular persona characteristic is either unnecessary or, more important, erroneous and will lead to incorrect design decisions.

# Conceptual Design – *Personas*

- Advantages of personas:
  - They are quick and easy to create.
  - They provide a consistent model for all team members.
  - They are easy to use with other design methods.
  - They make the user real in the mind of the designer.
- Disadvantages of personas:
  - They can be difficult to create if the target audience is international.
  - Having too many personas will make the work difficult.
  - There is a risk of incorporating unsupported designer assumptions.



# Conceptual Design – Scenarios

- Scenarios

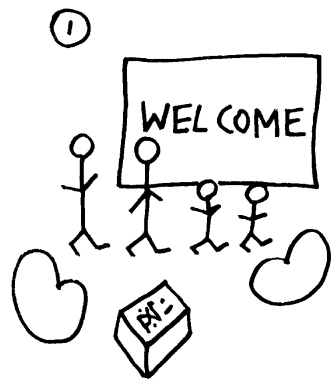
- A description of a typical task
- It describes
  - The basic goal
  - The conditions that exist at the beginning of the task
  - The activities in which the persona will engage
  - The outcomes of those activities

*Scenarios afford a rich picture of the user's tasks*

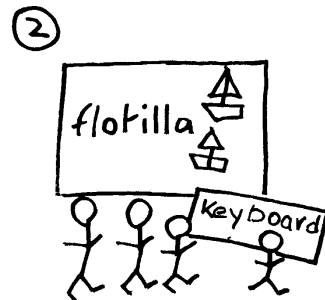
# Using scenarios in conceptual design

- Express proposed or imagined situations
- Used throughout design in various ways
  - scripts for user evaluation of prototypes
  - concrete examples of tasks
  - as a means of co-operation across professional boundaries
- Plus and minus scenarios to explore extreme cases

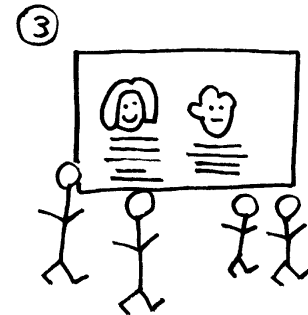
# Generate storyboard from scenario



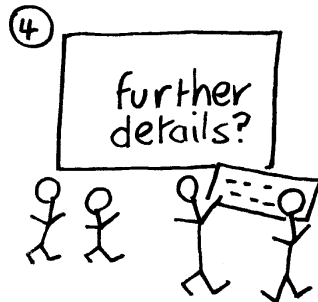
Thomson family  
gather around



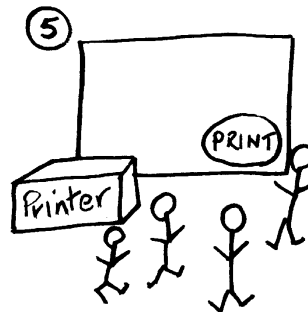
System suggests  
flotilla



System shows  
descriptions



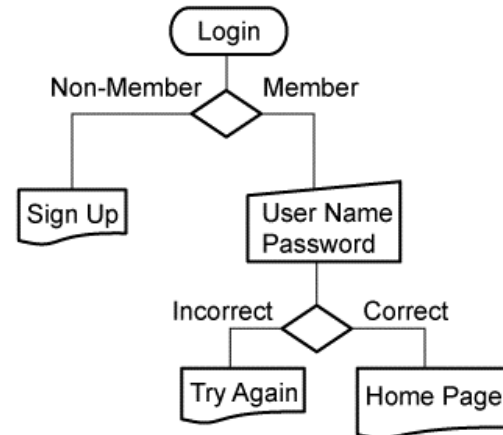
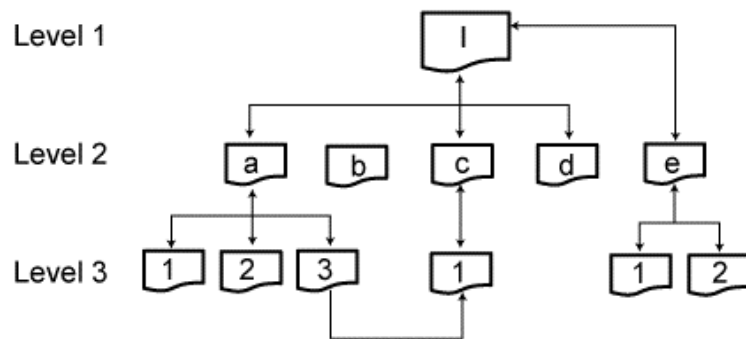
System asks  
for details



Summary printed

# Conceptual Design –Flowcharts

- Flowcharts can be:
  - Simple network diagrams that identify the pages of a Web site and the navigational links between them
  - Sophisticated diagrams that capture conditional junctures and computational processes



# Is there a suitable metaphor?

- Interface metaphors combine familiar knowledge with new knowledge in a way that will help the user understand the product.
- Three steps: understand functionality, identify potential problem areas, generate metaphors
- Evaluate metaphors:
  - How much structure does it provide?
  - How much is relevant to the problem?
  - Is it easy to represent?
  - Will the audience understand it?
  - How extensible is it?

# Considering interaction types

- Which interaction type?
  - How the user invokes actions
  - Instructing, conversing, manipulating or exploring
- Do different interface types provide insight?
  - WIMP, shareable, augmented reality, etc

# Expanding the conceptual model

- What functions will the product perform?  
What will the product do and what will the human do (task allocation)?
- How are the functions related to each other?  
Sequential or parallel?  
Categorisations,  
e.g. all actions related to telephone memory storage
- What information needs to be available?  
What data is required to perform the task?  
How is this data to be transformed by the system?

# Physical Design

- The physical design involves:
  - What it will look like
  - What components it will require
  - How the screens will be laid out



# Physical design

- Considers more concrete,  
detailed issues of designing the interface
- Iteration between physical and conceptual design
- Guidelines for physical design
  - Nielsen's heuristics  
(and others by Shneiderman, Norman, ...)
  - Styles guides: commercial, corporate
    - decide 'look and feel' for you
    - widgets prescribed, e.g. icons, toolbar

# Physical design

## Different kinds of widget

(dialog boxes, toolbars, icons, menus etc)

- menu design
- icon design
- information display
- screen design

# How to choose between widgets

- ◆ What components must be in the display?
  - ✦ necessary visual affordances
  - ✦ frequent actions
    - direct manipulation for core activities
    - buttons/forms/toolbar/special tools for frequent/immediate actions
    - menus/property window for less frequent actions
    - secondary windows for rare actions
- ◆ How are components related?
  - ✦ organize related items as “chunks”
- ◆ What are familiar and expected idioms?
  - ✦ cross application look and feel

# Menu design

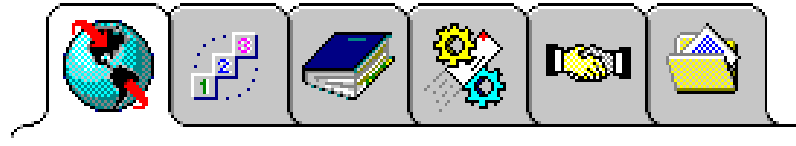
- How long is the menu to be?
- In what order will the items appear?
- How is the menu to be structured,  
e.g. when to use sub-menus, dialog boxes?
- What categories will be used  
to group menu items?

# Menu design

- How will division into groups be denoted, e.g. different colors, dividing lines?
- How many menus will there be?
- What terminology to use?  
(results of requirements activities will indicate this)
- How will any physical constraints be accommodated, e.g. mobile phone?

# Icon design

- Good icon design is difficult



What do these images mean?

- Meaning of icons is cultural and context sensitive
- Some hints:
  - always draw on existing traditions or standards
  - concrete objects or things
    - are easier to represent than actions
  - Use labels or tool-tips if necessary

# Information display

- Relevant information available at all times
- Different types of information  
imply different kinds of display
- Consistency between  
paper and screen display

# Screen design

Two aspects:

- How to split across screens

- moving around within and between screens

- how much interaction per screen?

- Individual screen design

- balance between enough information/interaction and clarity

- white space

- grouping items together:

- separation with boxes? lines? colors?



# Screen design: splitting functions across screens

- Task analysis as a starting point
- Each screen contains a single simple step?
- Frustration if too many simple screens
- Keep information available:  
multiple screens open at once

# Screen design:

## individual screen design

- Draw user attention to salient point,  
e.g. colour, motion, boxing
- Animation is very powerful  
but can be distracting
- Good organization helps:  
grouping, physical proximity
- Trade off between  
sparse population and overcrowding

# Visual Organization

## Four principles of visual organization:

- ✦ Proximity
- ✦ Alignment
- ✦ Consistency (repetition)
- ✦ Contrast

# Proximity

- ◆ People tend to perceive items that are located close together as being related.
- ◆ Group related content items close together.  
Separate unrelated items.
- ◆ Place paragraph headings close to the paragraph they introduce.

# Dan's Clothing: the mindless version

## Dan's Clothing Store

Checkout  
close out on pink socks  
Email us  
July specials  
Kid's clothes  
Men's clothes  
Open an account  
Sale on rain wear  
Special sizes  
Store locations  
Your account status  
Women's clothes

# What groups would make sense?

- ◆ Women's clothes, Men's clothes, Kid's clothes, Special sizes
- ◆ July Specials, Sales on rainwear, Closeout on pink socks
- ◆ Store locations, Store hours
- ◆ Open an account, Your account status
- ◆ Check out
- ◆ Email us.

# Dan's Clothing: with sensible groups

## Dan's Clothing Store

Women's clothes  
Men's clothes  
Kid's clothes  
Special Sizes

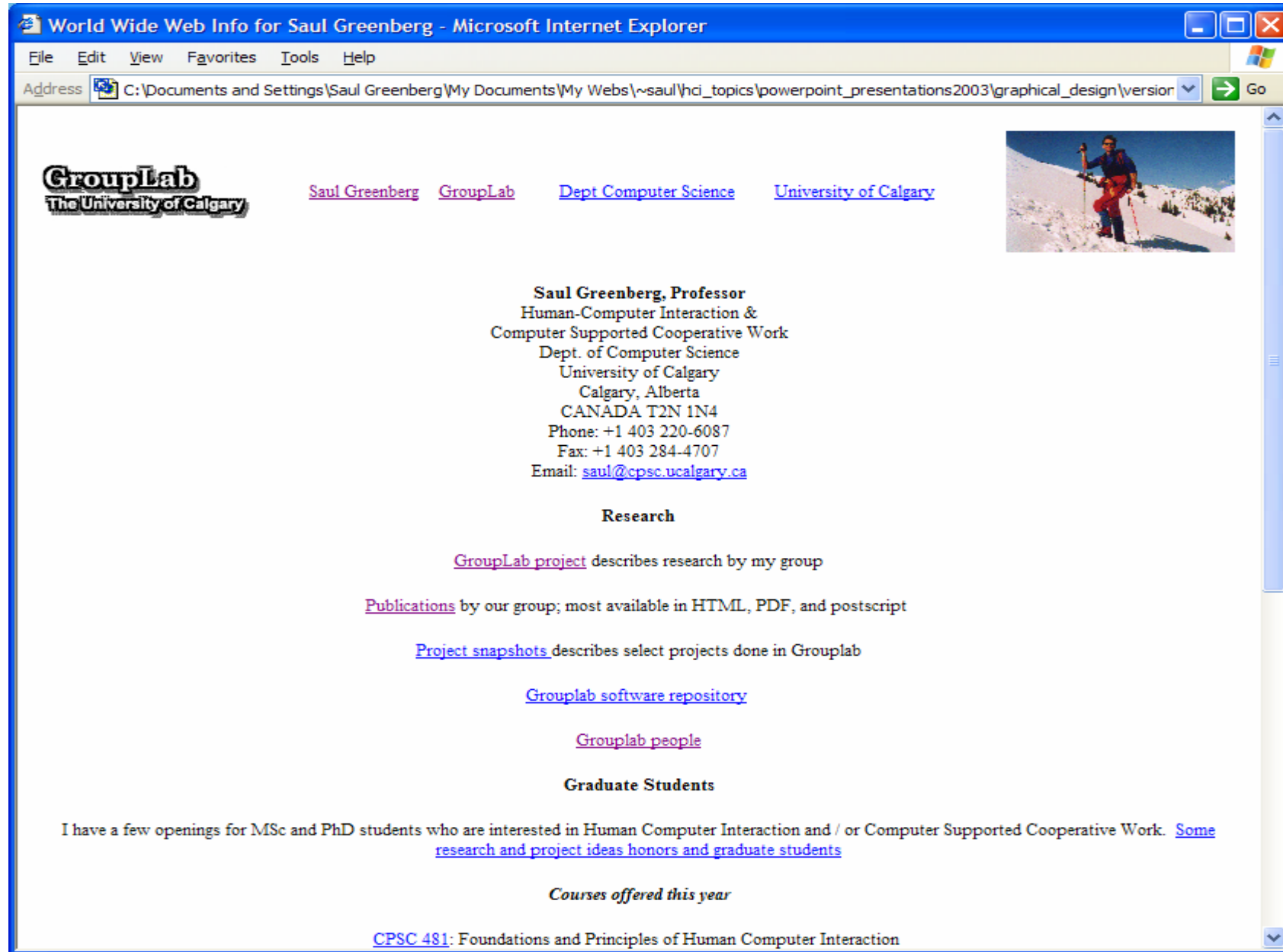
July Specials  
Sale on Rainwear  
Closeout on pink socks

Store locations  
Store hours

Open an account  
Your account status

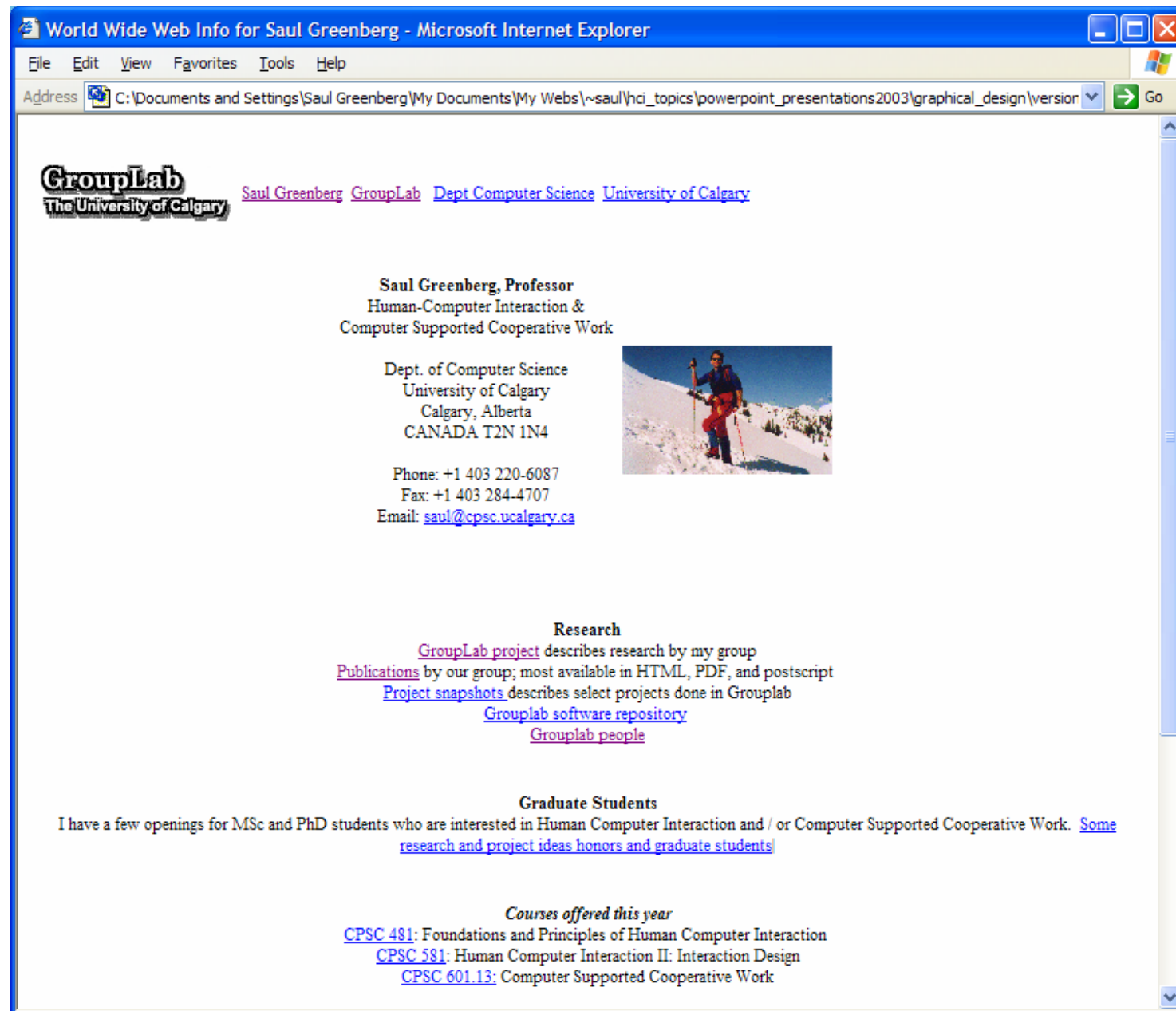
Checkout

Email us



original






using proximity

# Alignment

- ◆ Place related items along an imaginary line.
- ◆ Align items of equal importance
- ◆ Indent subordinate items
- ◆ Visually connects elements
- ◆ Creates a visual flow
- ◆ Indenting the items that belong to a main heading is an example of using alignment to clarify meaning

Avoid centered alignment for lines that are of nearly equal length



Division of Computer Graphics and Animation  
School of Computer Science, Telecommunications  
and Information Systems DePaul University

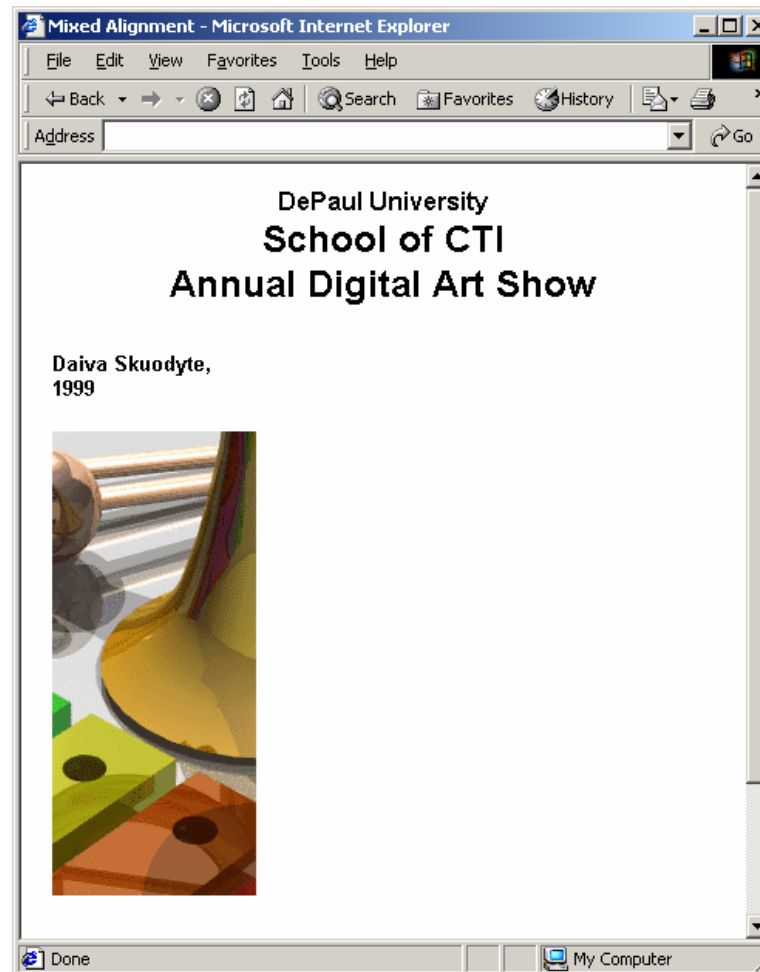
Lines are now greatly different in length:  
reader knows it's intentional

Division  
of Computer Graphics and Animation

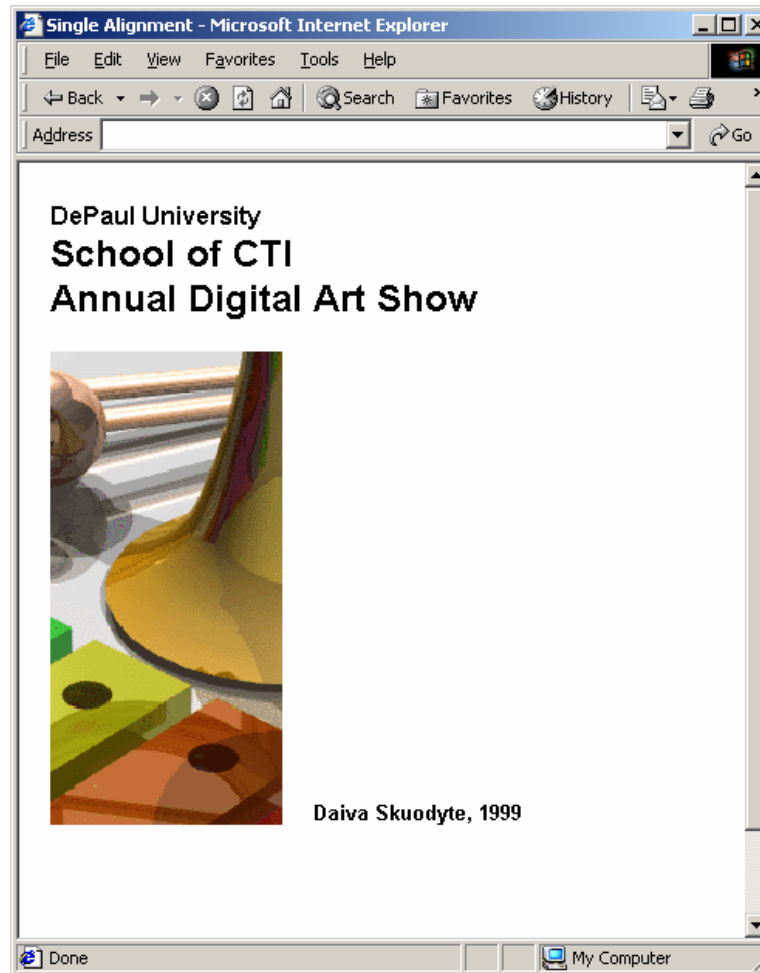
School of Computer Science, Telecommunications  
and Information Systems

DePaul University

Don't be a slave to centered alignment . . .

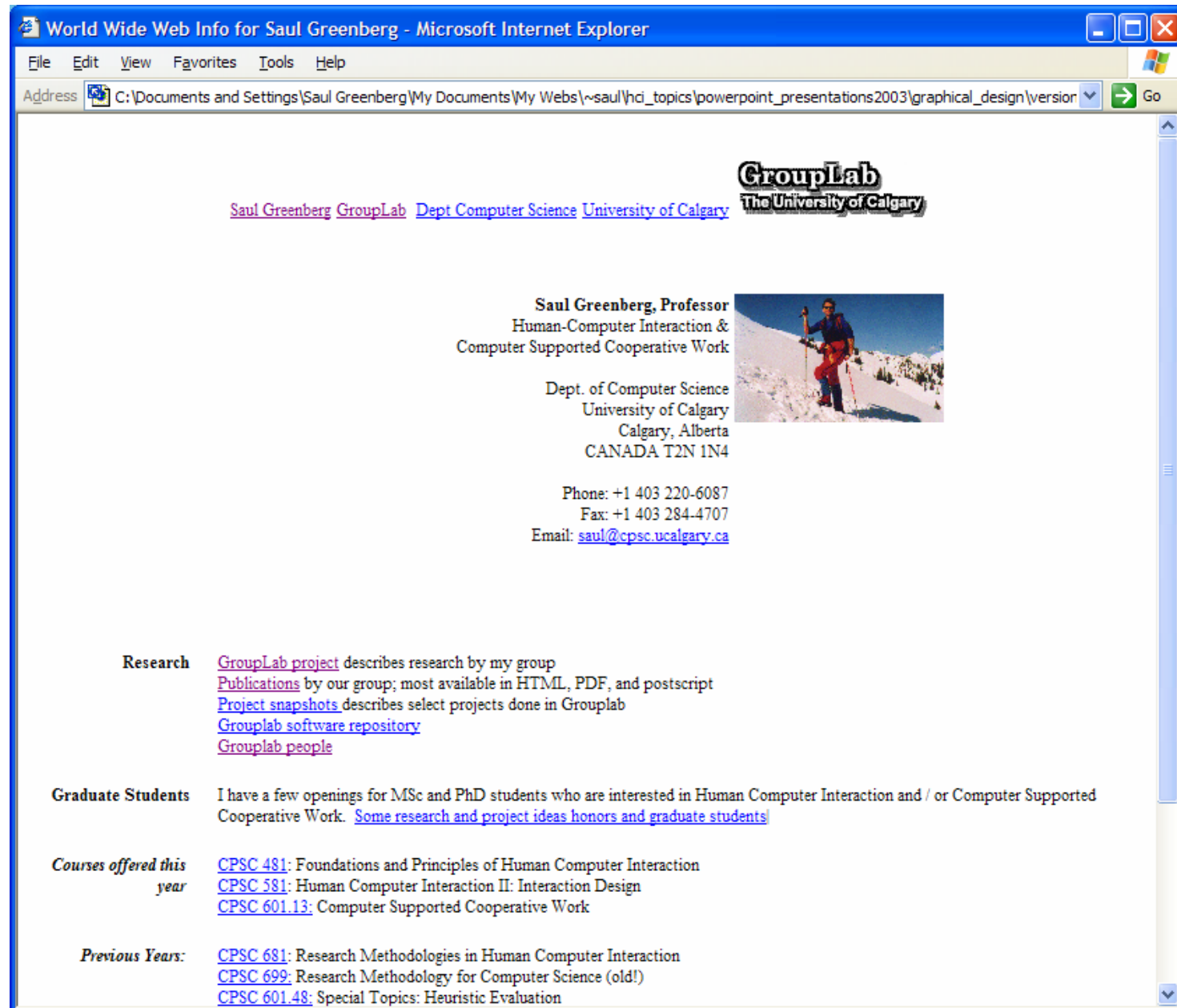


. . . which is OK, but isn't this better?



# Orpheus Chamber Orchestra: nice use of proximity and alignment





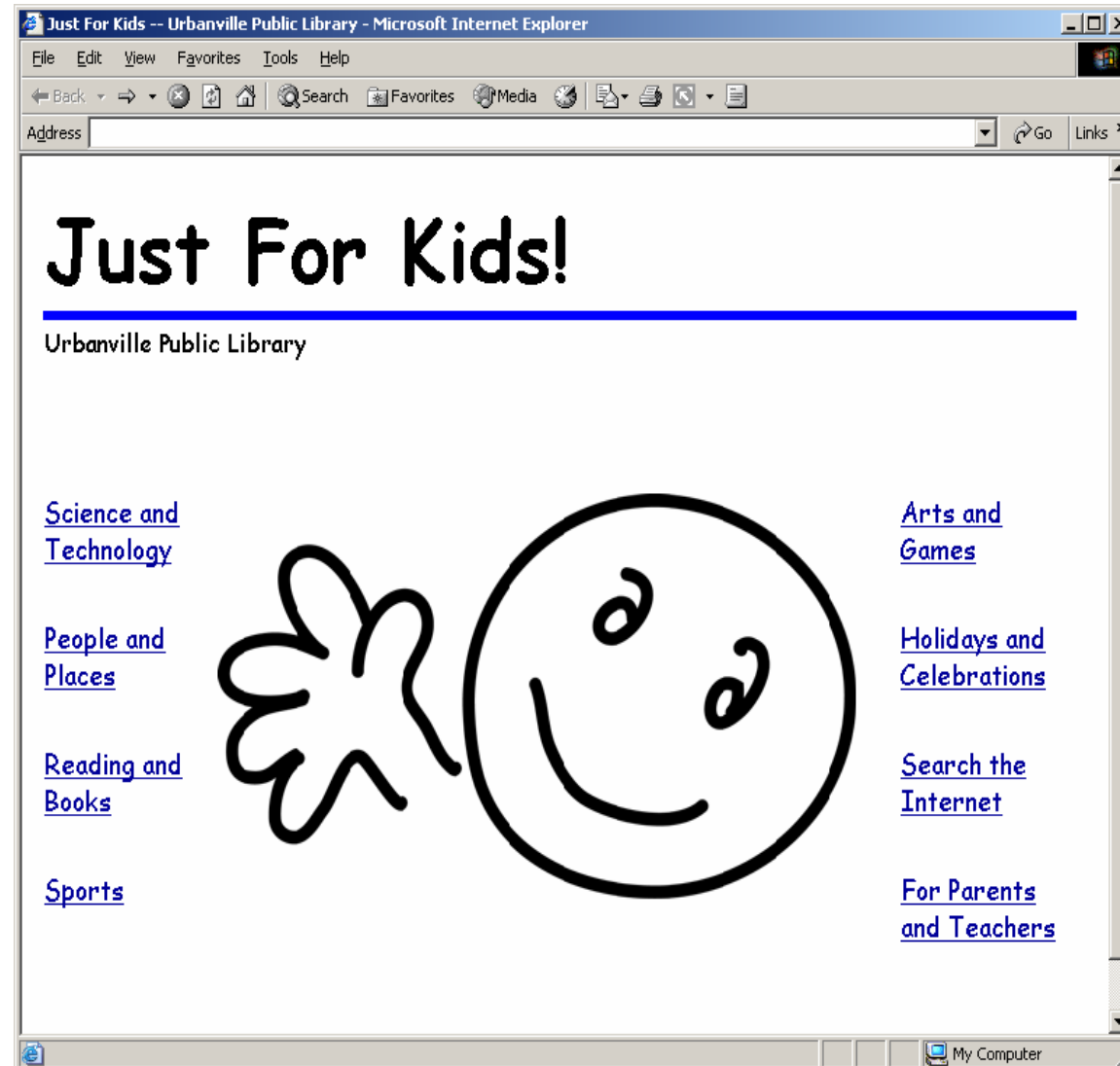
using alignment



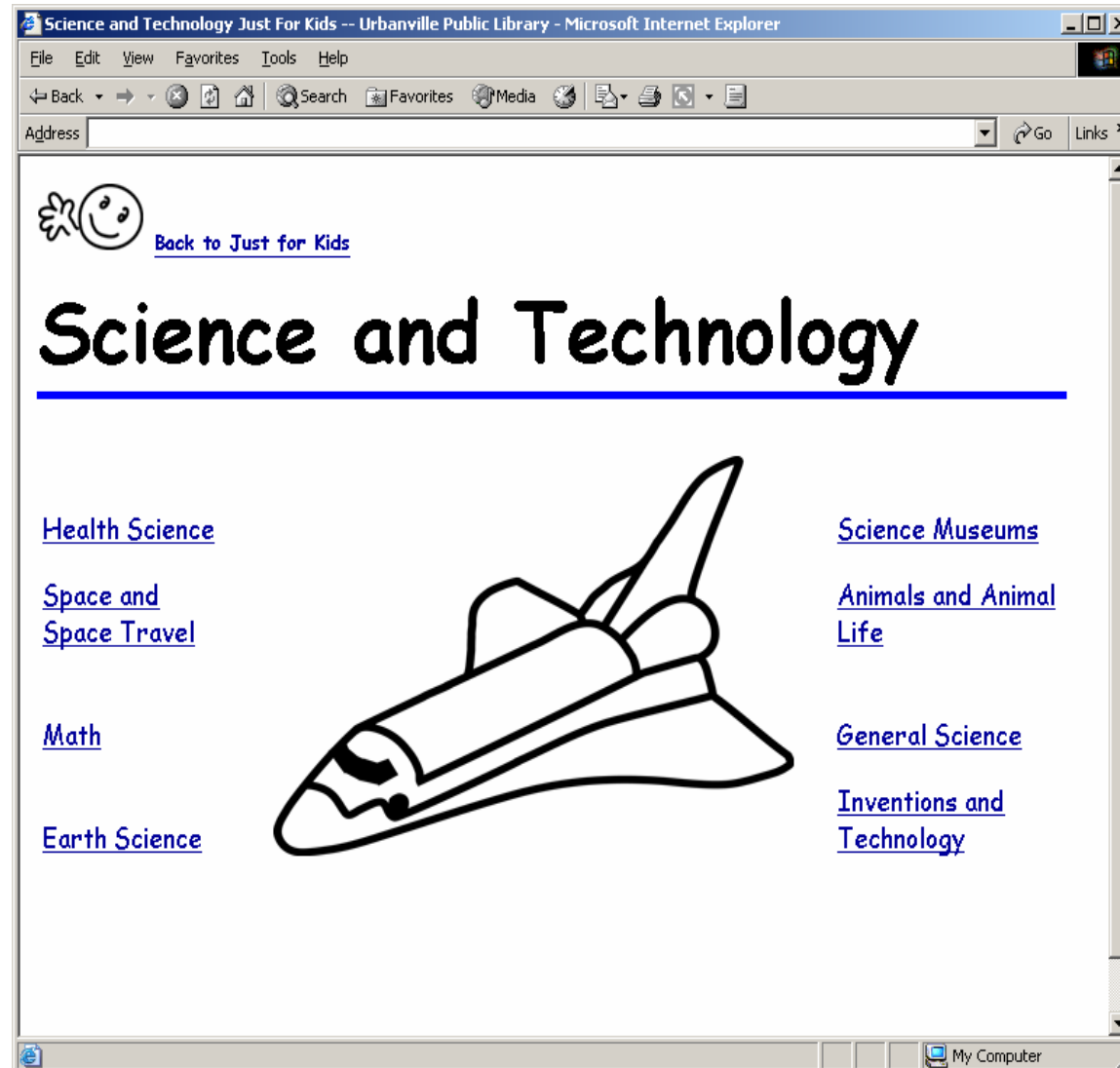
# Consistency

- ◆ Make related items look the same.
- ◆ repeat design throughout the interface
- ◆ creates unity
- ◆ Putting a navigation bar on the left side of every page of a website is an example of consistency.
- ◆ Making all the buttons the same size is another example of consistency.

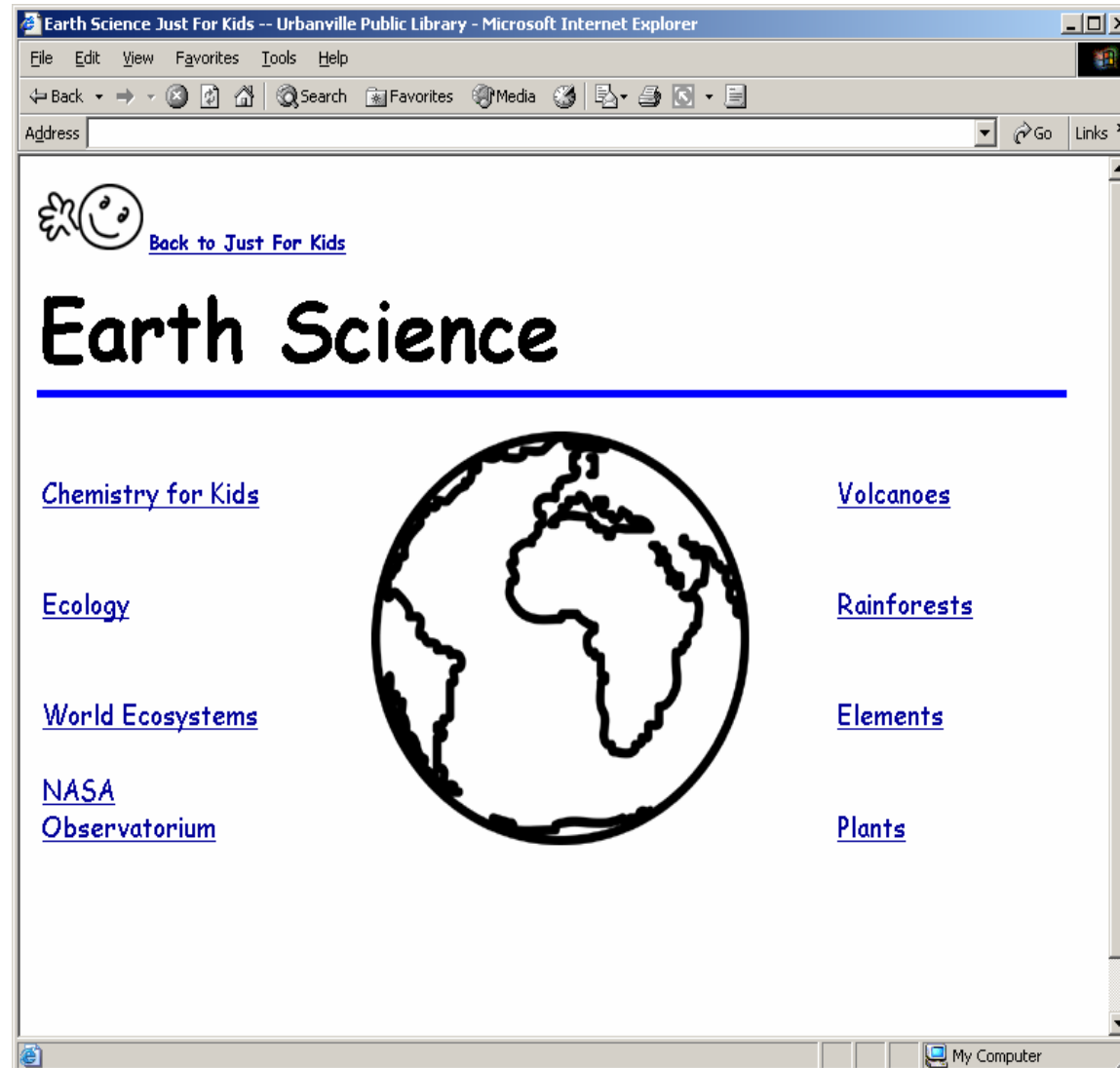
Note the consistent layout in the next few slides

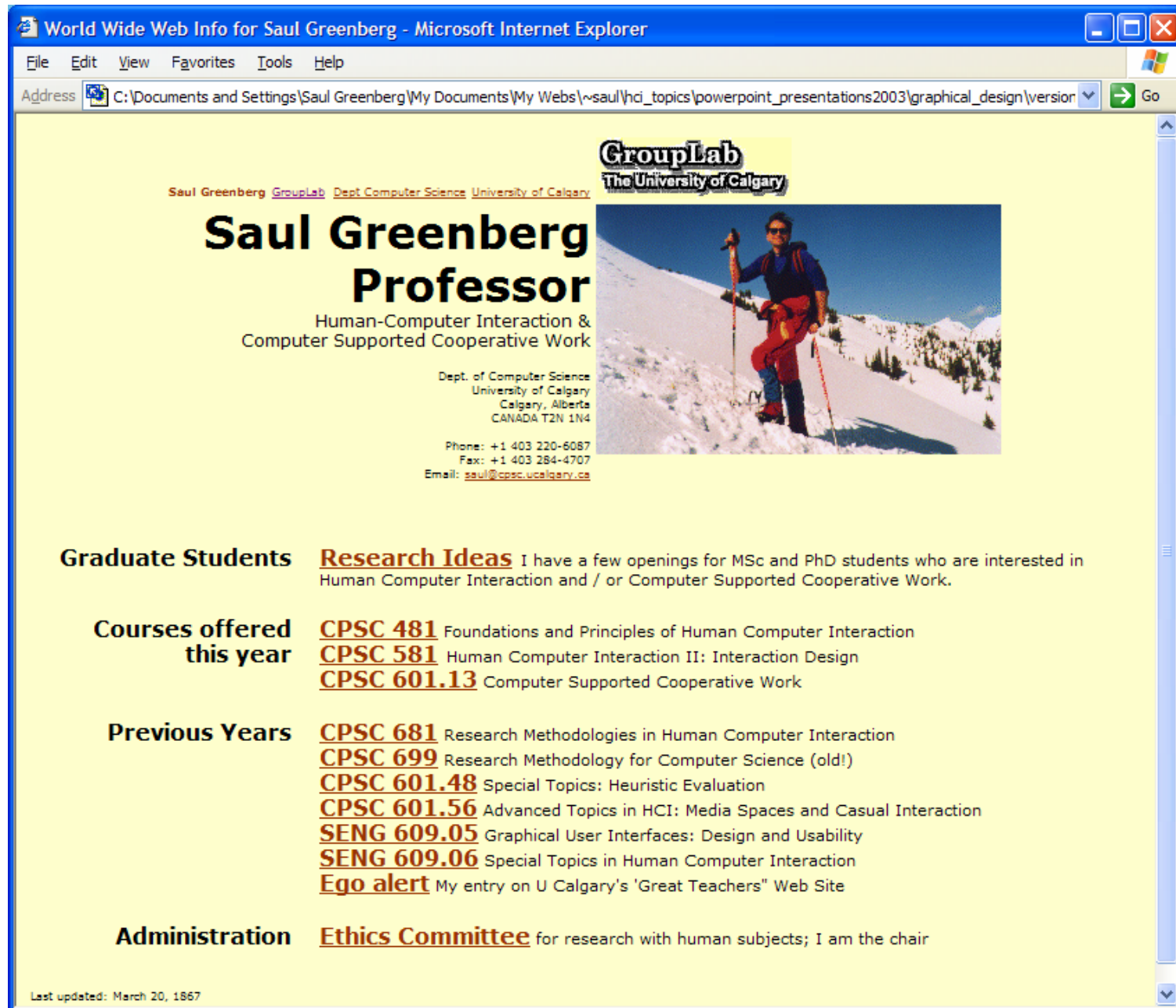


One of the pages reachable from the previous slide



One of the pages reachable from the previous slide

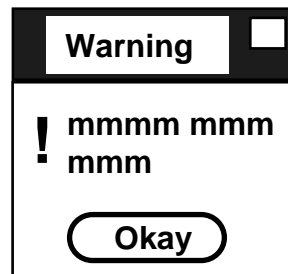




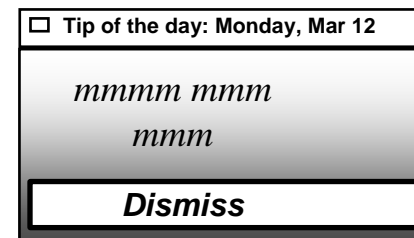
using consistency (repetition)

# Visual consistency (repetition)

- ◆ internal consistency
  - ✦ elements follow same conventions and rules
  - ✦ set of application-specific grids enforce this
- ◆ external consistency
  - ✦ follow platform and interface style conventions
  - ✦ use platform and widget-specific grids
- ◆ deviate only when it provides a clear benefit to user



**Right!**



**Wrong!**

# Relating screen elements

- ◆ proximal clusters
- ◆ alignment
- ◆ white (negative) space
- ◆ explicit structure

Mmmm:

Mmmm:

Mmmm:

Mmmm:

Mmmm:

**Wrong!**

Mmmm:

Mmmm:

Mmmm:

Mmmm:

Mmmm:

**Right!**

Mmmm:

Mmmm:

Mmmm:

Mmmm:

Mmmm:

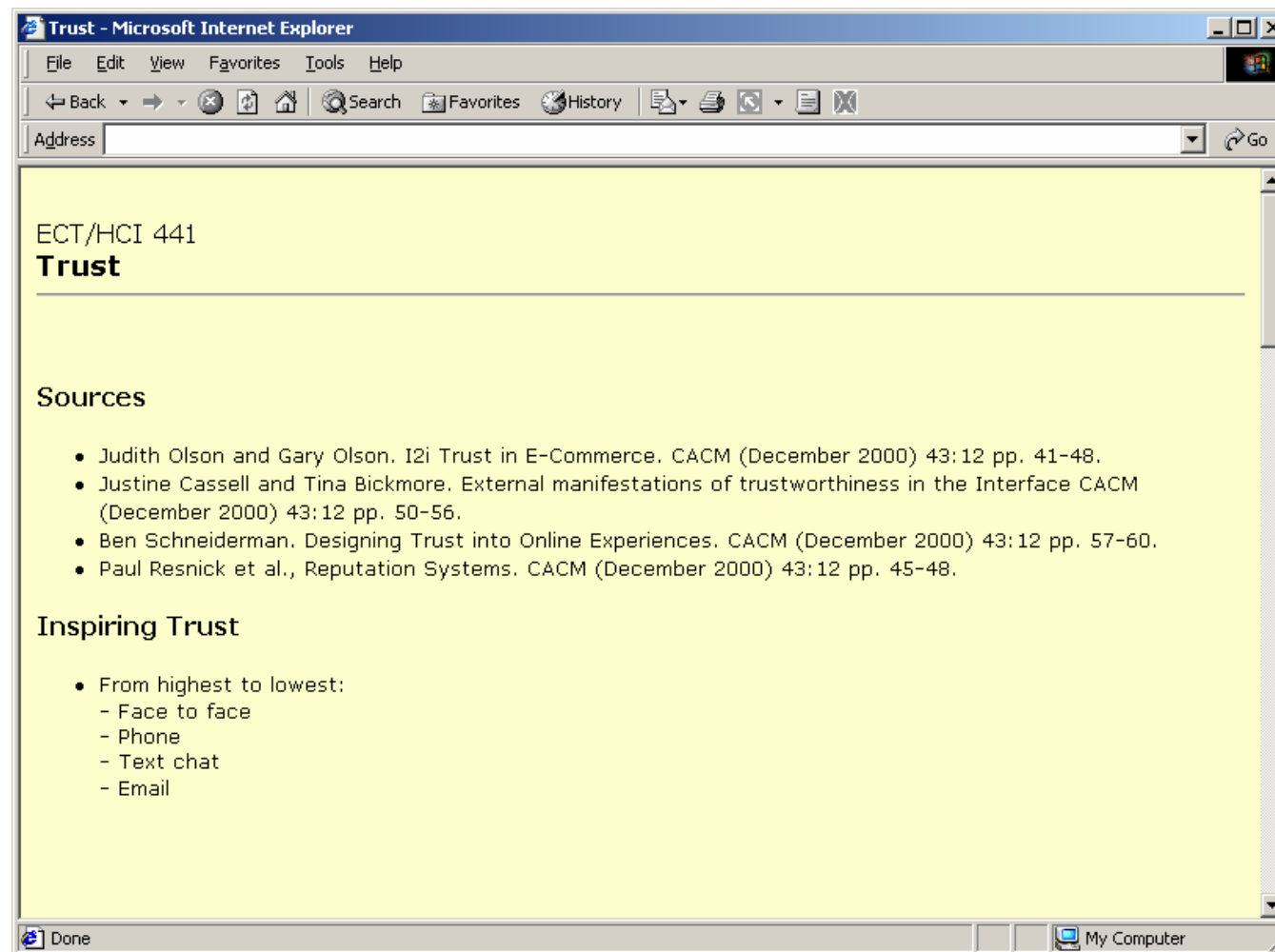
**Right!**

# Contrast

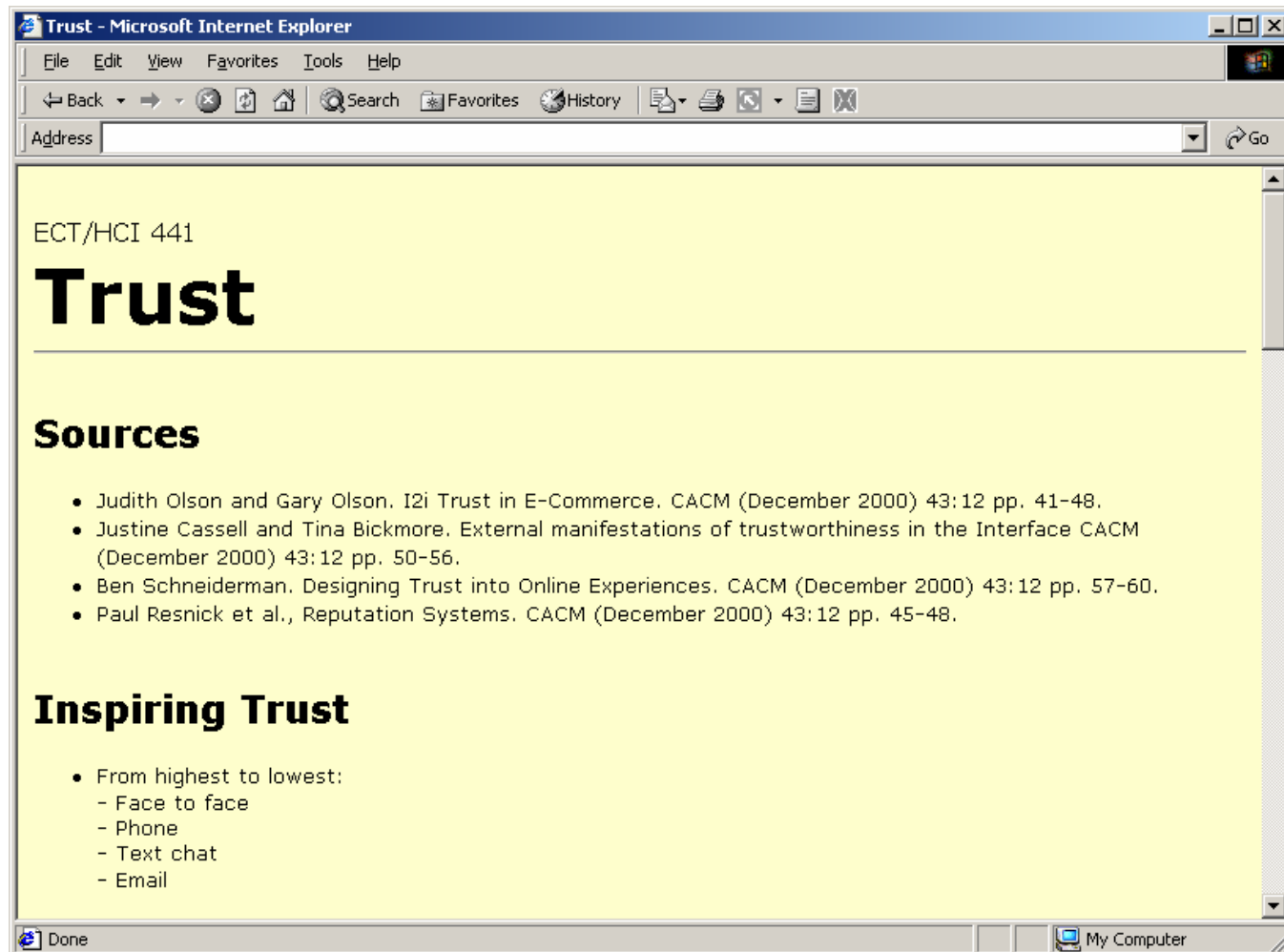
- ◆ Make different items look different.
- ◆ Brings out dominant elements.
- ◆ Mutes lesser elements.
- ◆ Creates dynamism.
- ◆ The large bold lettering of a chapter title sets it apart from the small lettering in the body of the page.

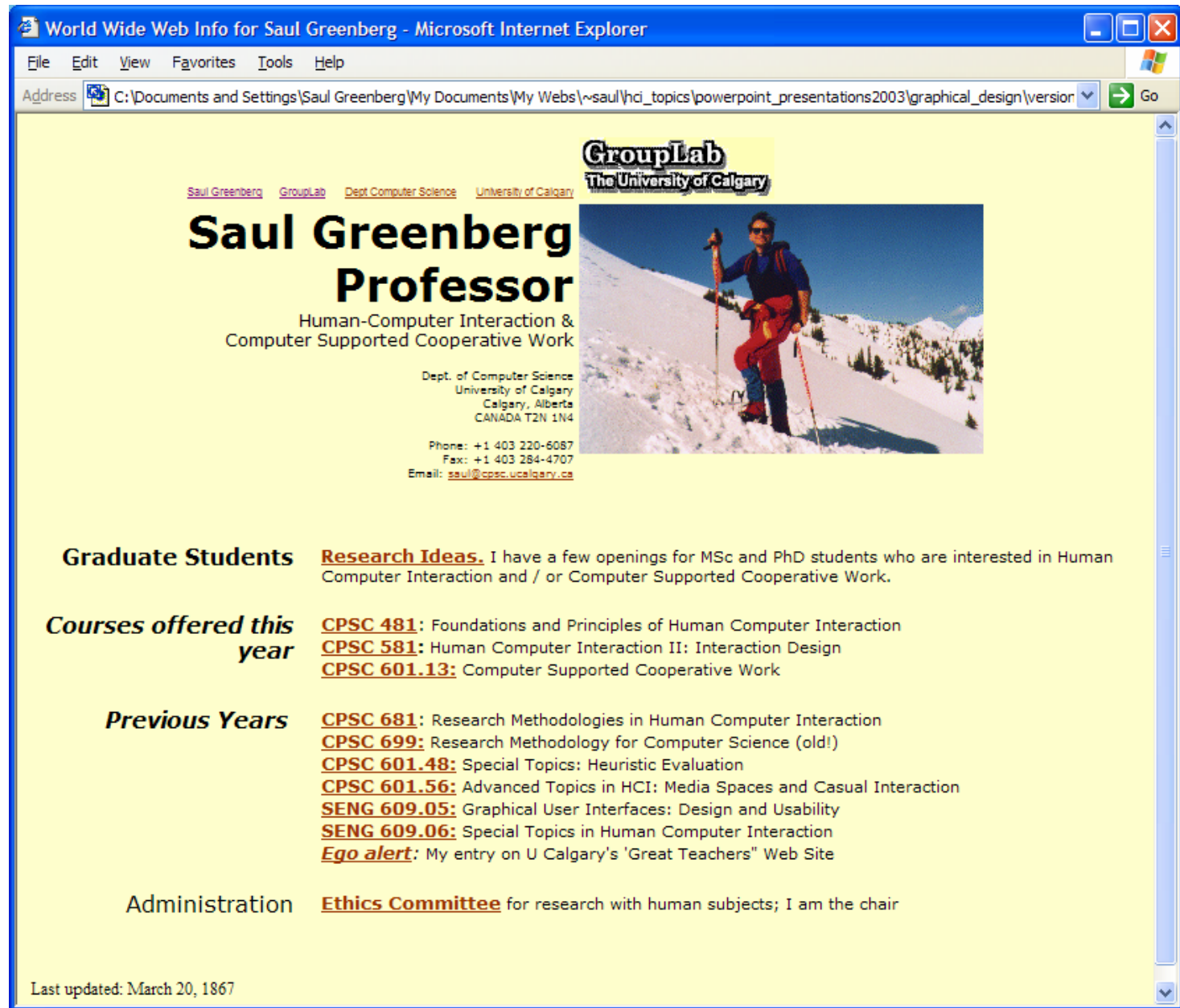


# How can we make this more interesting?



# Use more contrast





using contrast

# Poor example

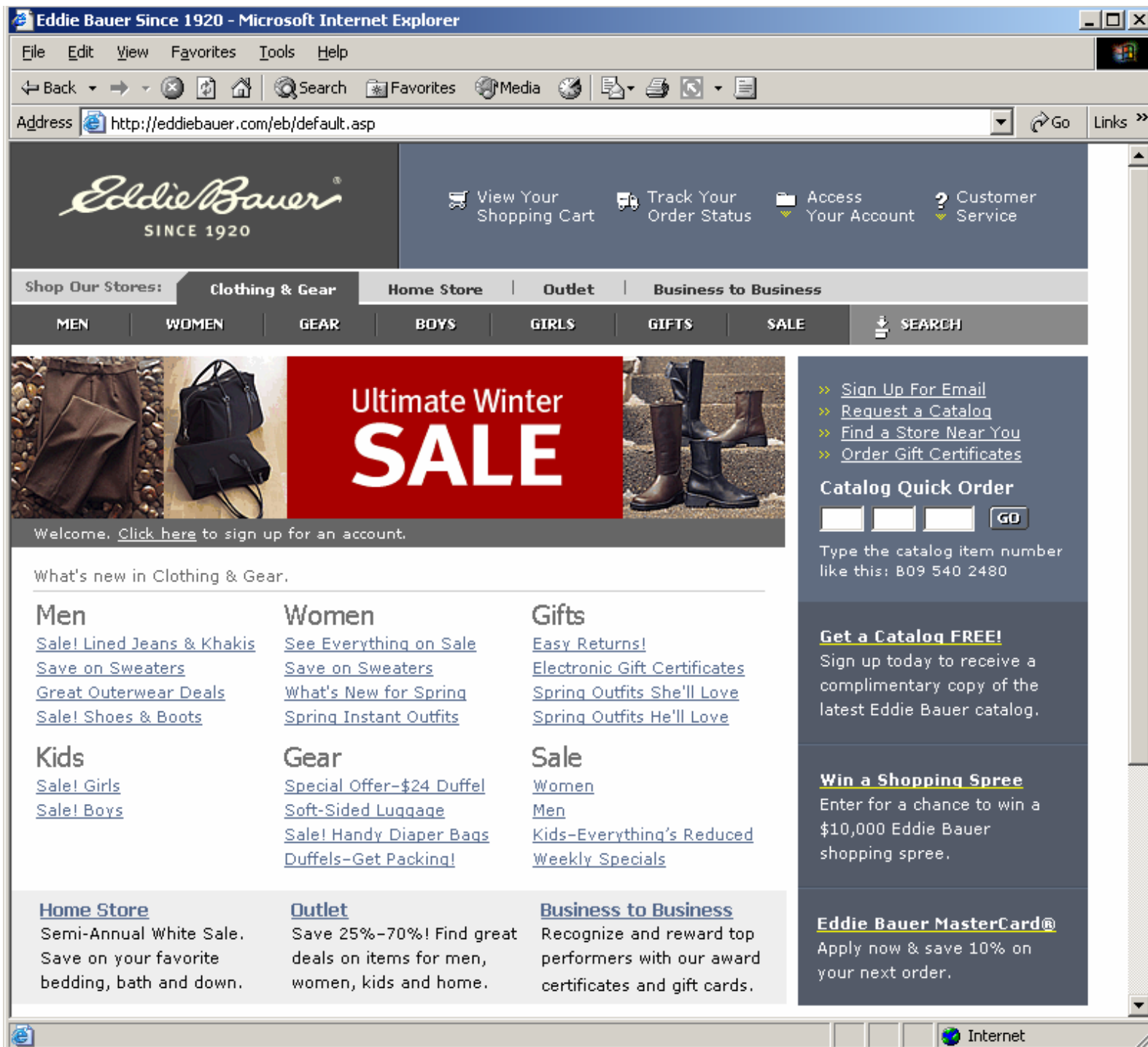
Form Title -- (appears above URL in most browsers and is used by WWW search)		Background Color:
Q&D Software Development Order Desk		FFFBF0
Form Heading -- (appears at top of Web page in bold type)		Text Color:
Q&D Software Development Order Desk		000080
E-Mail responses to (will not appear on)	Alternate (for mailto forms only)	Background Graphic
dversch@q-d.com		
Text to appear in Submit button	Text to appear in Reset button	<input type="radio"/> Mailto
Send Order	Clear Form	<input checked="" type="radio"/> CGI
Scrolling Status Bar Message (max length = 200 characters)		
***WebMania 1.5b with Image Map Wizard is here!***		
<< Prev Tab		Next Tab >>

- ◆ Terrible alignment
  - ✦ no flow
- ◆ Poor contrast
  - ✦ cannot distinguish colored labels from editable fields
- ◆ Poor repetition
  - ✦ buttons do not look like buttons
- ◆ Poor explicit structure
  - ✦ blocks compete with alignment

# Good example

The Eddie Bauer site (next slide) has

- ✦ Horizontal alignment
- ✦ Vertical alignment
- ✦ Proximity, to group similar items
- ✦ Consistency, in type size and font for links
- ✦ Contrast, between **SALE** and almost everything else



# Grids

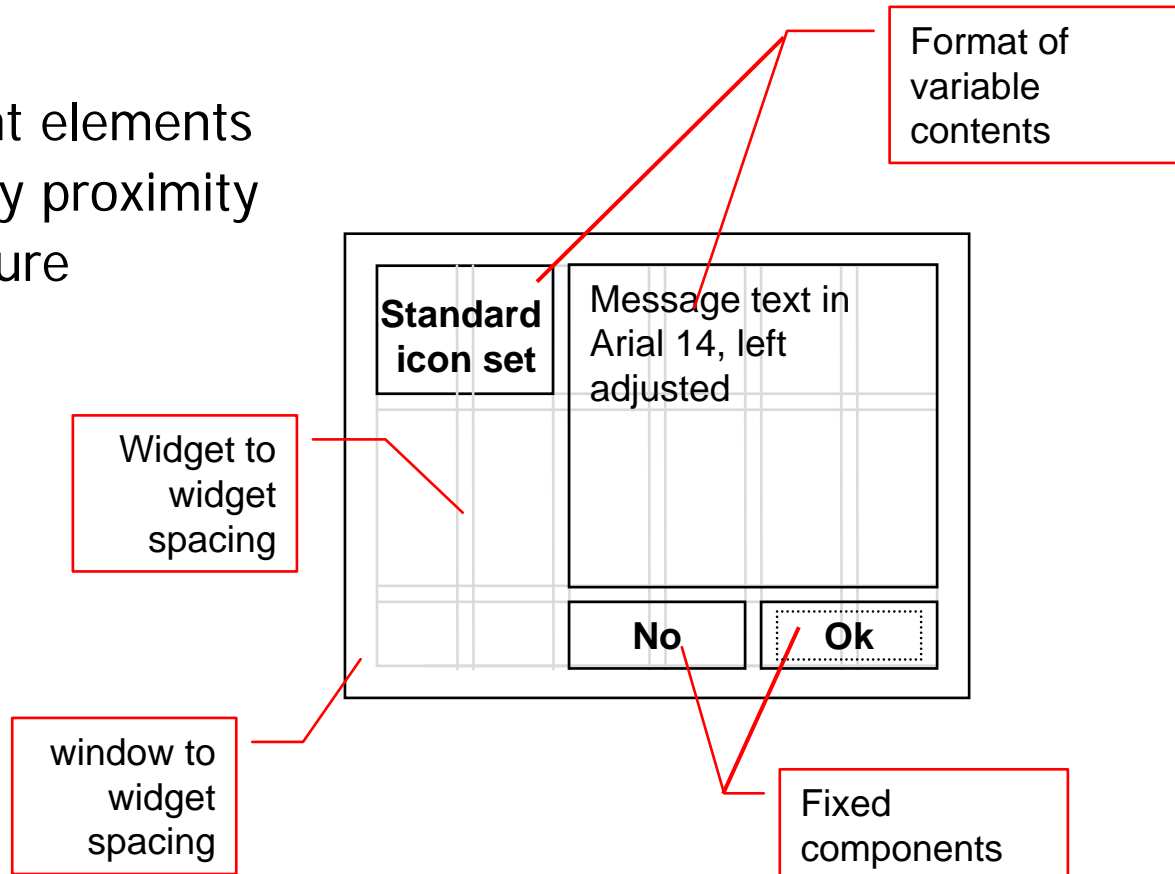
- ◆ Horizontal and vertical lines to locate window components
  - ✦ aligns related components

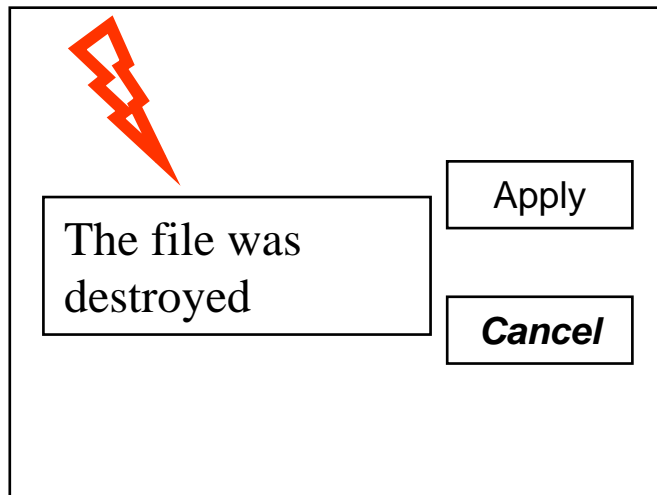
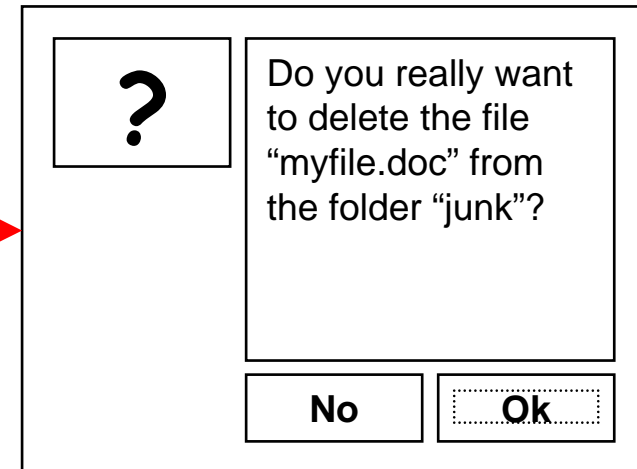
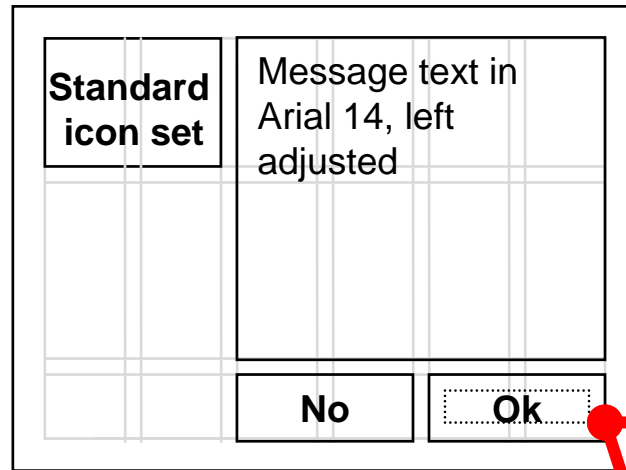
- ◆ Organization

- ✦ contrast for dominant elements
- ✦ element groupings by proximity
- ✦ organizational structure
- ✦ alignment

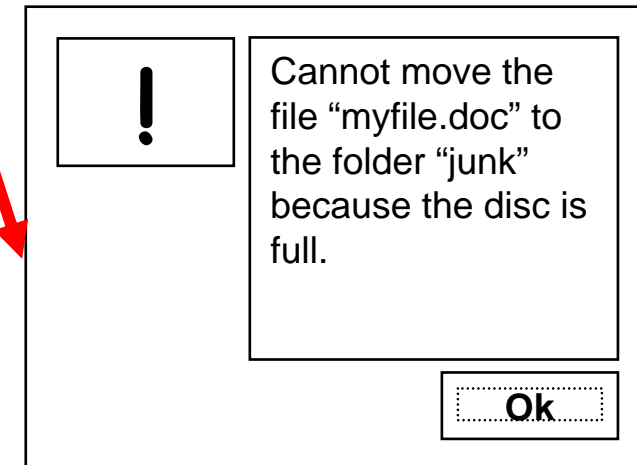
- ◆ Consistency

- ✦ location
- ✦ format
- ✦ element repetition
- ✦ organization





**Wrong!**

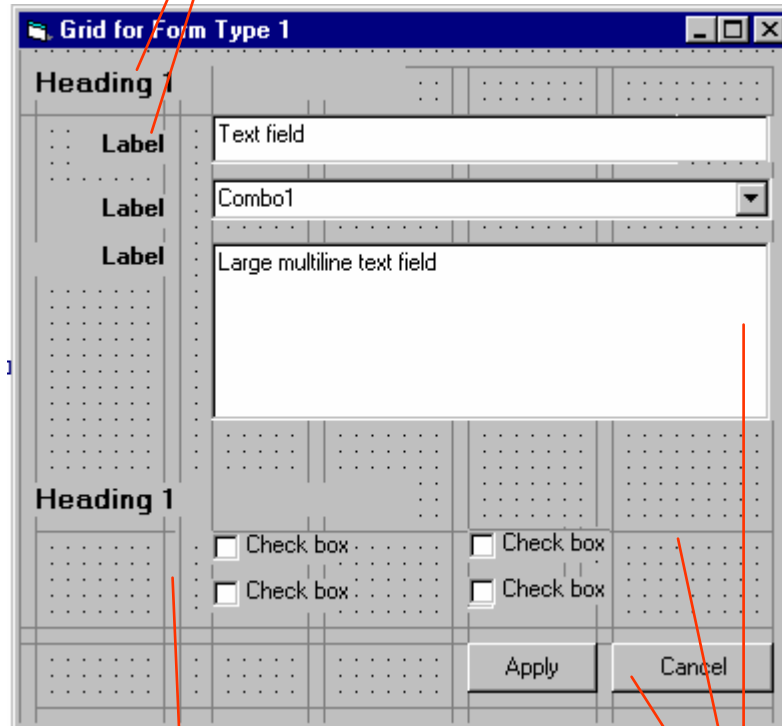


**Right!**



### Two-level Hierarchy

- indentation
- contrast



A wireframe diagram of a form titled "Grid for Form Type 1". It features a grid layout with two main sections, each starting with a "Heading 1". The first section contains three rows: "Label" followed by a "Text field", "Label" followed by a "Combo1" dropdown, and "Label" followed by a "Large multiline text field". The second section contains four rows of "Check box" controls, followed by "Apply" and "Cancel" buttons. Red lines connect annotations to specific elements: one points to the "Text field" label, another to the "Large multiline text field", and a third to the "Apply" button.

Alignment connects  
visual elements in a  
sequence



### Logic of organizational flow



A final form titled "Note Sender". It has a "Send to" section with "Name" (Saul Greenberg) and "Email" (saul@cpssc.ucalgary.ca) fields. Below is a "Message" section with a text area containing "Hi Saul", "Lets get together for lunch, Perhaps tomorrow?", and "Judy". The "Instructions" section has a "Type" dropdown set to "Normal mail", and two checkboxes: "Include attachments" (checked) and "Carbon copy" (unchecked). "Apply" and "Cancel" buttons are at the bottom right. A red line connects the "Logic of organizational flow" annotation to the "Name" field.

Grouping  
by white  
space

# Using the five E's in Design

Dimension	Key needs	Design tactics
Effective	Accuracy	Consider how many places in the interface are opportunities for error, and protect against them. Look for opportunities to provide feedback and confirmations.
Efficient	Operational speed	Place only the most important information in front of the user. Work on navigation that moves as directly as possible through a task. Be sure the interaction style minimizes the actions required.
Engaging	Draw users in	Consider what aspects of the product are most attractive and incorporate them into the design.
Easy to learn	Just-in-time instruction	Create step-by-step interfaces to help users navigate through complex tasks. Look for opportunities to provide small chunks of training.
Error tolerant	Validation	Look for places where selection can replace data entry. Look for places where calculators can support data entry. Make error messages include opportunities to correct problems.