Graphical Screen Design

CRAP (contrast, repetition, alignment, proximity)

Grids are an essential tool for graphical design

Other important graphical screen design concepts

- Visual consistency
- Visual relationships
- Visual organization
- Legibility and readability
- Navigational cues

The Squint Test

Used to determine what stands out or what elements appear to belong together

CRAP: An Important Tool For Graphical Screen Design

Contrast
- Make different things even more different
- Brings out dominant elements
- Mutes lesser elements

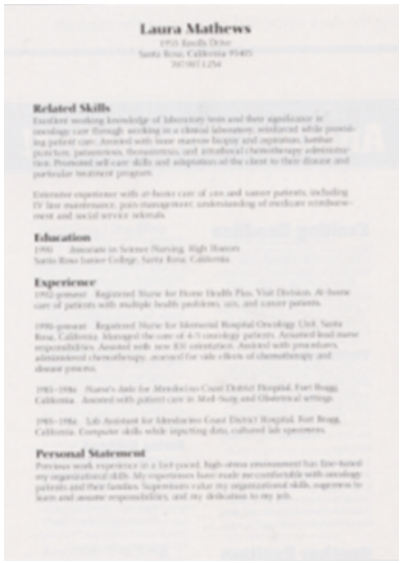
Repetition
- Repeat conventions throughout the interface to tie elements together
- Consistency

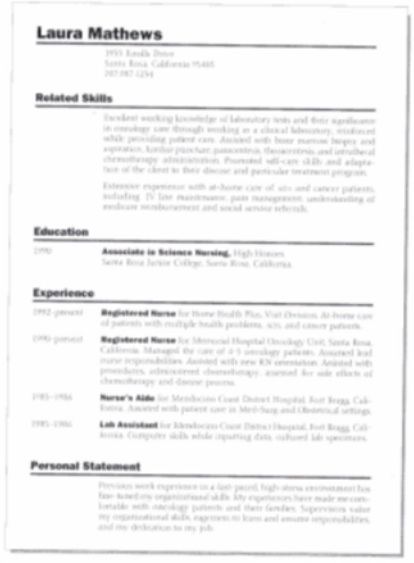
Alignment
- Visually associate related elements by lining them up

Proximity
- Group related elements
- Separate unrelated elements

James Tam

Contrasting Contrast





James Tam

Repetition

Mickey Mouse

- Walt Disney Studios
  Anaheim, California
  58 years old, no children

Employment

- Walt Disney Studios
- Various television studios

Education

- Walt Disney Studios

Favorite Activities

- Driving steamboats
- Roping cattle

Favorite Quote

- Everybody can't be a duck.

James Tam

Alignment

Honor Form

Heresy rheumatic starry offer former's dodder. Violate Huskings, an wart hoppings darn honor form.

Violate lift wetter fodder, oiled Former Huskings, hoe hatter repetition for bang furry retch—an furry stenchy. Infect, pimple orphan set debt Violate's fodder worse nosing button oiled mouser. Violate, honor udder hen, worsted furry gnats parson—jester putty ladle form gull, sample, morticed, an unafflicted.

Tarred gull

Wan moaning Former Huskings nudist haze dodder setting honor cheer, during nosing.

"Violate!" sorted dole former. "Watcher setting darn fur? Denture nor yore canned gut retch setting darn during nosing? Germ pup otter debt cheer?"

"Arm tarred, Fodder," resplendent Violate warily.

"Watcher tarred fur?" aster stenchy former, hoe dint half mush symphony further gull.

Feeder pegs

"Are badger dint doe mush woke disk moaning! Ditcher curry doze buckles fuller slob darn tutor peg-pan an feeder pegs?"

"Yap, Fodder. Are fetter pegs."

"Ditcher mail-car caws an swoop otter caw staple?" "Off curse, Fodder. Are mulct oiler caws an swapped otter staple, fetter checkings, an clammed upper larder inner checking-horse toe gadder

Honor Form

Heresy rheumatic starry offer former's dodder. Violate Huskings, an wart hoppings darn honor form.

Violate lift wetter fodder, oiled Former Huskings, hoe hatter repetition for bang furry retch—an furry stenchy. Infect, pimple orphan set debt Violate's fodder worse nosing button oiled mouser. Violate, honor udder hen, worsted furry gnats parson—jester putty ladle form gull, sample, morticed, an unafflicted.

Tarred gull

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Feeder pegs

"Are badger dint doe mush woke disk moaning! Ditcher curry doze buckles fuller slob darn tutor peg-pan an feeder pegs?"

"Yap, Fodder. Are fetter pegs."

"Ditcher mail-car caws an swoop otter caw staple?" "Off curse, Fodder. Are mulct oiler caws an swapped otter staple, fetter checkings, an clammed upper larder inner checking-horse toe gadder oiler aches, an wen darn tutor vestibule guarding two peck oiler bogs

James Tam

Proximity

CD ROMs
CD ROMs
Children's CDs
Educational CDs
Entertainment CDs
Laser discs
Educational
Early learning
Language arts
Science
Math
Teacher Tools
Books
Teacher tools
Videos
Hardware &
Accessories
Cables
Input devices
Mass storage
Memory
Modems
Printers & supplies
Video and sound

CD ROMs
CD ROMs
Children's CDs
Educational CDs
Entertainment CDs
Laser discs

Educational
Early learning
Language arts
Science
Math

Teacher Tools
Books
Teacher tools
Videos

Hardware & Accessories
Cables
Input devices
Mass storage
Memory
Modems
Printers & supplies
Video and sound

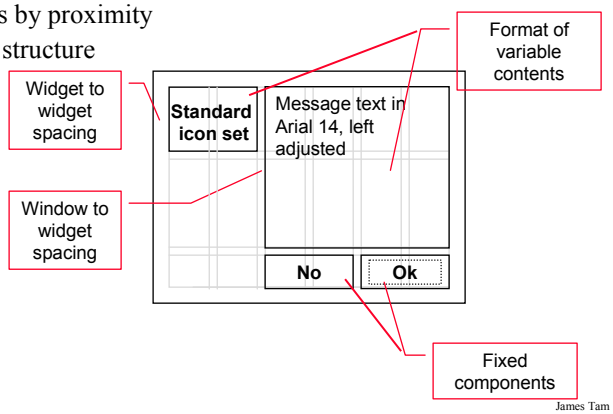
James Tam

Grids

Horizontal and vertical lines to locate window components
- Aligns related components

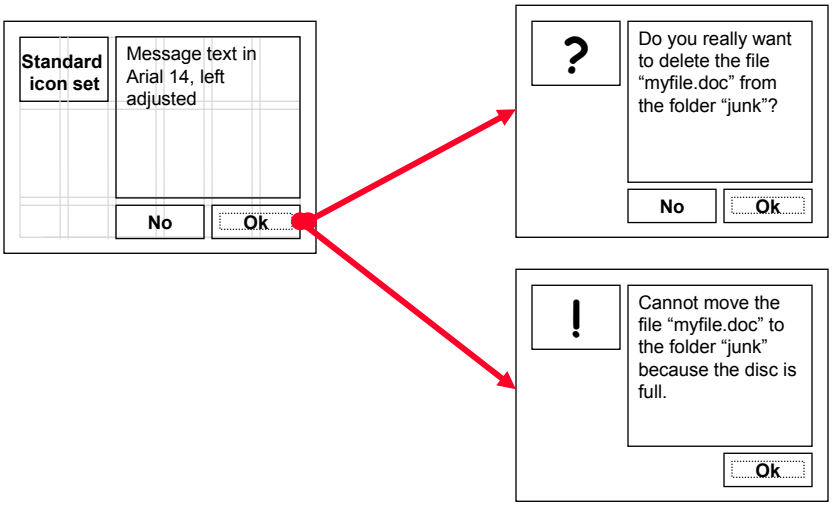
Organization
- Contrast to bring out dominant elements
- Grouping of elements by proximity
- Show organizational structure
- Alignment

Consistency
- Location
- Format
- Repetition
- Organization



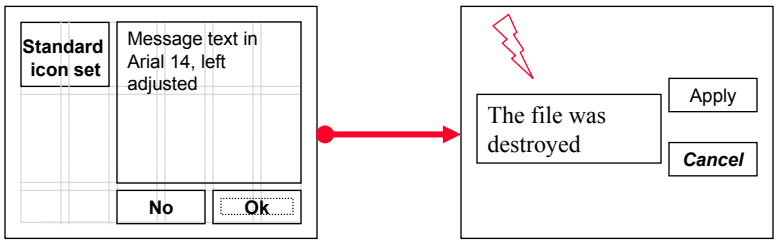
James Tam

Uses A Grid: Consistent



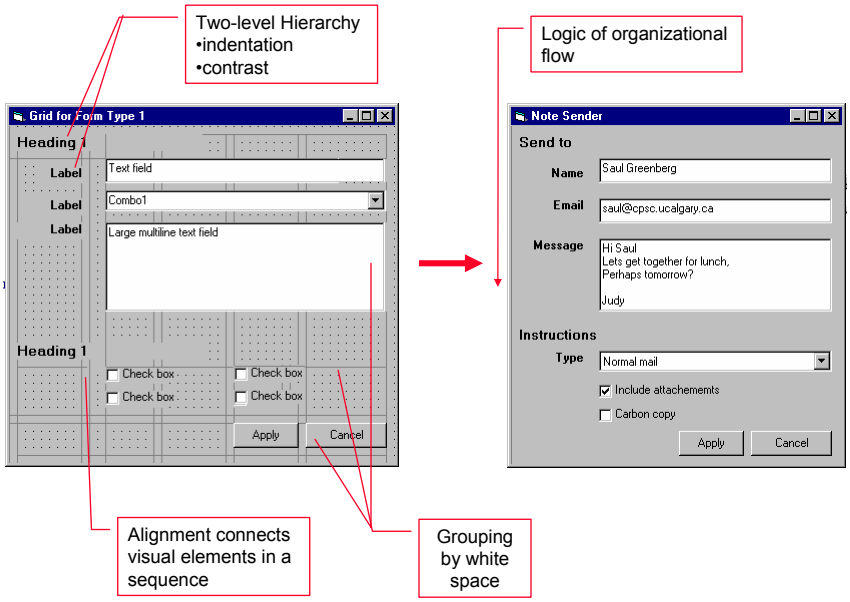
James Tam

No Grid: Inconsistent



James Tam

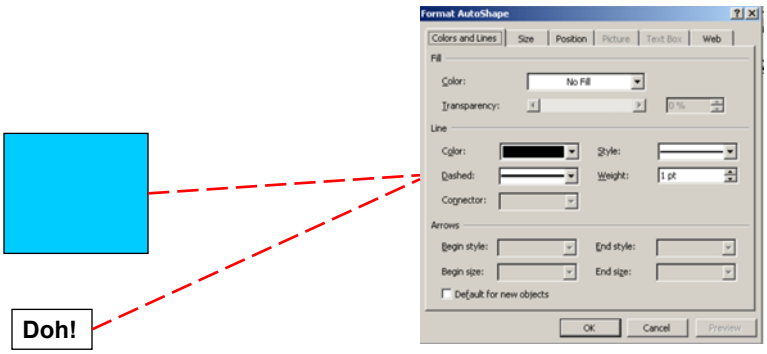
Another Grid Example



James Tam

Visual Consistency: Internal Consistency

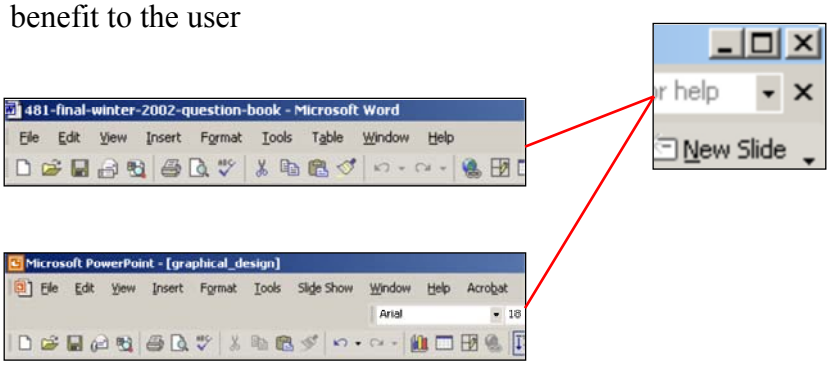
- Unless there is a compelling reason all elements of the same program follow the same rules and conventions
- Application specific grids can be used to enforce this



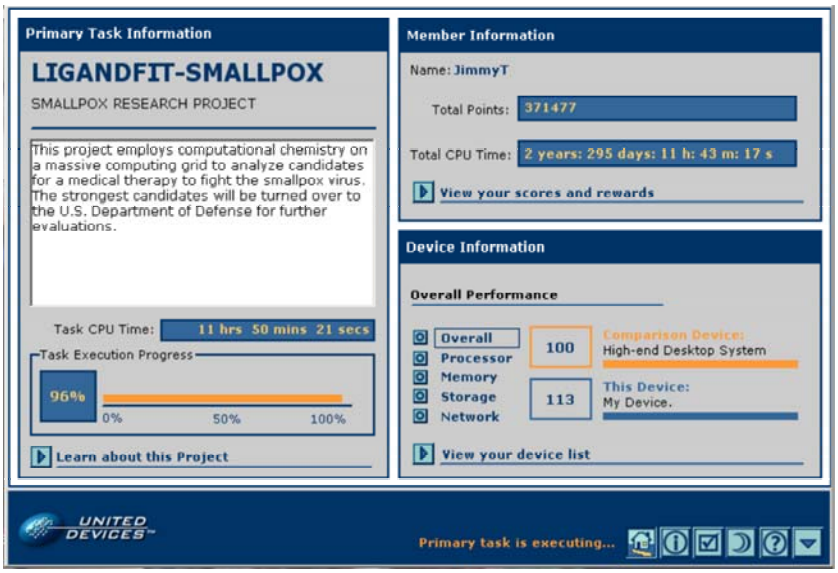
James Tam

Visual Consistency: External Consistency

- Follow interface and platform style conventions
- Use grids that are platform (e.g., Windows) and widget (e.g., Java Swing) specific
- Deviate from these conventions only when there is a clear benefit to the user



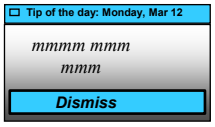
External Consistency Violated



The UD agent © United Devices: www.ud.com

A Tool For Ensuring Consistency: Mumble Text

✓



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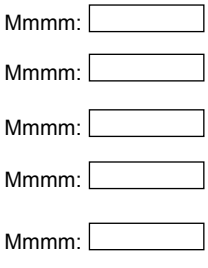
Relationships Between Screen Elements

- Using white space (negative proximity) vs. forcing an explicit onscreen structure (e.g., the use of frames)



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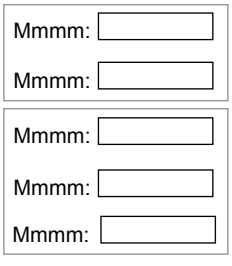

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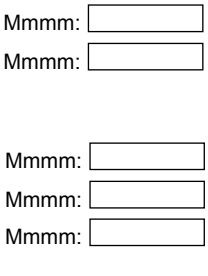

✓

Structure Is Difficult To Ascertain

Placement determines where the awareness information is located in the display. Awareness information has *situated* placement if the information is located in the part of the workspace where the event occurred, and it has *separate* placement if is located somewhere else. Gutwin argues that situating awareness information takes advantage of a person's existing familiarity with the workspace, for it provides context. However, if many changes and events are taking place in the space over time then the potential downside is clutter leading to overload requiring increased effort to interpret the changes. Thus, some balance must be struck between context and overload.

The presentation dimension of Figure 4.1 classifies the display of awareness information as *literal* when it describes awareness information in the same form that it is gathered. In terms of change awareness this would mean that all the details about changes would be shown. It is *symbolic,* when only a subset of the information about a workspace event is displayed (Gutwin 1997). While a literal presentation may be easier to understand and interpret, in terms of change awareness, because of the potentially large amount of information that can accumulate as changes occur time an overly literal presentation may sometimes be more a nuisance than a benefit. This was found to be the case in my own investigation of potential change display mechanisms summarized in Chapter 5 and published as Tam, McCaffrey, Maurer, and Greenberg (2000). During this study, many test participants expressed a desire for useful abstractions that combine rudimentary change information into one higher-level conceptual change. For example, one participant noted while watching the animated replay of a class name being shown, "…I don't need to see each and every character being typed just to see a name change!" Of course, care must be taken to make these abstractions understandable, e.g., by using already familiar representations or notations. This minimizes the cost of acquiring information while maximizing its benefits due to the added structure and organization.

Based upon my previous findings (to be discussed in Chapter 5), I add a third dimension, *persistenc*e, to Gutwin's classification. Persistence refers to how long the information is displayed (Figure 4.1 side pane). The display of information is *permanent* if it is always visible and *passing* if it only appears for a certain period. We noticed how study participants frequently complained when important information disappeared off the screen. Conversely, they also indicated that screen clutter might occur with the mechanisms that constantly displayed all changes. Thus, there's a need to classify change information according to how long it should stay visible. With permanent persistence, the effort needed to find changes i.e., the acquisition cost is low because the information is always there. Ideally, a person merely has to shift their gaze over to see the information. Because people can become accustomed to the occurrence of workspace events, they can also ignore things that do not interest them and pay closer attention to things that are of interest (Gutwin 1997).

James Tam

Explicit Structure Imposed

Placement determines where the awareness information is located in the display. Awareness information has *situated* placement if the information is located in the part of the workspace where the event occurred, and it has *separate* placement if is located somewhere else. Gutwin argues that situating awareness information takes advantage of a person's existing familiarity with the workspace, for it provides context. However, if many changes and events are taking place in the space over time then the potential downside is clutter leading to overload requiring increased effort to interpret the changes. Thus, some balance must be struck between context and overload.

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James Tam

Structure Implied With White Space

Placement determines where the awareness information is located in the display. Awareness information has *situated* placement if the information is located in the part of the workspace where the event occurred, and it has *separate* placement if is located somewhere else. Gutwin argues that situating awareness information takes advantage of a person's existing familiarity with the workspace, for it provides context. However, if many changes and events are taking place in the space over time then the potential downside is clutter leading to overload requiring increased effort to interpret the changes. Thus, some balance must be struck between context and overload.

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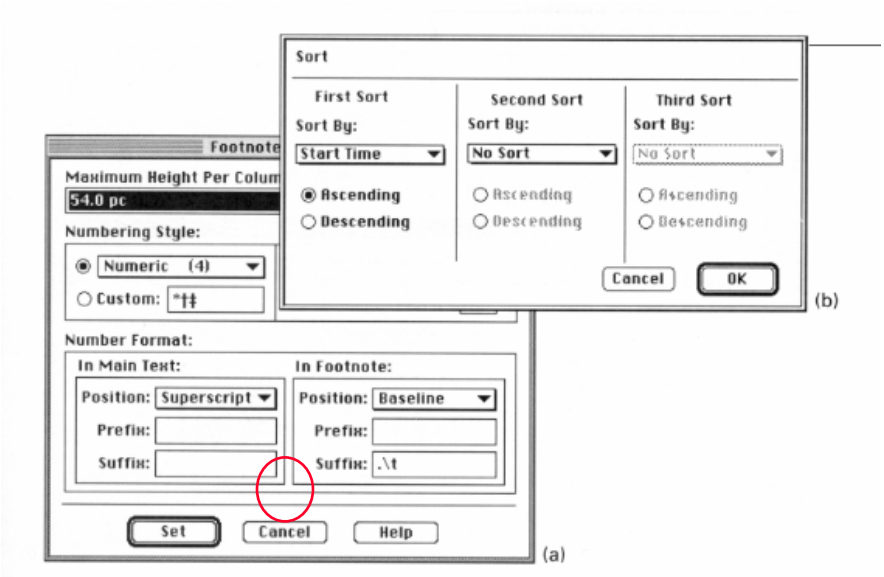
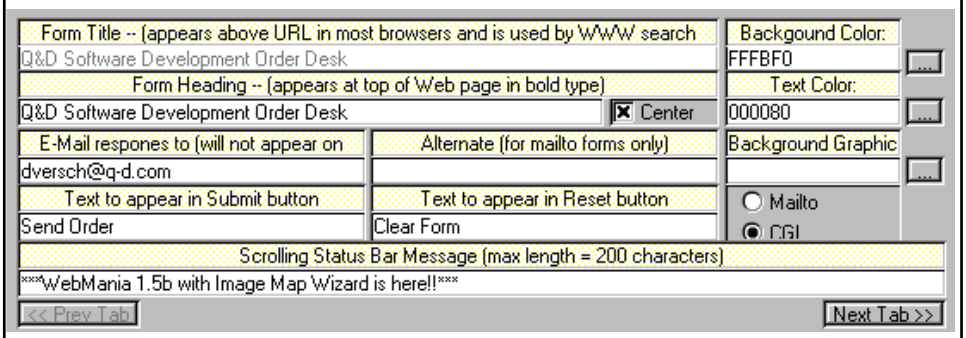
James Tam



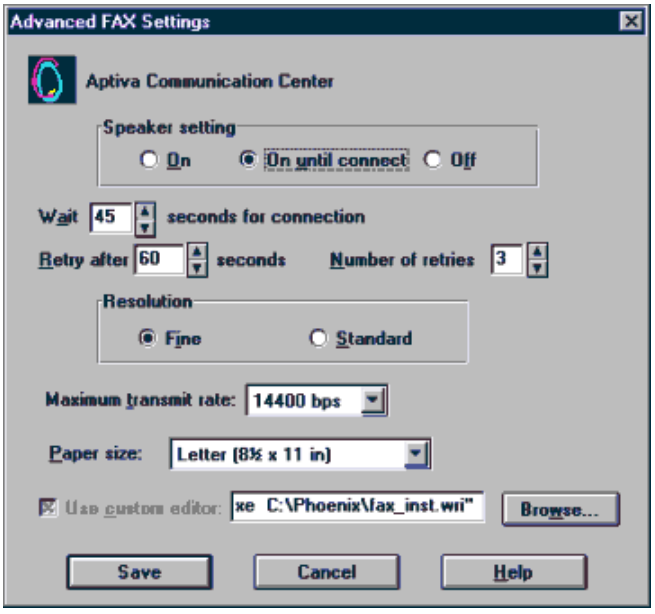
Using explicit structure as a crutch from Mullet & Sano page 31

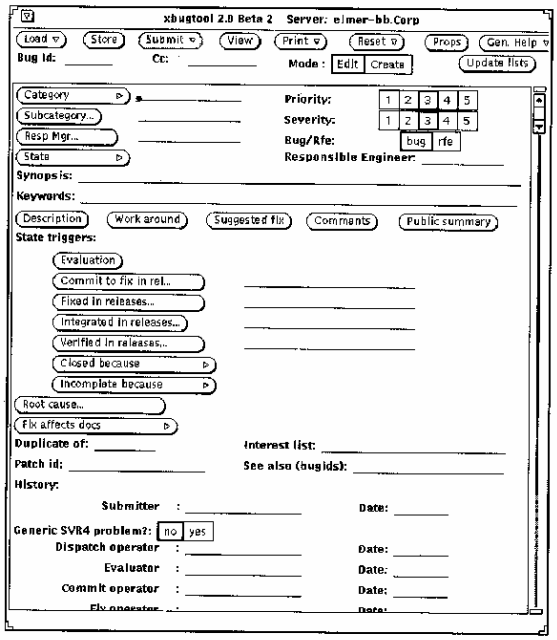
James Tam



Bad alignment
Poor choice of colors to distinguish labels from editable fields

No regard for order and organization

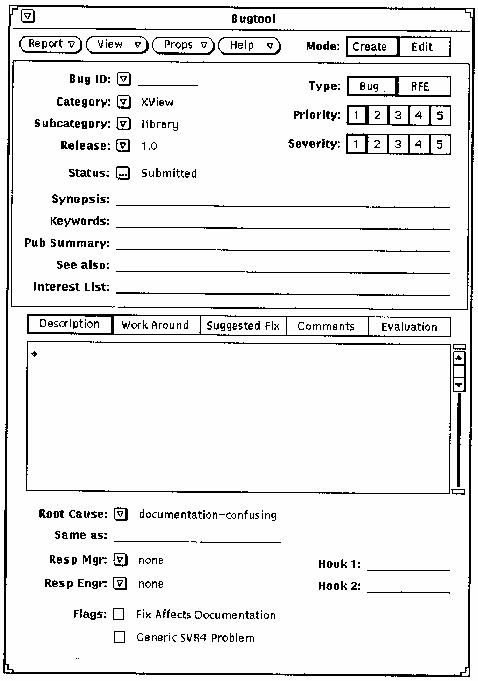




(a)

Haphazard layout
from Mullet & Sano page 105

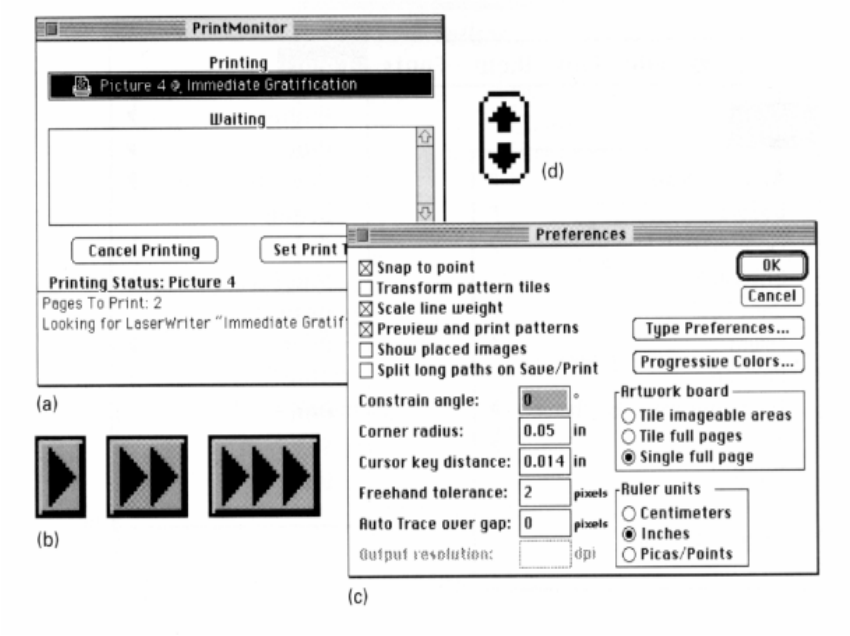
James Tam



(b)

Repairing a
haphazard layout
from Mullet &
Sano page 105

James Tam



Spatial Tension from Mullet & Sano page 72

James Tam

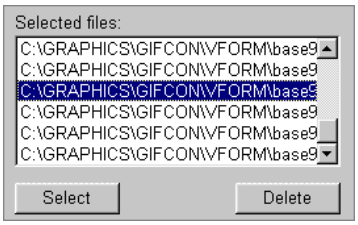
Overuse of 3-D effects makes the window unnecessarily cluttered

WebForms

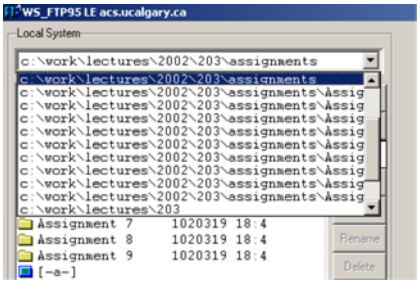
James Tam

Relationships Between Screen Elements

How do you chose when you cannot discriminate screen elements from each other?



GIF Construction Set

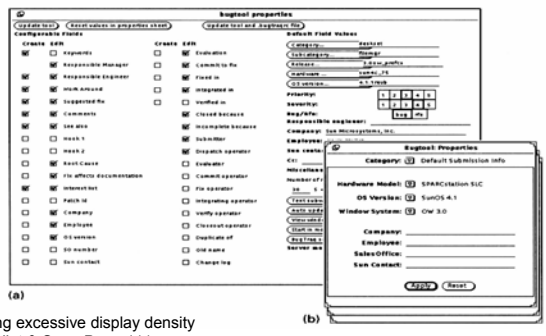


WS-FTP

James Tam

Economy Of Visual Elements

- Minimize number of controls
- Include only those that are necessary
  - Eliminate, or relegate others to secondary windows
- Minimize clutter
  - So information is not hidden
  - Combine redundancies



Repairing excessive display density
from Mullet & Sano Page 111

James Tam

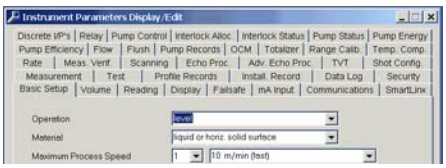
Economy Of Visual Elements (Tabs)

Excellent means for factoring related items

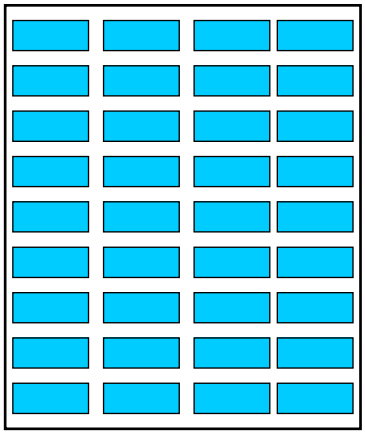
Economy Of Visual Elements (Tabs)

Excellent means for factoring related items

But it can be overdone



Balance Between Too Many Controls On A Single Screen Vs. Too Many Screens



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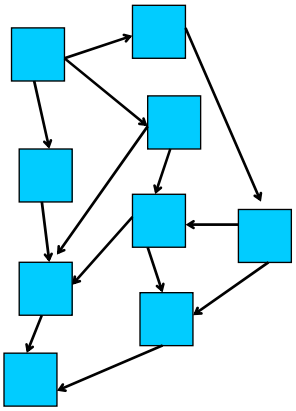

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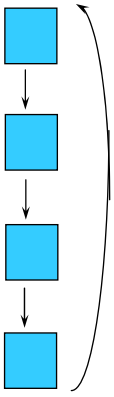
Widgets And Complexity

- How can window navigation and clutter be reduced?
  - Avoid long paths
  - Avoid deep hierarchies
  - Re-factor/combine functions



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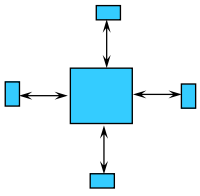


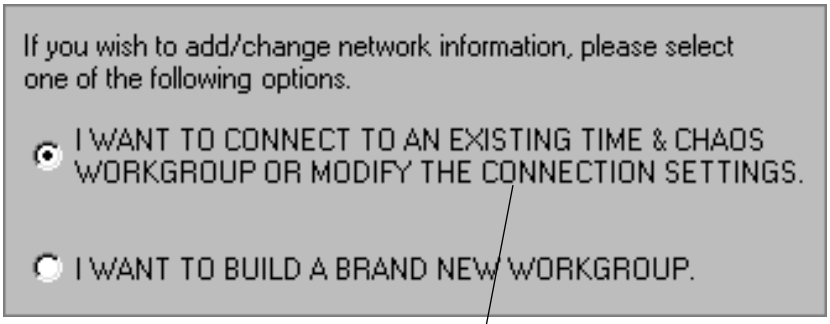
✓

Legibility And Readability

Whenever your local SMS Administrator sends you an actual software Package, the SMS Package Command Manager will appear (usually at network logon time) displaying the available Package(s). The following screenshots display scenes similar to what you will see when you receive an actual SMS Package.

To start the demonstration, click the "CLICK HERE TO CONTINUE" button at the bottom of the screen.

Legibility And Readability



These choices must be really important, or are they?

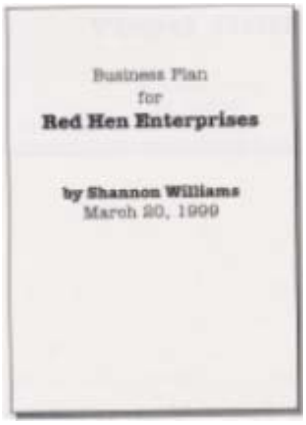
Upper Case Text

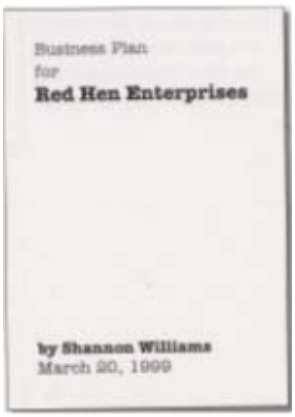
THIS IS AN EXAMPLE OF TEXT THAT IS SHOWN ALL IN CAPITAL LETTERS. AS YOU CAN PROBABLY TELL, THE LACK OF VARIATION IN HEIGHT MAKES IT SOMEWHAT MORE DIFFICULT TO READ. THIS WHOLE PARAGRAPH JUST GOES ON AND ON WITHOUT SAYING ANYTHING SIGNIFICANT. THE OTHER SIDE EFFECT OF ALL CAPITALS IS THAT SOME PEOPLE THINK THAT IT IS THE TEXT EQUIVALENT OF SHOUTING AT SOMEONE. ALSO OTHER PEOPLE MAY THINK THAT IT IS MORE SIGNIFICANT BECAUSE IT IS ALL IN CAPITALS. THAT IS PROBABLY WHY SOME PEOPLE DO IT – IN ORDER TO GIVE THE IMPRESSION THAT THEIR MESSAGE IS REALLY IMPORTANT. BUT AS YOU HAVE PROBABLY ASCERTAINED (ASSUMING THAT YOU HAVE EVEN READ THIS FAR) THAT PUTTING TEXT ALL IN CAP'S IS SIMPLY TOO PAINFUL TO READ.

James Tam

Center Alignment

- Some regard it as unprofessional and advocate against it's use.
- It's described as being unprofessional looking and plain.





From the Non-Designer's Design Book page 30

James Tam

Center Alignment

Overuse of it can make it harder to determine the structure of onscreen elements.

```
while ((reRun == 'y') || (reRun == 'e'))
                {
            if (reRun != 'e')
                b.scan();
                b.display();
            generation += 1;
        System.out.println("\t\tGeneration: " + generation);
    System.out.print("Do you wish to play another generation (y/n): ");
            reRun = (char) Console.in.readChar();
            Console.in.readLine();
            if (reRun == 'e')
                b.edit();
                }
```


Center Alignment  

- **It can be useful for providing additional contrast**
  - e.g., titles vs. the body of the text.

Some Potential Research Topics

HCI and expert systems: Scope -Masters or Doctorate level projects

There has been little research conducted into determining what is usable for software used by expert users. Most of the work in the area of Human-Computer interaction is more applicable to high level interfaces such as GUI's than they are for low level interfaces such as a Unix command line. Research in this area would involve studying these types of users and their tasks in order to come up with a set of usability heuristics that can guide future designers of these systems as well be used as an evaluation tool for existing systems.

Educational tools: Scope – undergraduate research project

In order to help undergraduate students grasp some of the more difficult and abstract concepts being taught in class, instructors will sometimes provide visual representations in order to provide a mental model of what the code is actually doing. For example, when first teaching linked lists to students it is common to draw out a picture of a list consisting of nodes and their links. List operations are then demonstrated by redrawing some or all parts of the list manually. A useful learning aid could consist of a system that could demonstrate list operations but do so in an interactive fashion. The student could create some code and see the effects of different list operations in order to better understand the cause-effect relationship between the code and the list.

Gaming projects

- **So it should be used sparingly**
- **It should also be used for a reason rather than as the default**

Center Alignment


- **If you are employing it provide contrast then make it obvious**

This text is ***centered.***
If you are going to
center text,
make it obvious.

See, in this paragraph it is
difficult to tell if this text
was centered purposely
or perhaps accidentally.
The line lengths are not
the same, but they are not
really different. If you can't
instantly tell that the type
is centered, why bother?

The Non-Designers Design Book

James Tam

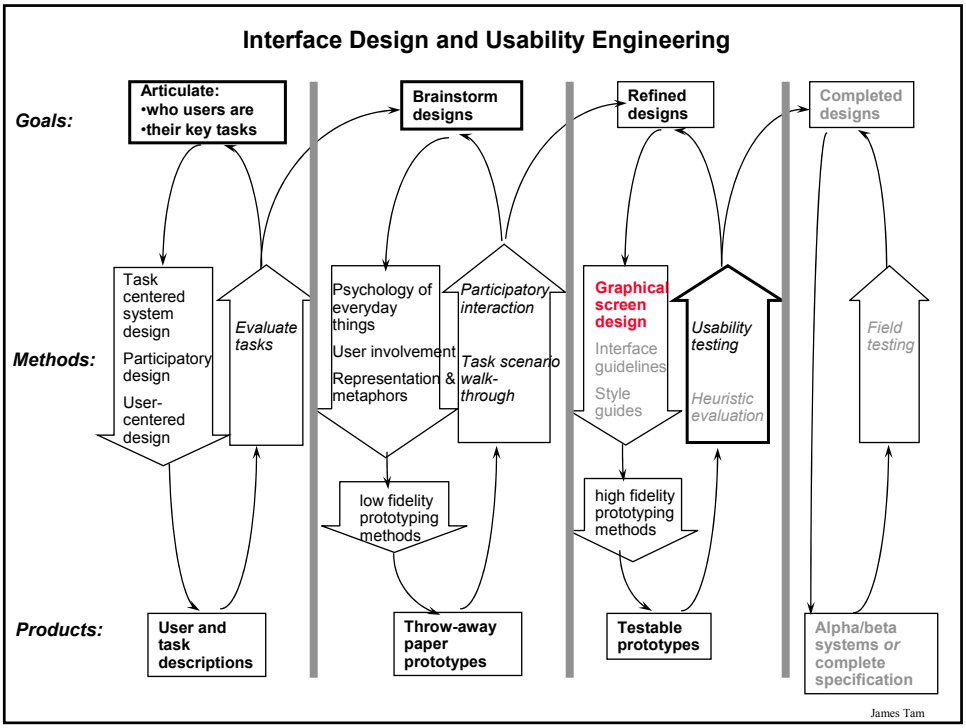
What You Now Know

Grids and C.R.A.P. are essential tools for graphical design

Important visual concepts include

- Visual consistency
  - Repetition
- Visual organization
  - Contrast, alignment and navigational cues
- Visual relationships
  - Proximity and white space
- Legibility and readability

James Tam


Interface Design and Usability Engineering
Goals:
Articulate:
•who users are
•their key tasks
Brainstorm designs
Refined designs
Completed designs
Methods:
Task centered system design
Participatory design
User-centered design
Evaluate tasks
Psychology of everyday things
User involvement
Representation & metaphors
Participatory interaction
Task scenario walk-through
Graphical screen design
Interface guidelines
Style guides
Usability testing
Heuristic evaluation
Field testing
low fidelity prototyping methods
high fidelity prototyping methods
Products:
User and task descriptions
Throw-away paper prototypes
Testable prototypes
Alpha/beta systems or complete specification
James Tam