

Top Ten Principles for Highly Effective User Interface Design

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Objectives

- Describe the top ten principles of effective user interface design.
- Describe what is meant by effective user interface design.
- Describe the situations where these principles are applicable.
- Describe why it is appropriate for informatics nurses to be involved in user interface design.

What is effective design

- Meets the functionality requirements.
- Provides a highly usable interface.
- Uses development and implementation resources effectively.

Where do these principles apply?

- Large information systems.
- Small IT projects, either new or additions to existing systems.
- Paper forms.
- Both vendor and hospital environments

Why Informatics Nurses?

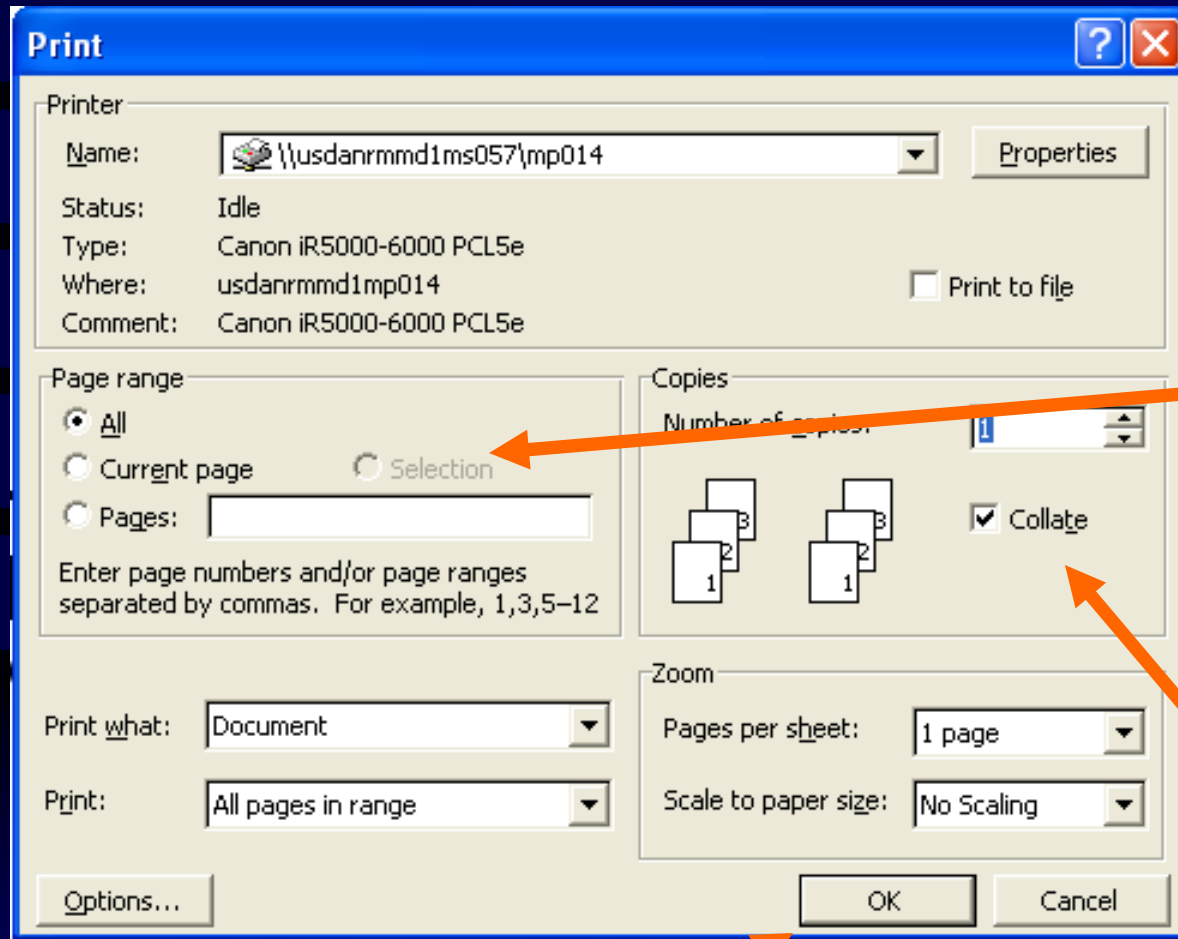
- Others recognize the benefits of informatics nurses in development.
- Reduces communication problems in the development process.
- Opportunities for creative approaches.
- Change costs less the earlier it occurs in the development process.

The Top Ten

1. Adopt and Extend A Style Guide

- Style guide: defines the look and feel.
- Common style guides: windows, web
- Why a style guide:
 - Provides user interface design guidelines.
 - Reduces user interface design time.
 - Reduces software development time.
 - Reduces customer training time.

Style Guide Example



Title bar and icons

Field types and behavior

Colors and shading

Button placement/labels

Extending and Overriding a Style Guide

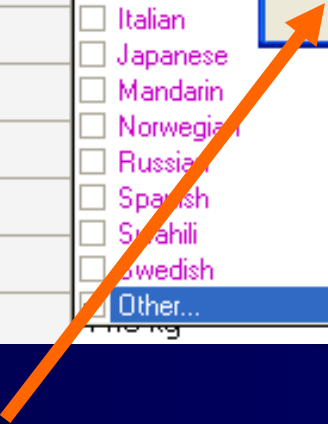
- Extending: because the Style guide doesn't cover everything.
- Overriding:
 - Will cause extra engineering effort.
 - May cause additional user training.
 - Must have a good reason.

Style Guide Extension

Primary Language	
Citizenship	<input checked="" type="checkbox"/> <Clear Entry>
Nationality	<input type="checkbox"/> Cantonese
Ethnic Group	<input type="checkbox"/> Danish
Race	<input type="checkbox"/> Dutch
	<input type="checkbox"/> English
	<input type="checkbox"/> Farsi
	<input type="checkbox"/> Finnish
	<input type="checkbox"/> French
	<input type="checkbox"/> Gaelic
	<input type="checkbox"/> German
	<input type="checkbox"/> Greek
	<input type="checkbox"/> Italian
	<input type="checkbox"/> Japanese
	<input type="checkbox"/> Mandarin
	<input type="checkbox"/> Norwegian
	<input type="checkbox"/> Russian
	<input type="checkbox"/> Spanish
	<input type="checkbox"/> Swahili
	<input type="checkbox"/> Swedish
	<input type="checkbox"/> Other...

Primary Language

OK Cancel



Entering free-text in a drop down
or check box list

Style Guide Override

Original Style Guide

Dose/Weight

← Entered

Dose/Weight

← Displayed

Override

Dose/Weight mcg/kg/min

← Entered

Dose/Weight

← Displayed

2. Look to the Future and Design for Reuse

- Large systems are often developed in phases
 - Causing focus on the here and now.
 - Costly rework later.
- Rework is more costly than initial work.
- Look for patterns: from small fields to dialogs.
- Look at long term needs.
- Add to the Style Guide.

Reuse Example

Properties for Patient Full Name

Patient Full Name

Maggie Simpson at 3/22/2007 1:43 PM

Summary Details History

Patient Full Name	
First Name	Maggie
Middle Name	
Last Name	Simpson
Suffix	

Close

Properties Dialog

- Same dialog used in all applications.
- Same dialog used for all data elements

Another Example of Reuse – Configuration Editors

Edit Body Location

Short Label: *

Long Label: *

Internal Name: *

SNOMED CT Concept: *

OK Cancel

Search

Anywhere in the string

Results

Concepts and Terms	Parent Concept
Abrasion AND/OR friction burn of thigh wi...	Abrasion AND/OR friction
Abrasion AND/OR friction burn of thigh wi...	Abrasion AND/OR friction
Abrasion of thigh, infected	Abrasion of thigh, infed
Abrasion of thigh, infected	Abrasion of thigh, infecte
Abrasion of thigh, infected (disorder)	Abrasion AND/OR friction
Abrasion of thigh, infected (disorder)	Abrasion, thigh (disorder)
Abrasion, thigh (disorder)	Injury of thigh (disorder)
Abrasion, thigh (disorder)	Abrasion of lower limb (di
Abscess of tendon-thigh	Abscess of tendon-thigh i
Abscess of thigh (disorder)	Abscess of lower limb (dis
Abscess of thigh (disorder)	Disorder of thigh (disorde
Acute lymphangitis of thigh	Acute lymphangitis of thi
Acute lymphangitis of thigh	Acute lymphangitis of thi
Acute lymphangitis of thigh	Acute lymphangitis of thi
Acute lymphangitis of thigh (disorder)	Inflammatory disorder of e
Acute lymphangitis of thigh (disorder)	Acute lymphangitis (disorc
Acute lymphangitis of thigh (disorder)	Disorder of thigh (disorde
Acute osteomyelitis of the pelvic region a...	Acute osteomyelitis of th
Acute osteomyelitis of thigh	Acute osteomyelitis of th
Acute osteomyelitis of thigh	Acute osteomyelitis of th
Adductor compartment of thigh	Entire adductor compart
Adductor compartment of thigh	Entire adductor compart
Amputation above-knee, mid-thigh	Amputation above-knee,
Amputation above-knee, mid-thigh (proc...	Amputation above-knee (
Amputation mid-thigh	Amputation above-knee,
Animal bite of thigh (disorder)	Animal bite wound of low
Animal bite of thigh (disorder)	Open wound of thigh (dis
Anterior aspect of thigh (body structure)	Surface region of thigh (t
Anterior muscle of thigh	Anterior muscle of thigh (
Anterior surface of thigh	Structure of anterior surf

More than 500 matches found. Please refine your search.

SNOMED CT Concepts

- Limb structure (body structure)
 - All extremities (body structure)
 - All legs (body structure)
 - Bone and/or joint structure of limb (body s
 - Coffin joint (body structure)
 - Entire limb (body structure)
 - Extremity part (body structure)
 - Digit structure (body structure)
 - Lower extremity part (body structure)
 - Lower leg structure (body structure)
 - Structure of ankle and foot (body s
 - Thigh structure (body structure)
 - Entire thigh (body structure)
 - Structure of left thigh (body str
 - Structure of posterior femoral c
 - Structure of right thigh (body st
 - Structure of sciatic nerve (body
 - Thigh part (body structure)
 - stifle bone (body structure)
 - Upper extremity part (body structure)
 - Lower limb structure (body structure)

Concept Details

- Name
 - Structure of left thigh (body structure)
- SNOMED ID
 - 61396006
- Terms
 - Structure of left thigh
 - Left thigh
 - Structure of left thigh (body structure)
- Super Concepts
 - Thigh structure (body structure)
 - Left lower extremity structure (body structure)

OK Cancel

Field is a reusable software component

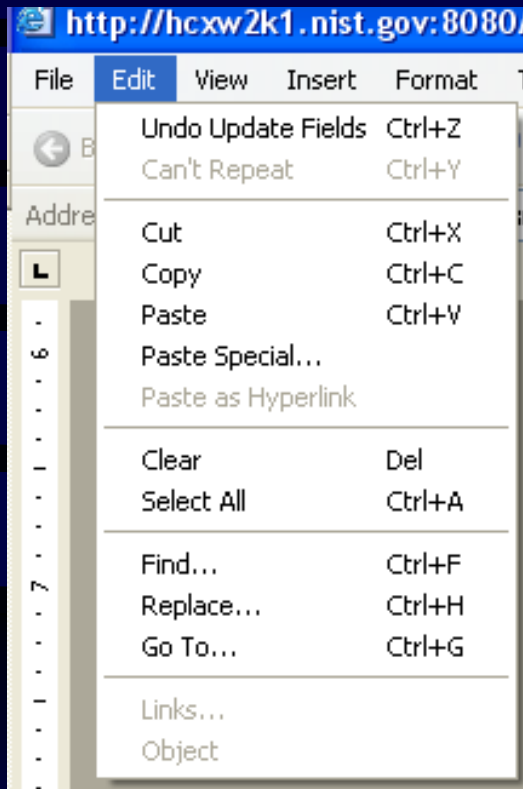
3. Explore Multiple Options

- Multiple options:
 - Dialog (modal and modeless)
 - Base screen
 - Wizard (navigate through a series of dialogs)
 - No user interface – just select the action (icon, context menu, etc).
- There is at least 3 ways to do the same thing.
- If functionality and usability is the same among options, then look at development time.

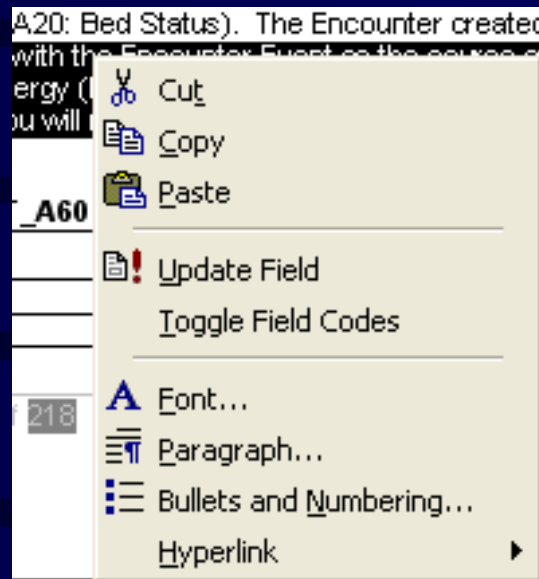
4. Allow Multiple Ways to Do the Same Action

- Somewhat determined by the style guide.
- Why:
 - Support beginners and experts.
 - Support the various ways people interact with the system.
- Examples:
 - Main menu
 - Toolbar
 - Context menu
 - Double click
 - Keyboard entry versus mouse entry

Multiple Ways – Example Copy/Paste



Edit Menu



Context
Menu



Toolbar
Icons

Ctrl-C, Ctrl-V

Keyboard

5. Clicks do Count

- Users will complain about the excessive number of clicks to perform an action.
- Where do you run into trouble?
 - High frequency actions.
 - Deviation from the standard style guide.
 - Not considering all types of users.
- How to reduce clicks.
 - Multiple selection.
 - Toolbars.
 - Context menus.
 - Double click.

6. Watch String Lengths

- Design screens up front to fit the number of characters for the most frequent situations.
- Caution with screen resolution.
- If you can't fit it, what do you do?
 - Resize the dialog/screen or allow it to be resized by user
 - Word wrap
 - Scroll bar
 - Truncate with appropriate visual indicator
 - Tool tip
 - Can access full content another way.
- The approach depends on the situation - remember patient safety!

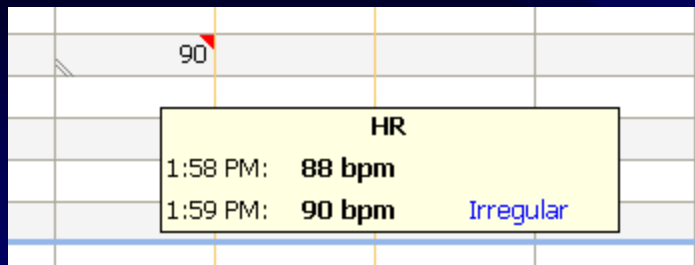
Examples of String Length

Word wrap

Regular Insulin 2 Units to 10 Units SC q 6 hr prn Sliding scale BS 150 - 200 Give 2 units BS 201 - 250 Give 4 units BS 251 - 300 Give 6 units BS 301 - 350 Give 8 units BS 350 - 400 Give 10 units BS >400 Call physician	
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Truncation with visual clue

Furosemide (Lasix) 40 mg PO q AM	Da
D5 1/2 NS 20 mEq Potassium Chloride...	Da

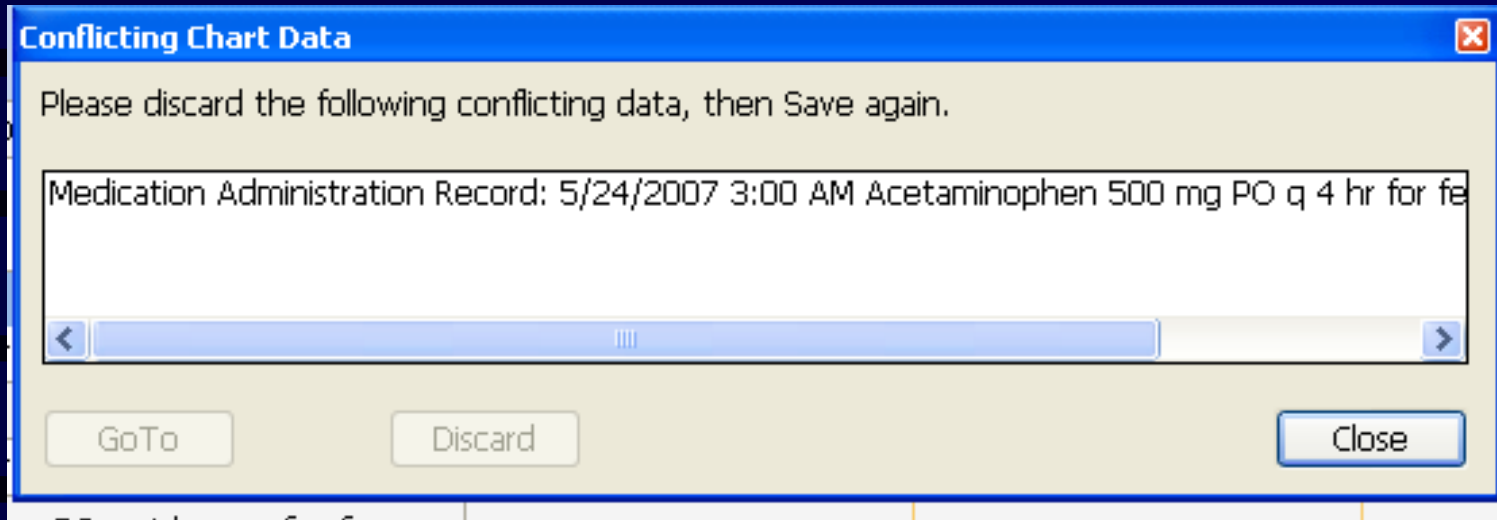


Tool tip

7. Focus on High Frequency Scenarios and Don't Sweat the Small Stuff

- High Frequency
 - Tasks performed frequently by users: charting meds, charting vital signs.
 - Make it fast – watch the clicks.
 - Fast access - toolbars, context menu, double clicks.
- Low frequency
 - Error conditions
 - Rare actions.
 - Can be limited it to the main menu actions.
 - Keep off context menus – in general.

Low Frequency Action



Error dialog displayed when two users chart on the same piece of data.

The one that stores first wins. The other gets a conflict message.

8. Caution with Colors and Visual Clues

- Don't look like a rainbow.
- UI Clues
 - Background color.
 - Foreground color (font color).
 - Font variations (italic, underline, cross-out, etc).
 - Icons.
 - Flashing or other changes in color.
 - Sound.
- Look for consistency, especially for states.

Where do you use visual clues?

- To distinguish items from each other such as separation of areas, rows, etc.
- States: such as active versus inactive.
- Warnings and alarms.
- Reminders to take an action: such as cosign a verbal order.
- Phases of care: pre-delivery versus postpartum.

Examples of Visual Clues

HR		
Cardiac Rhythm		
⊕ Cardiac Ectopy		

- Discontinued items crossed out.

- Unsaved data in magenta

- Red triangle indicates comments.

- Double slashes indicated multiple values.

- Light gray indicates no longer active.

- Alternate shading of flowsheet rows

⊕ Temp (C)		
HR	//	90
Cardiac Rhythm		
⊕ Cardiac Ectopy		

9. Focus Feedback on High Risk Areas

- Reviews and feedback are critical to UI design, but they can be time consuming.
- Focus on high risk areas:
 - New functionality
 - Never been done before
 - Fussy users
 - No paper equivalent
 - Where failure would be very costly

Some Feedback Examples

- Screen Mockups
- Interactive Screens
- Throw away prototype
- Usability Laboratory



10. Performance Requirements

- Define performance requirements
 - To navigate screens
 - To store
 - Data from other systems
- Define the number of elements on the screen as part of the criteria.
 - Define both average and high load.
 - Define variability between care units and patient types.

The Top Ten

1. Adopt and extend a style guide.
2. Look to the future and design for reuse.
3. Explore multiple options.
4. Allow multiple ways to perform the same action.
5. Clicks do count.
6. Watch string lengths and handle appropriately.
7. Focus on high frequency scenarios and don't sweat the small stuff.
8. Caution with color and visual clues.
9. Focus user feedback on high risk areas, using appropriate evaluation methods.
10. Include performance requirements as well.

Questions?

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