Interaction Design
Desktop

Matthias Rauterberg
Department Industrial Design
Technical University Eindhoven
g.w.m.rauterberg@tue.nl

12-DEC-2005

Key references/literature 1:

  chapter 9: dialog styles - direct manipulation.

ISO/FDIS 9241 (1997) Ergonomic requirements for office work with visual display terminals (VDTs).
  Part 16: direct-manipulation dialogues.

Key references/literature 2:

  chapter 5: data entry screens.
  chapter 6: inquiry screens.

  chapter 5: dialog styles - fill-in forms.

ISO/FDIS 9241 (1997) Ergonomic requirements for office work with visual display terminals (VDTs).
  Part 12: presentation of information.

Dimensions of interaction styles

- Initiation
  - Degree to which initiation of the dialogue rests with the computer or the human user.
- Dialogue flexibility
  - number of ways in which a user can perform given functions.
- Degree of automation
  - Amount of work accomplished by the system in response to a single user command.
- Complexity of action space
  - Number of different options available to the user at any given point in the dialogue.
- Complexity of perception space
  - Degree to which the interactions absorbs the memory and reasoning power of the user.
- Interaction style and user type

[taken from Smith&Mosier, 1986]
SketchPad, Ivan Sutherland, MIT, 1963

NLS, Douglas Engelbart, Stanford Research Institute, 1968

First Mouse
D. Engelbart & W. English, 1964
**Star**, Xerox, 1981

![Star, Xerox, 1981](image)

**Lisa Desktop**, Apple, 1982

![Lisa Desktop, Apple, 1982](image)
How to design Desktop Interfaces (DI)?

- Menu structure (i.e. pull-down menus)
- discrete and partially continuous actions
- WIMP = Windows, Icons, Mouse, Pointing
- ‘desktop’ is NOT ‘direct manipulation’
- the ‘desktop’ metaphor does NOT fit to all application domains

Menus

Menus play two critical roles in graphical user interfaces. In Desktop Interfaces the menu bar is the major form of navigation through the interface and the pull-down menus convey the mental model to the user in a snapshot.
Dialog Box

Graphical user interfaces communicate with users through controls. The usability of your initial design depends a great deal on how you use controls. Push buttons are the primary way that users navigate from dialog box to dialog box. Use push buttons to convey to users the major actions for a particular box. Users should be able to glance at a dialog box and know what to do there, and what to do next, based on the names and placement of the push buttons.

Push Buttons (1)

<table>
<thead>
<tr>
<th>Use this label</th>
<th>To do this:</th>
<th>Use this mnemonic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OK</strong></td>
<td>Makes changes and closes the window</td>
<td>O</td>
</tr>
<tr>
<td><strong>Cancel</strong></td>
<td>Does not make changes and closes the window</td>
<td>C</td>
</tr>
<tr>
<td><strong>Close</strong></td>
<td>Closes the window when changes can't be canceled</td>
<td>L</td>
</tr>
<tr>
<td><strong>Reset</strong></td>
<td>Resets to defaults, leaves window open</td>
<td>R</td>
</tr>
<tr>
<td><strong>Apply</strong></td>
<td>Makes changes, resets to defaults, leaves window open</td>
<td>P</td>
</tr>
<tr>
<td><strong>Help</strong></td>
<td>Opens online help document to particular location</td>
<td>H</td>
</tr>
</tbody>
</table>
Windows Shortcuts

- **Copy:** Ctrl+C  
  **Cut:** Ctrl+X  
  **Paste:** Ctrl+V

- **Undo:** Ctrl+Z  
  **Save:** Ctrl+S

- **Switch to another open program:** Alt+Tab

- **Open or close Start menu:** Ctrl+Esc or Windows key

- **Move up a directory level in Windows Explorer:** Backspace

- **In Explorer or dialog box, rename selected folder or file on the desktop:** F2

- **In Explorer, search:** F3 or Ctrl+F

- **In Explorer, refresh:** F5

- **Open My Computer:** Windows+E

- **Search for a file in a new window:** Windows+F

- **Show desktop (push again to restore windows):** Windows+D
Desktop: example (1)

Desktop: example (2)
Desktop Interface (1): advantages

- Easy to learn and remember
- Direct, intuitive, "wysiwyg": allows user to focus on task semantics rather than on system semantics and syntax
- Flexible, easily reversible actions
- Provides context and instant, visual feedback
- Exploits human use of visual/spatial cues and motor behaviour
- Low typing requirements and visual feedback means less opportunity for user input error (and less error messages)

Desktop Interface (2): disadvantages

- Can be inefficient for high frequency experts, especially touch typist, and when there are more actions and objects than can be fit on one screen
- may be difficult to design recognizable icons for many objects and actions (‘what is it’ versus ‘where is it’)
- icons take more screen ‘real estate’ than words
Desktop Interface (3)

Most appropriate for:

- Knowledge and experience
  - low typing skills
  - low system experience
  - low task experience
  - low application experience
  - high frequency of use of other systems
  - low computer literacy

- job and task characteristics
  - low frequency of use
  - little or no training
  - discretionary use
  - high turn over rate
  - low task importance
  - low task structure

Desktop Interface (4)

Guideline:
accompany icons with names
Desktop Interface (5)

Guideline: choose appropriate windowing strategy

Desktop Interface (6)

• **Windowing uses:**
  - quick context switching with place-saving
  - work in one, monitor another
  - cut and paste
  - compare
  - show more detail, preserve context
  - give command, see results
  - get HELP, preserve context
  - display same object in different forms

• **Windowing types:**
  - system-controlled
  - user-controlled, tiled
  - user-controlled, overlapping
Desktop Interface (7)

Windowing: experimental study


Desktop Interface (8)

Windowing: experimental study

[K. Gaylin (1986) How are window used? Some notes on creating an empirically based windowing benchmark task. Proceedings CHI'86, ACM, pp. 96-100]
Windowing: experimental study


Desktop Interface (9)

Windowing design guidelines:

- design easy to use and learn window operations (complexity of windowing interfaces should NOT cancel out advantages).
- minimise the number of window operations necessary to achieve a desired effect.
- make navigation between windows particularly easy and efficient to do.
- make setting up windows particularly easy to remember.
- provide salient visual cues to identify ‘active’ window.
- provide a consistent ‘user model’ of windows (window is an object OR workspace OR dialog box).
- allow overlapping when displays are unpredictable, screens are small, and users are fairly frequent and experienced.
- in overlapping windowing, provide powerful commands for arranging windows on the screen in user-tailorable configurations.

Desktop Interface (10)
Layout of the Form (1)

• Not too much on a Form
  – Split, logically, over several Forms
  – hide/reveal controls

• Information in centre of visual field is most likely to be seen.
  – Put important info in obvious positions

Layout of the Form (2)

• Arrange controls in a logical sequence
  – especially for data entry
  – work from left - right, top-bottom
  – consistency of layout over Forms
    • e.g. “exit” button in same position on all Forms
• Arrange order using “Tab-key”
• Set Focus after major operation
  – e.g. after pressing a Command button when loading/returning to a Form
  – clear text boxes on data entry forms?
Generic Rule: Balance

- Equal weight of screen elements
- Left to right, top to bottom
  (! ONLY true for Western cultures)

see the following presentation for more background information on this rule:
“Perception, Cognition, Action”

Balance

Unstable
Generic Rule: Balance

- Left column processed
  - Right column noted as same

- Both columns need to be understood by visual processing system

Generic Rule: Symmetry

- Replicate elements left and right of the center line
Symmetric

Asymmetric

Generic Rule: Symmetry

- Left column processed - Right column noted as same
- Both right & left columns processed plus relationship of right to left
Generic Rule: Regularity

- Create standard and consistent spacing on horizontal and vertical alignment points
Generic Rule: Regularity

- Left column processed
  - 2 right columns noted as same

- Location & size of each object processed

Generic Rule: Predictability

- Put things in predictable locations on the screen
Generic Rule: Predictability

- User expects title & menu bar on top of screen

- Visual scene needs to be completely processed - objects not in expected places
Generic Rule: Sequentiality

- Guide the eye through the task in an obvious way
- The Eye is attracted to:
  - bright elements over less bright
  - Isolated elements over grouped
  - graphics before text
  - color before monochrome
  - saturated vs. less saturated colors
  - dark areas before light
  - big vs. small elements
  - unusual shapes over usual ones

Sequential

Membership Form
Name:  
Address:  
City:  
State:  
Zip:  

Dues:  
Pubs:  
Total:  
OK  Cancel

Random

Membership Form  Cancel  Name:  OK
Address:  
Dues:  
State:  
Zip:  
City:  
Total:  

Generic Rule: Unity

• Make items appear as a unified whole (for visual coherence)
  • Use similar shapes, sizes, or colors
  • Leave less space between screen elements than at the margin of the screen
Generic Rule: Pleasing Proportions

- Create groupings of data or text by using aesthetically pleasing proportions

<table>
<thead>
<tr>
<th>Square - 1:1</th>
<th>Golden Triangle - 1:1.618</th>
<th>Square Root of 2 - 1:1.414</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Double Square - 1:2</th>
<th>Square Root of 3 - 1:1.732</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Generic Rule: Simplicity

- Minimize the number of aligned points
  - Use only a few columns to display screen elements
- Combine elements to minimize the number of screen objects
  - Within limits of clarity
Generic Rule: Simplicity

- Only four alignments need to be processed
- A total of nine alignments need to be processed

Simple

Size:

☐ Preserve Proportions
☐ % of original height
☐ % of original width

Complex

Size:

Uniformity:

☐ Preserve Proportions
Height: ☐ % of original
Width: ☐ % of original
Generic Rule: Groupings

- Use visual arrangements to provide functional groupings of screen elements
  - Align elements in a group
  - Evenly space elements in a group
  - Provide separation between groups
- Use additional group elements sparingly
  - color & borders add complexity

Generic Rule: Simple Grouping

- Similar elements aligned vertically
- Vertical distance between similar objects small

Membership Form

Name: ____________________________ Dues: ____________________________
Address: ____________________________ Pubs: ____________________________
City: ____________________________ Total: ____________________________
State: ____________________________
Zip: ____________________________

OK  Cancel
Generic Rule: Boxed Grouping

- Boxes add additional complexity to form
- Spatial arrangement adequate

Generic Rule: Background Grouping

- Color adds additional visual complexity
- Spatial arrangement adequate
Design Guidelines

• Be consistent
• Allow shortcuts
• Offer feedback
• Organize in logical groups (screens)
• Provide simple error handling
• Provide reversible actions

Historical Trends for Icon Design

• Four different levels of abstraction can be found over the last 80 years.
• Actual icons get more abstract compared to the past.
The Meaning of Icons

- The numbers in the table mean the percentage of all collected answers; each intended answer is underlined.


Redesign of Icons (1)

- Design Principle:
  - avoid excessive detail in icon design.

Redesign of Icons (2)

**Design Principles:**
- design the icons to communicate object relations and attributes whenever possible;
- accompany icons with names.

Recognition rates in percent (first rows, bold-faced: above 67%) and certainty ratings (second rows) for the 23 Referents by subjects from Philippines and Sweden (N=100).

<table>
<thead>
<tr>
<th>Referent</th>
<th>Abstract Form</th>
<th>Categories Form</th>
<th>Proposed Form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phil.</td>
<td>SWED.</td>
<td>Phil.</td>
</tr>
<tr>
<td>1. Acute Headache</td>
<td>74.5</td>
<td>72.2</td>
<td>74.5</td>
</tr>
<tr>
<td>2. Acute Respiratory</td>
<td>72.2</td>
<td>72.2</td>
<td>72.2</td>
</tr>
<tr>
<td>3. Cell Sign</td>
<td>70.0</td>
<td>69.0</td>
<td>70.0</td>
</tr>
<tr>
<td>4. Conference</td>
<td>70.0</td>
<td>69.0</td>
<td>70.0</td>
</tr>
<tr>
<td>5. Dial</td>
<td>70.0</td>
<td>69.0</td>
<td>70.0</td>
</tr>
<tr>
<td>6. Drop</td>
<td>54.5</td>
<td>53.5</td>
<td>54.5</td>
</tr>
<tr>
<td>7. Help Septic</td>
<td>72.2</td>
<td>72.2</td>
<td>72.2</td>
</tr>
<tr>
<td>8. Help System</td>
<td>54.5</td>
<td>53.5</td>
<td>54.5</td>
</tr>
<tr>
<td>9. Help</td>
<td>54.5</td>
<td>53.5</td>
<td>54.5</td>
</tr>
<tr>
<td>10. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>11. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>12. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>13. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>14. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>15. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>16. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>17. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>18. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>19. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>20. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>21. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>22. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>23. Help</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Note: Phil. = Philippines, Swed. = Sweden.


Graphical symbols used in the main studies as based on Böcker (1993) for the European Telecommunications Standards Institute (ETSI, 1993).

Best videophone symbols when combining hit rates, false alarms (confusions) and missing values (no answers), per country. Numbers indicate Symbol Set.
Information types

<table>
<thead>
<tr>
<th>Physical (static)</th>
<th>Static descriptive relationships</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>spatial</td>
<td>evidence is uncertain</td>
</tr>
<tr>
<td>Dynamic</td>
<td>discrete action</td>
<td>evidence is uncertain</td>
</tr>
<tr>
<td></td>
<td>continuous action</td>
<td>evidence is uncertain</td>
</tr>
<tr>
<td></td>
<td>events</td>
<td>evidence is uncertain</td>
</tr>
<tr>
<td></td>
<td>procedural</td>
<td>evidence is uncertain</td>
</tr>
<tr>
<td></td>
<td>causal</td>
<td>evidence is uncertain</td>
</tr>
<tr>
<td>Conceptual (static)</td>
<td>static descriptive relationships</td>
<td>descriptive features of a computer</td>
</tr>
<tr>
<td></td>
<td>values</td>
<td>classes of religious belief</td>
</tr>
<tr>
<td>Dynamic</td>
<td>discrete action</td>
<td>choosing to agree/disagree</td>
</tr>
<tr>
<td></td>
<td>continuous action</td>
<td>monitoring success</td>
</tr>
<tr>
<td></td>
<td>procedural</td>
<td>diagnosing a fault</td>
</tr>
<tr>
<td></td>
<td>causal</td>
<td>explanation of gravity</td>
</tr>
</tbody>
</table>
Media selection and combination

<table>
<thead>
<tr>
<th>Information type</th>
<th>Preferred media selection</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Realistic still or moving image</td>
<td>Photo of a person</td>
</tr>
<tr>
<td>Conceptual</td>
<td>Text or speech, designed image</td>
<td>Explain sales policy</td>
</tr>
<tr>
<td>Descriptive</td>
<td>Text, speech, realistic image</td>
<td>Chemical properties</td>
</tr>
<tr>
<td>Spatial</td>
<td>Realistic/designed image</td>
<td>Diagram of a building</td>
</tr>
<tr>
<td>Value</td>
<td>Text/tables/numeric list(s)</td>
<td>Pressure reading</td>
</tr>
<tr>
<td>Relationship</td>
<td>Designed images, graphs, charts</td>
<td>Histogram of rainfall/month</td>
</tr>
<tr>
<td>Procedural</td>
<td>Image series, text</td>
<td>Evacuation instructions</td>
</tr>
<tr>
<td>Discrete action</td>
<td>Still image</td>
<td>Make coffee</td>
</tr>
<tr>
<td>Continuous action</td>
<td>Moving image</td>
<td>Monoeuvres while skiing</td>
</tr>
<tr>
<td>Events</td>
<td>Sound, speech</td>
<td>Fire alarm</td>
</tr>
<tr>
<td>States</td>
<td>Still images, text</td>
<td>Photo of weather conditions</td>
</tr>
<tr>
<td>Causal</td>
<td>Still &amp; moving image, text, speech</td>
<td>Video of rainstorm causing flash flood</td>
</tr>
</tbody>
</table>

Examples for media design

<table>
<thead>
<tr>
<th></th>
<th>representational</th>
<th>abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>visual</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>concrete</td>
<td>picture, e.g.</td>
<td>speed -&gt; speedometer, e.g.</td>
</tr>
<tr>
<td>signified</td>
<td>symbol, e.g.</td>
<td>danger -&gt; alarm flasher, e.g.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>blue light of a police car</td>
</tr>
<tr>
<td><strong>auditory</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>verbal</td>
<td>speech, e.g.</td>
<td>speech, e.g.</td>
</tr>
<tr>
<td></td>
<td>&quot;Stop the machine!&quot;</td>
<td>&quot;Attention, please!&quot;</td>
</tr>
<tr>
<td>spatial</td>
<td>onomatopoeia and mimic, e.g. event generated sound pattern</td>
<td>tone, e.g.</td>
</tr>
<tr>
<td></td>
<td>beep-beep-beep…</td>
<td></td>
</tr>
</tbody>
</table>

Feedback of system status information

Desktop Interface: design guidelines

- provide alternative interface for high frequency, expert user
- choose a consistent icon design scheme:
  - depict ‘before and after’
  - depict tool
  - depict action
- accompany icons with name/labels
- provide visual feedback for position, selection and movement, and physical feedback for modes!
### Summary

#### (1)

**USER PROFILE**

<table>
<thead>
<tr>
<th>Menu</th>
<th>Fill-in Forms</th>
<th>Question &amp; Answer</th>
<th>Command Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Negative Neutral</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Low</td>
<td>Low Moderate</td>
<td>Low High</td>
<td></td>
</tr>
<tr>
<td>Low Moderate</td>
<td>Moderate High</td>
<td>Moderate High</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Low Moderate</td>
<td>Low Moderate High</td>
<td></td>
</tr>
<tr>
<td>Low Moderate</td>
<td>Moderate Low</td>
<td>Low High</td>
<td></td>
</tr>
<tr>
<td>Low High</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Low</td>
<td>Low Moderate</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Low Moderate</td>
<td>Moderate</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Inrequent</td>
</tr>
<tr>
<td>Low Moderate</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

#### (2)

**USER PROFILE**

<table>
<thead>
<tr>
<th>Function Keys</th>
<th>Desktop</th>
<th>Natural Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>Low Low Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Low High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Low Low</td>
<td></td>
</tr>
<tr>
<td>Moderate High</td>
<td>Low High</td>
<td></td>
</tr>
<tr>
<td>Moderate Low</td>
<td>Low Low</td>
<td></td>
</tr>
<tr>
<td>Low High</td>
<td>High High</td>
<td></td>
</tr>
<tr>
<td>Moderate Low</td>
<td>Low Low</td>
<td></td>
</tr>
<tr>
<td>Moderate High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
Summary (3)

<table>
<thead>
<tr>
<th>USER PROFILE</th>
<th>DIALOG STYLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FUNCTION KEYS</td>
</tr>
<tr>
<td>Job &amp; Task</td>
<td>Low</td>
</tr>
<tr>
<td>Orientation</td>
<td>Little or no</td>
</tr>
<tr>
<td>FREQUENCY OF USE</td>
<td>Discretionary</td>
</tr>
<tr>
<td>PRIMARY TRAINING</td>
<td>Moderate</td>
</tr>
<tr>
<td>SYSTEM USE</td>
<td>Low</td>
</tr>
<tr>
<td>TURNOVER RATE</td>
<td>Moderate</td>
</tr>
<tr>
<td>OTHER SYSTEMS</td>
<td>Low</td>
</tr>
</tbody>
</table>

Summary (4)

<table>
<thead>
<tr>
<th>USER PROFILE</th>
<th>DIALOG STYLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MENU</td>
</tr>
<tr>
<td>Job &amp; Task</td>
<td>Low</td>
</tr>
<tr>
<td>Orientation</td>
<td>Little or no</td>
</tr>
<tr>
<td>FREQUENCY OF USE</td>
<td>Discretionary</td>
</tr>
<tr>
<td>PRIMARY TRAINING</td>
<td>High</td>
</tr>
<tr>
<td>SYSTEM USE</td>
<td>High</td>
</tr>
<tr>
<td>TURNOVER RATE</td>
<td>Paper Forms</td>
</tr>
<tr>
<td>OTHER SYSTEMS</td>
<td>Low</td>
</tr>
<tr>
<td>TASK IMPORTANCE</td>
<td>High</td>
</tr>
<tr>
<td>TASK STRUCTURE</td>
<td>High</td>
</tr>
</tbody>
</table>
Direct-manipulation Interface

Direct-manipulation Interaction
About HCI in general:


About design principles:


About usability evaluation methods:


About Design:

References for Guidelines

Articles and Books


Organizations

• ACM Special Interest Group on Computer-Human Interaction (SIGCHI): The largest organization of UI practitioners.
• German HCI Group: A specialist group of the German Computer Society.
• Human Factors and Ergonomics Society.
• Usability Professionals Association: See their consultant directory for contract resources.

Other Online Resources

• Microsoft User Experience and UI Design Resources [http://msdn.microsoft.com/ui/]
• Useit.com [http://www.useit.com/]

ISO TC 159 SC4 Ergonomics of Human System Interaction

WG1 is responsible for ISO 7249 and ISO 9555 which deal with fundamentals of displays and controls rather than HCI.

WGs 2 to 5 are responsible for ISO 9241 (see later slide).

WG 6 is concerned with how ISO 9241 can be used and with ISO 13407 Human-Centred Design of Interactive Systems.

WG8 is concerned with ISO 11064, (see Table h621-2) on the ergonomics design of control centres, which include process plant control centres, security control centres and other, frequently safety critical control centre applications.

Part 1 Principles for the design of control centres
Part 2 Principles of control suite arrangement
Part 3 Control room layout
Part 4 Workstation layout and dimensions
Part 5 Displays and controls
Part 6 Environmental requirements for control rooms
Part 7 Principles for the evaluation of control centres
Part 8 Ergonomics requirements for specific applications
ISO/IEC JTC1 SC18 WG9 User System Interfaces and Symbols

Joint Technical Committee (ITC1) deals with standards in the field of information technology.

Sub-committee 18 (SC18) is responsible for standards for Document Processing and Related Communication.

Working Group 9 is developing standards in keyboard layout, symbols and user interfaces which have relevance beyond the strict domain of document processing.

It has sub-groups working on Keyboard Layout, User Interfaces and Symbols.

ISO/IEC 9995 is a multi-part standard dealing with keyboard layout which replaces a number of existing standards (see Table h621-3).

It includes a keyboard layout for multiple Latin alphabet languages and a layout for letters used on a numeric keyboard. It should be noted that WG9 deals with the layout of keyboards, not with the key operation or other ergonomic features which are the responsibility of WG3 of TC 159 SC4.

ISO methods 9241 (ISO 9000 series standards address quality)

Ergonomic requirements of VDT - both hardware and software in 17 parts:

- Introduction
- Guidance on task requirements
- Visual Display requirements
- Keyboard requirements
- Workstation layout and postural requirements
- Environmental requirements
- Display requirements with reflections
- Requirements for displayed colours
- Edit requirements for non-keyboard input devices
- Dialogue Principles
- Usability Specification
- Presentation of Information
- User Guidance and Help
- Menu Dialogues
- Command Dialogues
- Direct Manipulation Dialogues
- Form-filling Dialogues

Task Design - ISO 9241-2

The application of ergonomic principles ... is essentially the integration of task design with the design of software - where well designed tasks

- provide for the application of an appropriate variety of skills;
- ensure that the tasks performed are identifiable as whole units of work rather than fragments
- provide sufficient feedback on task performance in terms meaningful to the user
## ISO 14915 Multimedia User Interface Design - Ergonomic Requirements for human-centered multimedia interfaces

### Status

<table>
<thead>
<tr>
<th>Part</th>
<th>Title</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 1</td>
<td>Design Principles and Framework</td>
<td>DIS</td>
</tr>
<tr>
<td>Part 2</td>
<td>Multimedia Control and Navigation</td>
<td>CD</td>
</tr>
<tr>
<td>Part 3</td>
<td>Media Selection and Media</td>
<td>DIS</td>
</tr>
<tr>
<td>Part 4</td>
<td>Domain Specific Interfaces</td>
<td>WI</td>
</tr>
</tbody>
</table>

(c) M. Rauchteberg, T.U.e