

Chapter 12 Overview

- Devices and Output
- Visual Output
- Dynamic Visualizations
- Sound Output
- Developments in Output

Devices and Output

- Output-information in some perceptible form coming from an electronic, internal representation
- Output devices
- Output in the past - on screen or hard copy
- Output trends emerging - GUIs, laptop/pocket computer output devices, multimedia, 3D

Visual Output (most common)

- Physical aspects - brightness, color combinations, selection of colors
- How information is displayed - size of text, item order on a menu, how icons are designed
- How information is used

Visual Feedback

- Users need to know what is going on on the computer's side
- Includes normal processes and warnings
- Examples : tell user where they are in a file, show progress of a process, prompt user for input

Computer-based visualizations

- Model Based - subject is some underlying computer-based model, program or simulation directly under the user's control
- Visualization of external data - come from a process beyond direct computer control

Three Advantages of Computer-Based Visualization

- Conceptually easy to adapt for new data
- Possible to control aid exploration
- Conceptually easy to change mappings for user's needs (colors, filters, etc.)

Sound Output

- Natural Sounds
- Musical Sounds
- Speech

Natural Sounds

- E-mail system sounds
- ARKola bottling factory
- Main drawbacks - distinguishing between sounds, too much sound, finding appropriate sounds

Music Sounds

- Still at early stage
- Value depends on the individual users
- Have been used to successfully for some time in many cultures

Speech Output

- Concatenations of digital recordings
- Synthesis-by-rule - does not record speech directly, allows for pitch and tone changes, can still sound synthetic
- Phonemes - basic building blocks of the spoken word

Developments in Output

- Multimedia
- Beethoven's Ninth Symphony CD-ROM
- Stravinsky's *Rite of Spring*