Three-Dimensional Widgets Revisited – Towards Future Standardization

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Outline

- Problems and Motivation
- Related Work
- Classification of 3D-Widgets
- Consistent Widget Specification
- Conclusion and Future Work
Problems and Motivation

- **3D User Interfaces**
  - Basically in VR applications for experts using specialized HW
  - Future alternative of present WIMP interfaces with great potential

- **Desktop-VR**
  - Broader variety of application domains including OS interfaces
  - 3D-Widgets [2]: especially important for Desktop-VR
  - Desktop 3D applications for the mass market? Standardization!
Problems and Motivation

■ Problems
  - Lack of 3D design standards and guidelines
  - Lack of ready-to-use general purpose 3D widgets
  - Unifying classification & consistent description of 3D widgets missing

■ Vision
  - Repertoire of well-defined, standardized 3D widgets (and 3D interaction techniques)
  - Towards standards for desktop VE and 3D-UIs
Related Work

- 3D Widgets [2]
  - More than 200 solutions already developed
  - 3D widget libraries and toolkits, e.g. it3d [9]
  - First 3D widgets overview by Leiner et al. [6]
  - Few other partial classification approaches (e.g. [11])

- VR interaction techniques
  - Various 3D interaction techniques available (e.g. [1])
Classification Approach

- Only for existing 3D widget solutions which
  - have a geometric representation,
  - are general enough to be used in various 3D projects.
  - Focus on widgets for system/application control incl. 3D menus

- Various criteria considered [3]
  - application area
  - interaction task
  - input device / degree of freedom
  - appearance
  - interaction purpose / intention of use
    - facilitates the practical use of widgets in real 3D projects
## Classification of 3D-Widgets

### Direct 3D Object Interaction
- Object Selection
- Geometric Manipulation

### 3D-Scene Manipulation
- Orientation and Navigation
- Scene Presentation Control

### Exploration and Visualization
- Geometric Exploration
- Hierarchy Visualization
- 3D Graph Visualization
- 2D-Data and Document Visualization
- Scientific Visualization

### System / Application Control
- State Control / Discrete Valuators
- Continuous Valuators
- Special Value Input
- Menu Selection
- Containers

### Menu Selection
- Temporary Option Menus
  - Rotary Tool Chooser
  - Menu Ball
  - Command & Control Cube
  - Popup Menu
  - Tool Finger
  - TULIP
- Single Menus
  - Ring menu
  - Floating Menu
  - Drop-Down-Menu
  - Revolving Stage
  - Chooser Widget
  - 3D-Palette, Primitive Box etc.

### Menu Hierarchies
- Hands-off Menu
- Hierarchical Pop-Up Menus
- Tool Rack
- 3D Pie Menu
  - Hierarchy Visualizations
Specification of 3D-Widgets

- Classification of more than 70 Widgets in 38 classes by now
  - Classification online: www.3d-components.org
- Similar solutions presented as a singular widget type
- Sample Ring Menu [7]: Consistent specification needed
- Goal: specification data sheets for widgets
Specification of 3D-Widgets

- XML-Schema based specification language \([3],[4]\)
  - within the research project CONTIGRA
  - defines interfaces of 3D widgets/components
    - Common metadata for each widget type:
      name, description, author, publication, picture
    - Set of high-level parameters describing
      the functionality and configuration options
Conclusion and Future Work

- Contribution towards the standardization of 3D user interfaces
  - Classification and specification of 3D-Widgets

- Future Work
  - Refinement and extension of the widget repertoire
  - Discussion of parameters/functionality among experts
  - Integration of 3D interaction techniques
Discussion

Widget Classification:  www.3dcomponents.org
Project Website:       www.contigra.com
And that’s Raimund:
References

- [8] Online Widget Classification: [www.3d-components.org](http://www.3d-components.org)