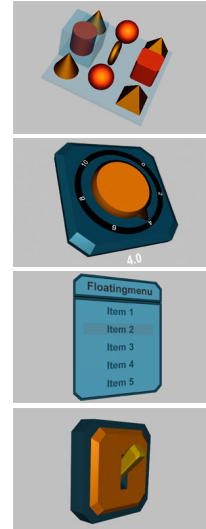# Three-Dimensional Widgets Revisited – Towards Future Standardization

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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])

  - XML-Specification & Classification: InTML [5]
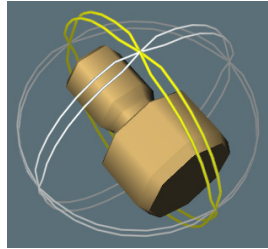
Classification Approach

- 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*
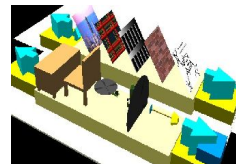- *Revolving Stage*
- *Chooser Widget*
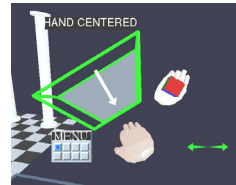- *3D-Palette, Primitive Box etc.*
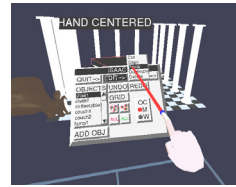
Menu Hierarchies
- *Hands-off Menu*
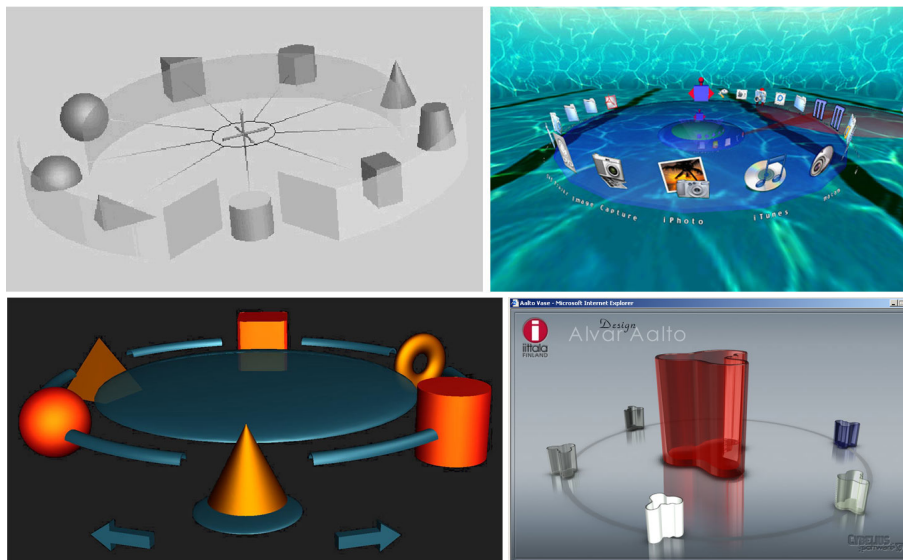- *Hierarchical Pop-Up Menus*
- *Tool Rack*
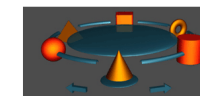- *3D Pie Menu*
- → Hierarchy Visualizations
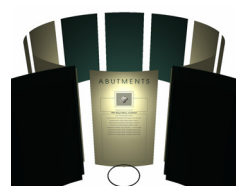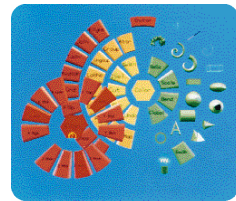
Specification of 3D-Widgets

- 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:

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