CONTIGRA

A High-Level XML-Based Approach to Interactive 3D Components

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EXPLORE INTERACTION AND DIGITAL IMAGES

Outline

- Motivation
  - (Web)3D User Interfaces:
    Current Situation & Future Vision
- The CONTIGRA Architecture
  - 3D Application Example
  - Component Development Levels & Tasks
  - CONTIGRA Markup Languages
- Conclusion & Future Work

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Motivation

- Current Situation
  - Improvements in 3D graphics hardware & fast-evolving Internet technologies
  - Increase of Web-based 3D applications
  - Problems:
    - Variety of proprietary Web3d-formats | X3D
    - Lack of design standards, authoring tools, no interdisciplinary development
    - Too much programming, time-consuming, few concepts of reuse

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Motivation

- Future Vision
  - Standards for three-dimensional user interfaces
  - Repertory of adaptable 3D Widgets, Metaphors
  - Reuse of 3D building blocks (components)
    - Less or no coding, high-level approach
    - Graphical tools, interdisciplinary development
- Existing Approaches
  - Bamboo, i4D, 3D Beans, …
  - 3D format dependency & code-centered

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CONTIGRA Architecture

Component OrieNted Three-dimensional Interactive GRaphical Applications

- Characteristics
  - Document-centered 3D component architecture
  - Documents describing component interfaces, implementation, configuration, and assembly
  - Declarative approach based on XML languages
  - High-level view, hides scene graph details
  - Abstraction to existing 3D toolkits, formats, APIs

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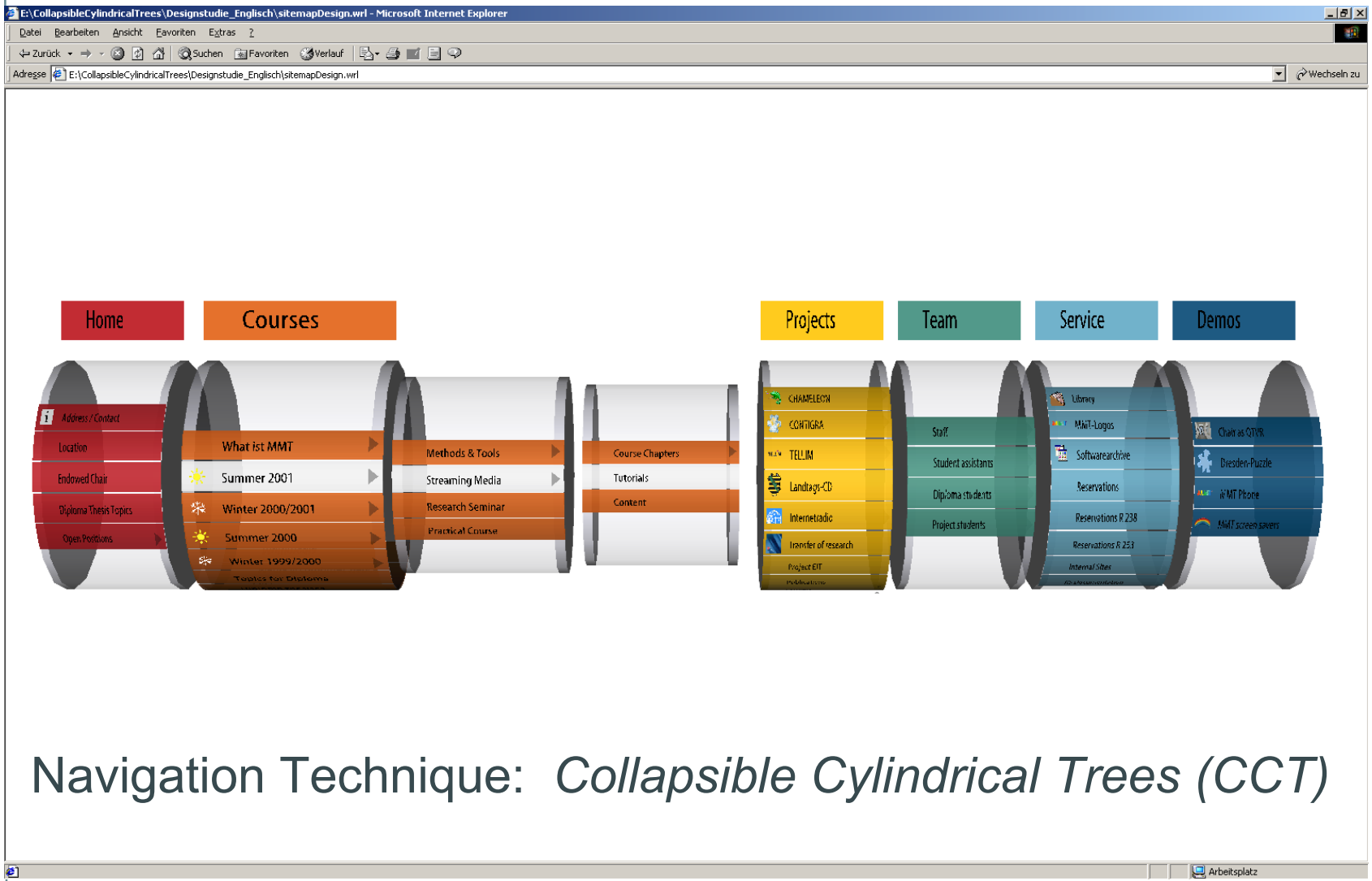
3D Application Example



Navigation Technique: *Collapsible Cylindrical Trees (CCT)*

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Component Levels & Tasks

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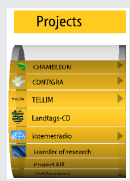
Level	Tasks *Component-*	Result (Documents)	Tools
Runtime	*Usage* *Adaptation*	Executable 3D Application	3D Viewer (e.g. X3D Applet)
Configuration & Assembly	*Connection* *Assembly* *Configuration*	Assembled 3D Application Configured Components	**CONTIGRA SceneBuilder** (3D UIB)
Distribution	*Search* *Selection*	Packaged 3D-Components	Component Database, Web Interface
Development	*Description* *Implementation*	CCT Component Interface =  Implementation Files	**CONTIGRA ComponentBuilder**, XML-, Media & Programming Tools

CONTIGRA Levels

- Basis: markup languages (XML Schema)
  - CONTIGRA SceneGraph
    - Component implementation language
    - Integrates various scene graph & media files
  - CONTIGRA SceneComponent
    - Component description & configuration language
    - Prototype concept
  - CONTIGRA Scene
    - High-level component integration language
    - Dependence on specific 3D Web environment

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CONTIGRA Levels

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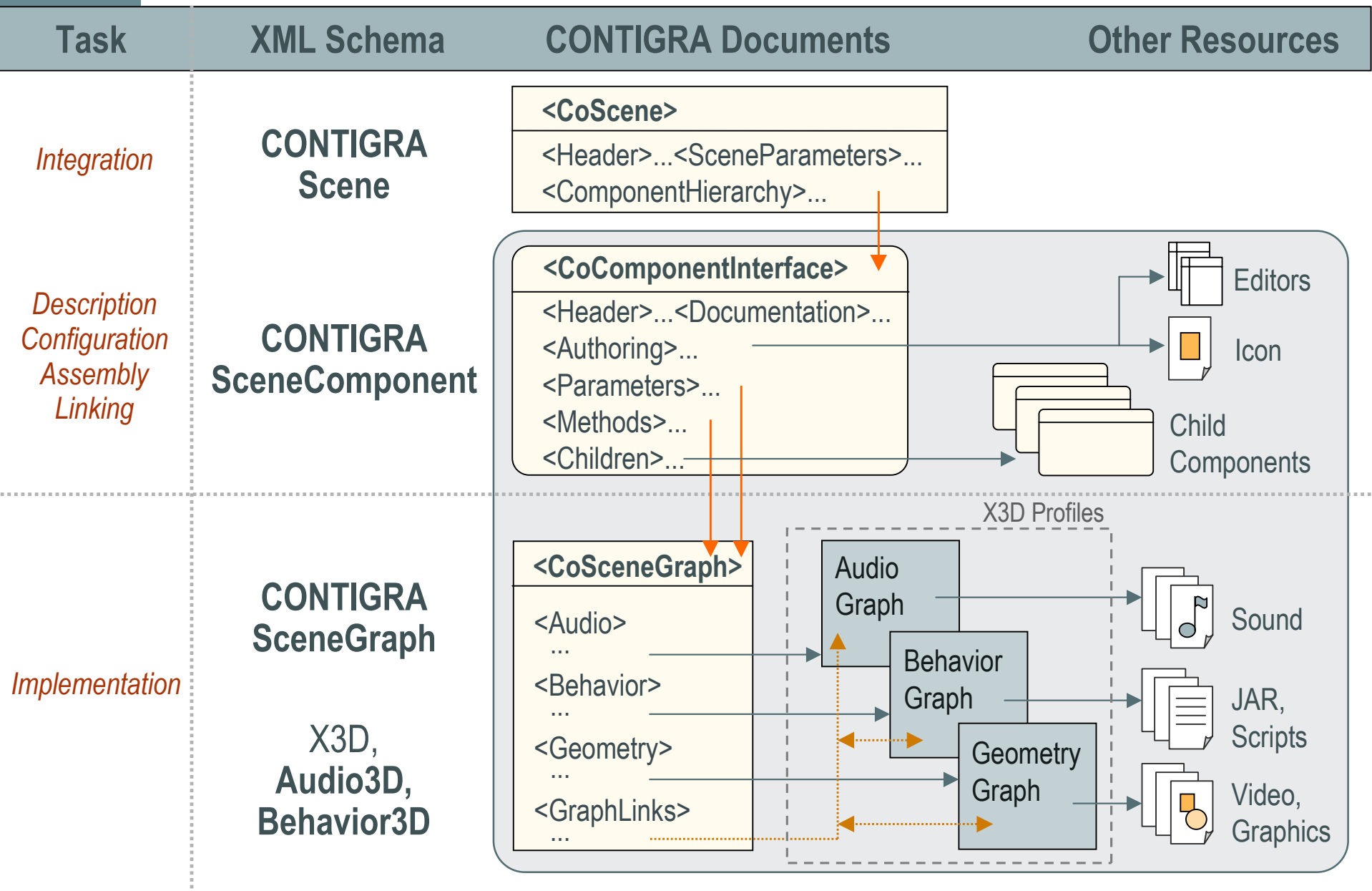

Conclusion & Future Work

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- CONTIGRA features
  - Componentization (design | deployment)
  - Reuse and platform independence
  - Abstraction to specific 3D formats
  - Declarative approach, well suited for tool support
- Future Work
  - Further improvements of Contigra schemas
  - Development of runtime-framework (translators) & 3D User Interface Builder

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Papers

- R. Dachselt. Contigra - *Towards a Document-based Approach to 3D Components*, Workshop proceedings "Structured Design of Virtual Environments and 3D-Components" of the ACM Web3D 2001 Symposium, Paderborn, February 2001.
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- R. Doerner and P. Grimm. *Three-dimensional Beans - Creating Web Content Using 3D Components in a 3D Authoring Environment*, Web3D/VRML 2000, February 2000.
- C. Geiger, V. Paelke, C. Reimann, W. Rosenbach. *A Framework for the Structured Design of VR/AR Content*, VRST 2000, October 2000.

Web pages

- XML-Schema: http://www.w3.org/XML/Schema
- Extensible 3D (X3D): http://www.web3d.org/x3d.html
- Contigra: http://www.contigra.com

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