Authoring System Independent
Creation and Publishing of Courseware

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Motivation

- Lecture content creation requires high production effort for
  - slides
  - manuscripts
  - e-learning content, etc.
- Reuse of existing content is necessary
- It is more comfortable for authors to keep their well known authoring system they are familiar with
- Presentation should be based on modern web standards
- Courseware format should be XML-based to meet future requirements and being platform independent
ITO Project

- E-Learning project

"Information Technology Online"

- Funded by the German Federal Ministry of Education and Research (BMBF)

- Goal: Creation and Exchange course materials

- Partner universities:
  - University of Stuttgart, TU München, TU Dresden, TU Hamburg-Harburg, PH Ludwigsburg

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Requirements in the ITO-Project

- Keep the well-known authoring tools
  - OpenOffice.org
  - Microsoft Word
  - Adobe FrameMaker
  - LaTeX, etc.

- Exchange and reuse of generated and existing content
- Support for visually disabled people

⇒ Idea: Define an intermediate courseware format in XML and integrate many authoring tools
Delivery of Content

ITOML
- Metadata
- Structure
- Content
- Objects
- Layout
- Documents

Navigation/TOC

Content presentation

Content editing

Web/Presentation
- x3d
- svg
- xml
- html

Print
- pdf
- ps

Edit
- sxi
- ppt
- sxw
- doc
Goals achieved so far

- Definition of an intermediate courseware format in XML
- OpenOffice.org based tool-chain allowing for generation of standard conformant courseware

Support for visually disabled people using special transformation styles for content like images and formulas

Employment of modern web standards for presentation and storage:
  - MathML for mathematic expressions
  - SVG for graphics, animations and simulations
  - X3D for 3D graphics
Usage of Style Templates

- Ease of use and flexibility in handling
- Paragraph and character styles
Toolchain using OpenOffice.org

- This concept is not restricted to OpenOffice.org
- It can also be realized with Microsoft Word, Adobe FrameMaker, etc.
Tool Chain Technology

Transformation Engine
- Java, JDOM (www.jdom.org), Castor (www.castor.org)
- Import of the OpenOffice.org file format
- Restructuring and transformation of style templates
- Extraction of metadata
- Format conversion
- Creation of intermediate courseware files

Output Preparation
- XSLT, XHTML
- Styling and delivery
- Special style for the external error display
- Special support for visually disabled people
Supporting the Authors

- FAQ for documentation
- ITO-Menu in OpenOffice.org
- Wizards
  - New ITO document
  - Structuring the chapters
  - Assignment of style templates
  - Import of objects (graphics, animations, simulations, etc.)
  - Math notation of the output for visually disabled people
ITO Menu
External Error Display

Future plan:
Display these errors directly inside the authoring system.

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Transformation of MathML Formulas for the Blind

Results in Mozilla: MathML Torture Test (XHTML + MathML)

- SMFB (Stuttgart Mathematical Notation For the Blind)
- MathML to LaTeX transformation uses a XSLT stylesheet of Vasil I. Yaroshevich was used

$$\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+1+x}}}}}}$$

\[ x^{y^{x^y}} \]

\[ \sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+1+x}}}}}} \]

\[ 2^{2^{2^x}} \]

\[ y^x^2 \]

$${x}^2{y}$$

$${\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+\sqrt{1+1+x}}}}}}}$$

$${2}^{{(2}^{{(2}^{{(2}^{{(2}^{{x}})})}})}$$

$${y}^{{(x}^{{(2})})}$$

$$\LaTeX$$
Conclusion and Outlook

- Creating courseware by use of traditional authoring systems is possible and comfortable
- The presented transformation engine for OpenOffice.org is flexible in use and configuration
- The described XML intermediate courseware format can be used in different learning platforms. The layout of the content can be changed easily
- Positive feedback from the authors received
- Plans for the near future:
  - Integrate our tool chain into the „metacoon virtual learning environment“
  - Extend the support for the authors
- Further Information: [http://www.ito-projekt.de](http://www.ito-projekt.de)