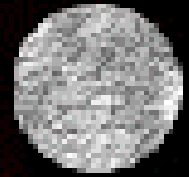


Renaissance of e-learning is here.
It comes via standards and new technologies.



Welcome to the workshop on:

WebCT and Standards: IMS, SCORM

Giedrius Balbieris
giedrius_balbieris@metalot.com



info@lerneffekt.de

WebCT and Standards

Introduction :: About myself

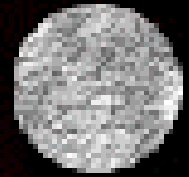


- Background is in software development.
- Involved in distance learning since 1995.
- Working on Ph.D. thesis 'Alternative model of integrated LMS'.
- Heading a consulting company metalot.com.
- Technology solutions for a number of EU e-learning projects.
- Since year 2000 working in partnership with Lerneffekt.de.
During this time created such WebCT tools and extentions as:
 - Formulars for WebCT 3.x,
 - Community Content Manager for WebCT 3.x,
 - Language pack Cross-version Checking Tool for WebCT 3.x, ...

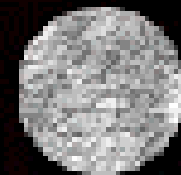
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WebCT and Standards Intention



- Rise understanding on meta-data concept,
- Review current situation in standard area,
- Check-out the WebCT implementation and possible benefits.



WebCT and Standards

Introduction :: About you

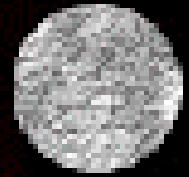
- What is your experience with WebCT?
- What is your experience with e-learning standards?
- What are your expectations of this workshop?

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WebCT and Standards

Contents



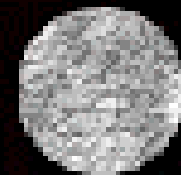
- 1st part: Meta-data concept,
- 2nd part: e-learning standards,
- 3rd part: WebCT implementations,
- 4th part: Questions and Answers.

Workshop resources:

<http://dev.lerneffekt.de/workshop/>

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Meta-data concept

WebCT and Standards :: Meta-data concept

Knowledge representation



■ Digitized knowledge consists of:

A) semantics,

The knowledge itself.
Can be coded as facts or different parameters of knowledge domain.

B) syntax,

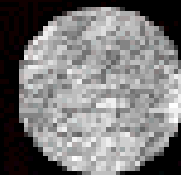
Format of knowledge encoding.
Usually follows some technical (ex.html) or knowledge domain standard.

C) layout and design.

Expression and visualization related information.

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WebCT and Standards :: Meta-data concept

Pre meta-data :: Data mixture

```
Lesson1.html
<title>Lesson1</title>
<body bgcolor="green">
<h1>Aims&objectives</h1>
...
</body>
```

Semantics

Syntax

Layout and design

WebCT and Standards

XML :: Basic points

- XML is aimed for:
 - structuring data,
 - separating semantics, layout and content.
- XML is a verbose license free standard.

Lesson1.html

```
<HTML>
<BODY>
<H1>Lesson1::Step1</H1>
<H2>HTML function</H2>
<P>HTML mixes all (content, layout
and code) into a single
document.</P>
</BODY></HTML>
```

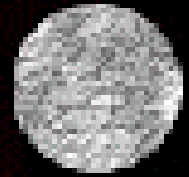
Lesson1.xml - a content file

```
<LESSON>
<NUMBER>1</NUMBER>
<STEP>
<NUMBER>1</NUMBER>
<TITLE>XML function</TITLE>
<TEXT>XML separates layout and
information</TEXT>
</STEP>
</LESSON>
```



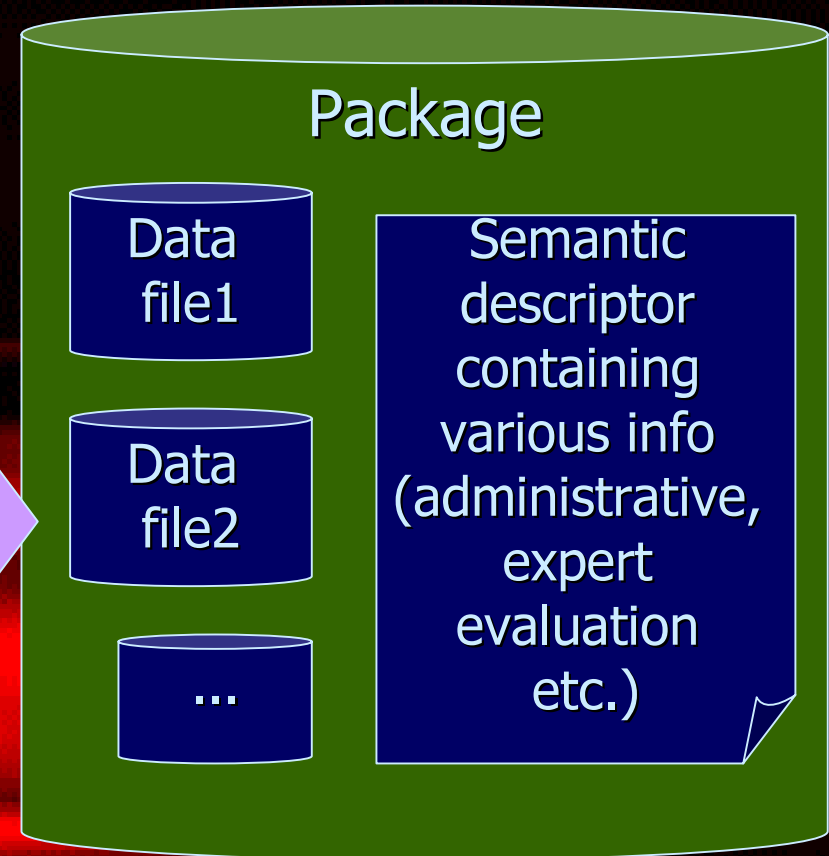
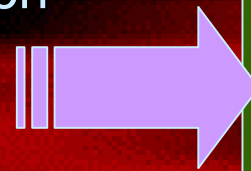
WebCT and Standards :: Meta-data concept

Wrapping data into package



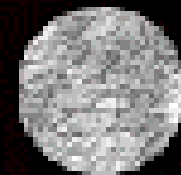
E-learning based facts for meta-data needs:

- Variety of current file formats and ones to come,
- Increasing interactivity via non-text based dynamic components,
- Increasing diversified data volumes,
- Variety of content subjects covering all topics of life.



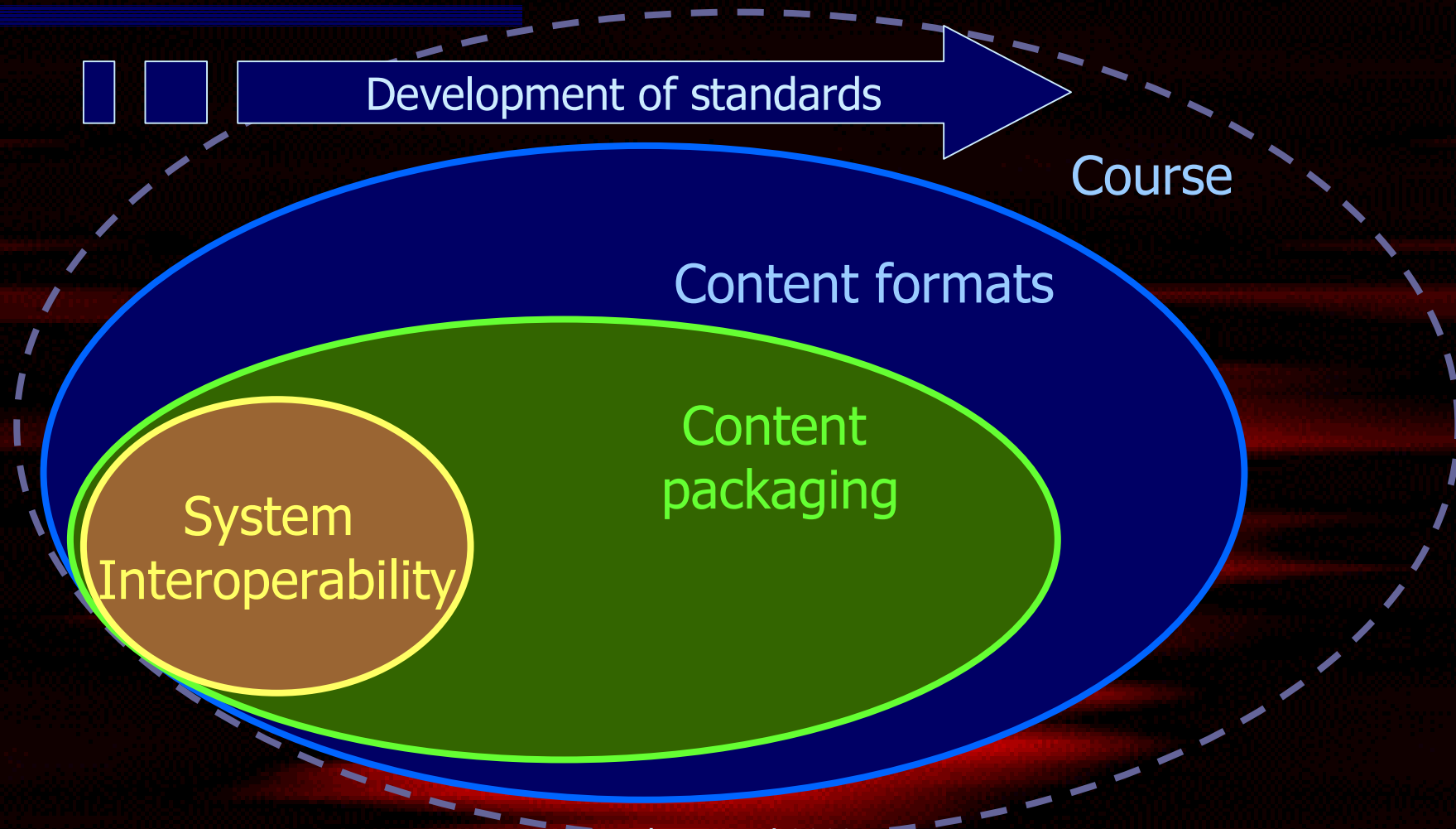
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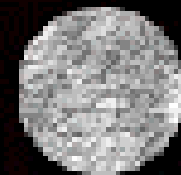
WebCT and Standards :: Meta-data concept

Levels of meta-data description



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WebCT and Standards :: Meta-data concept

Areas of e-learning development

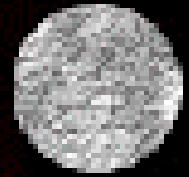
- XML vocabulary standardization,
- Runtime standardization: program and data connectivity,
- Meta-data encoded expert knowledge,
- Self-descriptive learning objects (LO),
- Lesser human involvement via automatic LO interconnections by using each other meta-data.

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WebCT and Standards

Contents



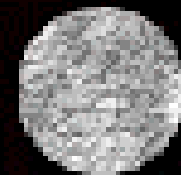
- ✓ 1st part: Meta-data concept,
- 2nd part: e-learning standards,
- 3rd part: WebCT implementations,
- 4th part: Questions and Answers.

Workshop resources:

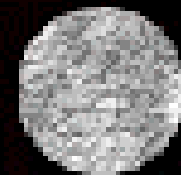
<http://dev.lerneffekt.de/workshop/>

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e-learning standards



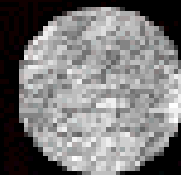
WebCT and Standards

e-learning standards :: Contents

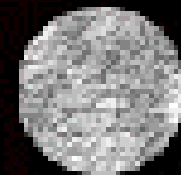
- Overview of existing standards,
- More details: IMS standard.

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Overview of existing standards



WebCT and Standards

Overview of existing standards

- IMS (<http://www.imsglobal.org>)
- SCORM (<http://www.adlnet.org>)
- AICC (<http://www.aicc.org/>)
- ARIADNE (<http://www.ariadne-eu.org/>)
- DUBLINCORE (<http://www.dublincore.org/>)
- CAN-CORE (<http://www.cancore.org>)
- ...

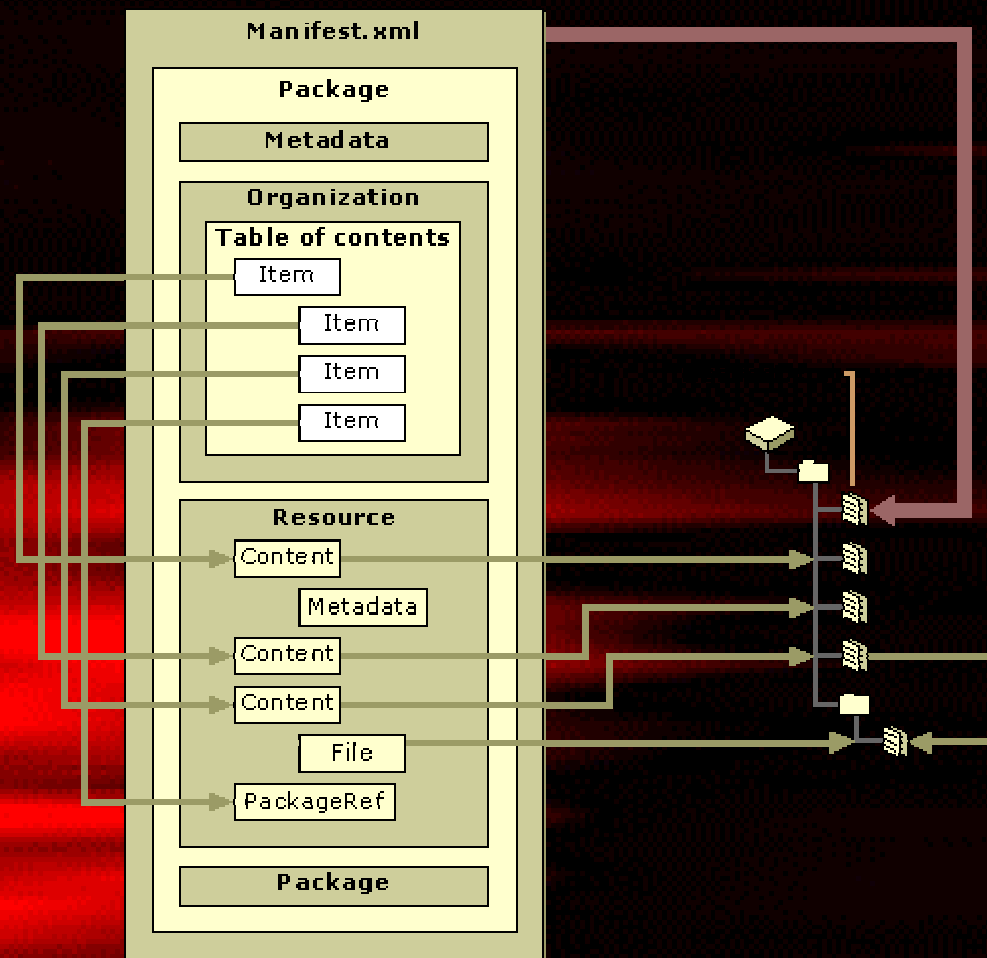
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WebCT and Standards

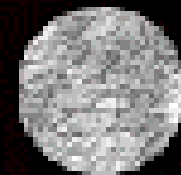
SCORM :: Components

- SCORM:
 - Content Aggregation Model (CAM),
 - Meta-data,
 - Content packaging.



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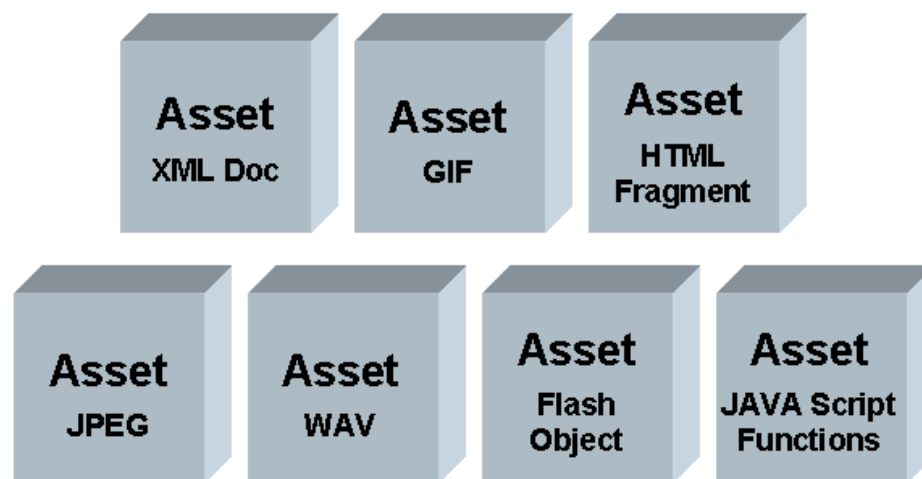
WebCT and Standards

SCORM :: Content Aggregation Model

■ Content Aggregation Model defines:

- Assets,
- Sharable Content Objects (SCO),
- Content Aggregation.

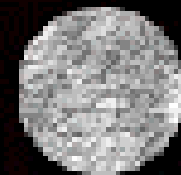
```
<!-- content.htm -->  
api = getAPI();  
var result = api.LMSInitialize("");  
var val = api.LMSGetValue("cmi.abc.xyz");
```



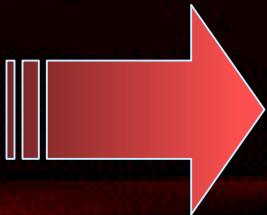
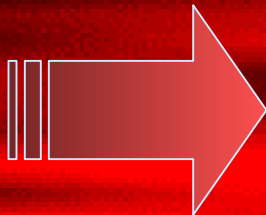
```
var result = api.LMSFinish("");
```

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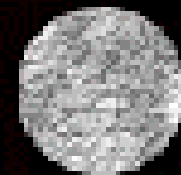


WebCT and Standards standards overview :: Summary

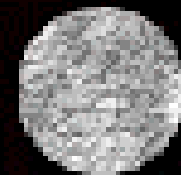
- There is a great hurry to develop e-learning systems which have content and layout separation.
 - Different simplifications appear (CANCORE, DUBLIN-CORE etc.) to speed development,
- 
- standards use parts of other standards.
 - standards merge using best practice criteria.
- 
- Stable fundament,
 - IMS - the most comprehensive standard,
 - WebCT implements an increasing IMS standard feature set.

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More details: IMS standard

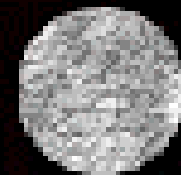


WebCT and Standards IMS :: Overview

- Content Packaging
- Meta-Data
- Learner Information Package
- Question & Test Interoperability
- Enterprise
- Accessibility
- Competencies
- Learning Design

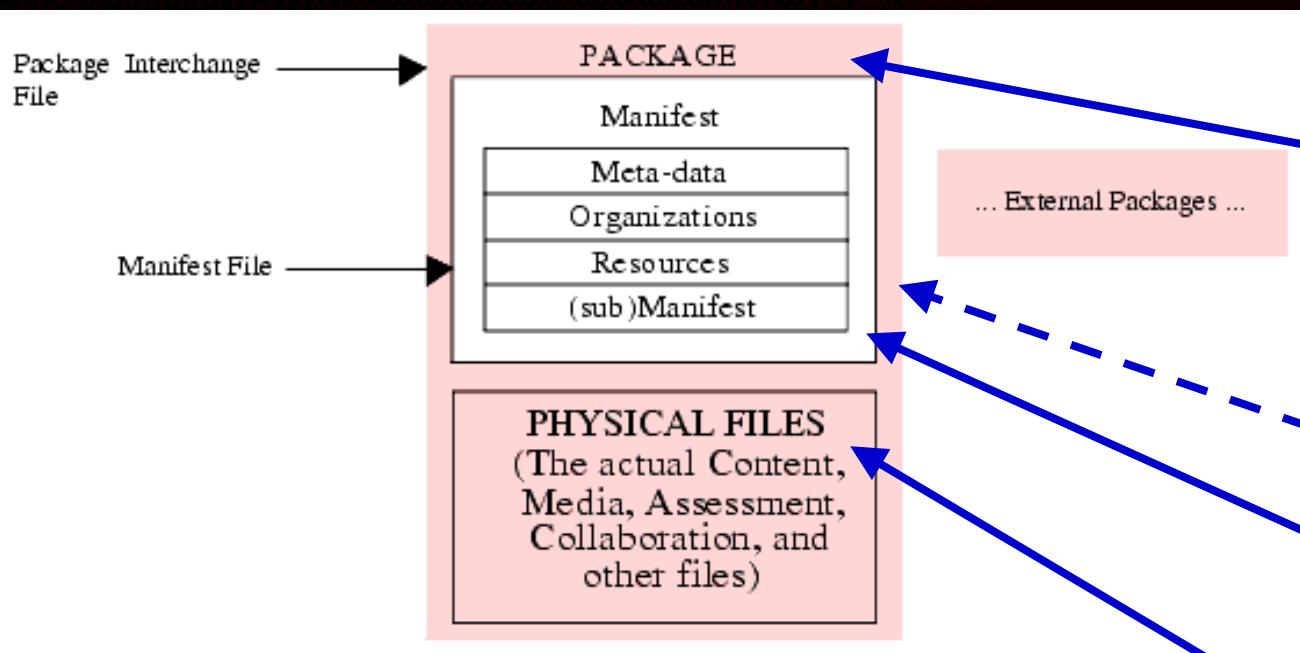
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WebCT and Standards

IMS :: Content packaging :: Package



Key elements:

- Package Interchange File,
- Package,
- Top-level Manifest,
- Physical Files.

<http://www.imsproject.org/content/packaging/index.html>

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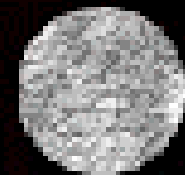
WebCT and Standards Content packaging

Definition elements:

- Meta-data,
- Organization,
- Resources.



```
<?xml version="1.0"?>
<manifest [identification]>
  <metadata>
    <schema>IMS Content</schema>
    <schemaversion>1.1.2</schemaversion>
    <imsmd:lom> <imsmd:general> <imsmd:title>
      <imsmd:langstring xml:lang="en-US">N1</imsmd:langstring>
    </imsmd:title> </imsmd:general> </imsmd:lom>
  </metadata>
  <organizations default="TOC1">
    <organization identifier="TOC1" structure="hierarchical">
      <item identifier="ITEM1" identifierref="R1">
        <title>Lesson 1</title>
        <item identifier="ITEM2" identifierref="R2">
          <title>Introduction 1</title>
        </item>
        ...
      </item>
      ...
    </organization>
  </organizations>
  <resources>
    <resource identifier="R1" type="webcontent" href="l1.htm">
      <file href="l1.htm"/>
    </resource>
    ...
  </resources>
</manifest>
```

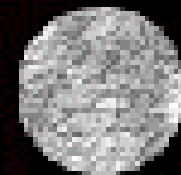
WebCT and Standards

IMS :: Question & Test Interoperability

- standards for: question, test and result.
- Question types according input:
 - Logical identifier,
 - X-Y coordinates,
 - String (text),
 - Numeric.
- QTI Specification 1.2:
<http://www.imsproject.org/question/>

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WebCT and Standards

WebCT support for IMS

- Content Packaging
- Meta-Data
- Learner Information Package
- Question & Test Interoperability
- Enterprise
- Accessibility
- Competencies
- Learning Design

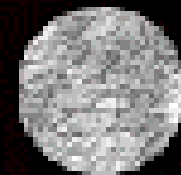
Full support

Space to improve

Specs not fully stable

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Questions to resonate:

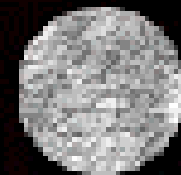
Why are standards so important?

What are the benefits of standardization?

What is the future of e-learning standards and LMS?

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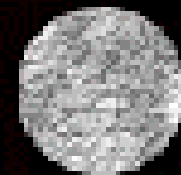
WebCT and Standards

e-learning standards :: Contents

- ✓ Overview of existing standards,
- ✓ More details: IMS standard.

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WebCT and Standards

Contents

- ✓ 1st part: Meta-data concept,
- ✓ 2nd part: e-learning standards,
- 3rd part: WebCT implementations,
- 4th part: Questions and Answers.

Workshop resources:

<http://dev.lerneffekt.de/workshop/>

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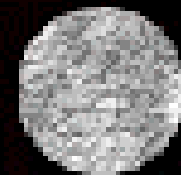


WebCT implementations :: Contents

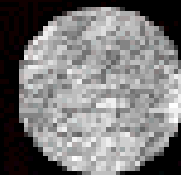
- Standard API,
- IMS Enterprise API,
- IMS Content Migration Utility.

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WebCT standard API

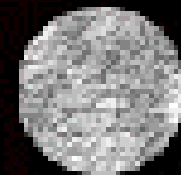


WebCT and Standards

WebCT standard API :: Features

- LMS data manipulation:
 - user management (global and course databases),
 - content management,
 - test and question management.

- Pros:
 - backward compatibility,
 - well known data manipulation techniques.
- Cons:
 - less possibilities,
 - no standard compatibility.



WebCT and Standards

WebCT standard API :: Functions

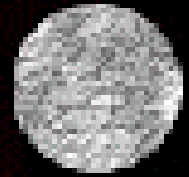
- User data manipulation:
 - add,
 - delete,
 - change id,
 - update,
 - find,
 - find WWUI (WebCT Unique Universal Identifier),
 - find IMS ID,
 - add from file,
 - delete from file,
 - change from file.

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WebCT and Standards :: WebCT standard API

Possible solutions



- E-learning portal with e-commerce features,
- LDAP and WebCT database synchronization tool,
- Campus DBMS gateway to WebCT,
- ...

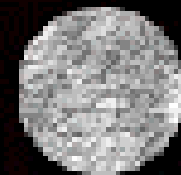
WebCT and Standards

WebCT implementations

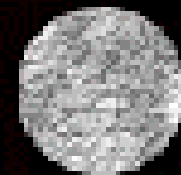
- ✓ Standard API,
- IMS Enterprise API,
- IMS Content Migration Utility.

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WebCT IMS Enterprise API



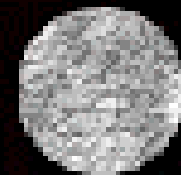
WebCT and Standards

WebCT IMS Enterprise API :: Features

- LMS data manipulation:
 - user management (global and course databases),
 - content management,
 - test and question management.

- Pros:
 - better optimization,
 - standard compatibility,
 - more functionality.

- Cons:
 - IMS Enterprise specification undergoes changes.



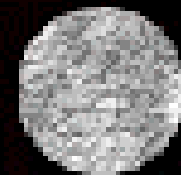
WebCT and Standards

WebCT IMS Enterprise API :: Overview

- Import:
 - Create/modify/delete course instances,
 - Create/modify/delete course users,
 - Register/unregister users from courses.
- Export:
 - Create descriptor (XML) of all user, course, and course membership information.
 - Create descriptor (XML) for student,
 - Create descriptor (XML) for student progress (grades midterm and final),
- Configure:
 - Add/update IMS data: IMS Source, IMS ID etc.

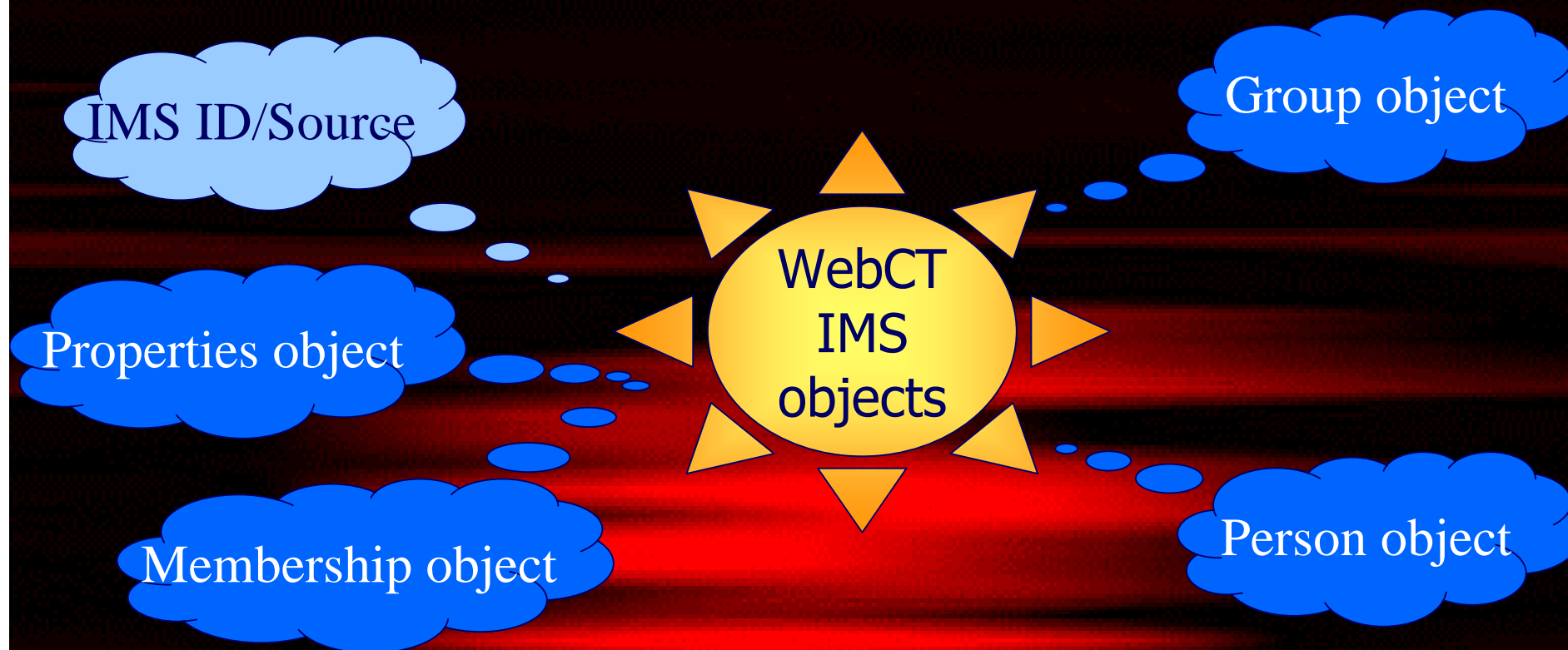
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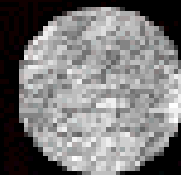
WebCT IMS Enterprise API :: Objects



Technical reference guide, page 25

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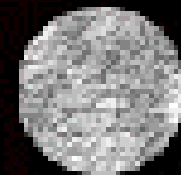
WebCT and Standards

WebCT IMS Enterprise API :: Functions

- Modification object XML description file,
- Modification actions:
 - import,
 - export,
 - configure.
- Action options:
 - import: restrict, unrestrict,
 - export: snapshot, person_record, group_record, group_final_grades, group_midterm_grades,
 - configure: set_group_ims_info, import_group_ims_info, get_person_ims_info.

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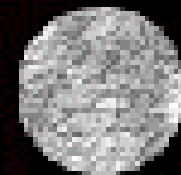
WebCT and Standards

IMS Enterprise API :: Web access

- Shared secret - a part of system identity and security,
- Creating Message Authentication Codes (MAC),
- Assembling HTTP request.

Syntax:

```
<GET | POST>  
/webct/ims/serve_ep_api.pl?ACTION=<action>&OPTION=<option>  
&TIMESTAMP=<unix_epoch_time> &AUTH=<32_byte_mac>  
[&INLINEMODE=<inlinemode>] [&COURSE=<course>]  
[&DATASOURCE=<datasource>] [&TARGET=<target>][&ID=<id>]  
[&SOURCE=<source>] [&SCTMODE=<sctmode>] HTTP/1.0
```



WebCT and Standards

WebCT IMS Enterprise API :: Solutions

- Similar as with WebCT API, but more robust:
 - E-learning portal with e-commerce features,
 - LDAP and WebCT database synchronization tool,
 - Campus DBMS gateway to WebCT,
 - ...

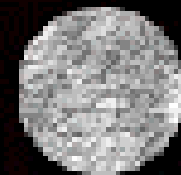
WebCT and Standards

WebCT implementations

- ✓ standard API,
- ✓ IMS Enterprise API,
- IMS Content Migration Utility.

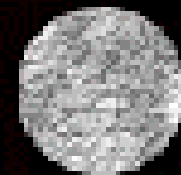
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WebCT IMS

Content Migration Utility (CMU)



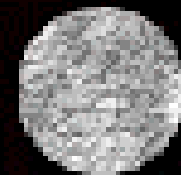
WebCT and Standards

WebCT IMS Content Migration Utility

- IMS Content Migration Utility (IMS CMU) - WebCT step toward Shared Content Objects.
- Support for:
 - Content Packaging Specification Version 1.1,
 - Question and Test Interoperability Specification Version 1.1,
 - Meta-data Specification 1.2.

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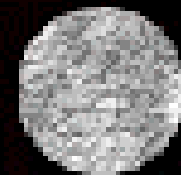
WebCT and Standards

WebCT support for IMS

- Content Packaging (WebCT IMS CMU)
- Meta-Data (WebCT IMS CMU)
- Learner Information Package
- Question & Test Interoperability (WebCT IMS CMU)
- Enterprise (IMS Enterprise API) **Full support**
- Accessibility **Space to improve**
- Competencies **Specs not fully stable**
- Learning Design

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WebCT and Standards

WebCT IMS Content Migration Utility

Can Import/Export

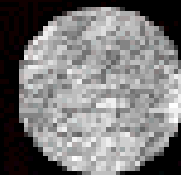
- an empty course,
- a course that includes content for the following tools: **Content Module, Glossary, Syllabus, Quiz, Self Test.**
- a course that includes any or all of the following: **Organizer Pages, WebCT tools, data files containing content for Content Module, Glossary, Syllabus, Quiz, and Self Test; properties files for course, Homepage, Organizer Pages, Content Module, Quiz tool, individual quiz, individual assignments.**

Can not Import/Export

- Content for the following tools: **Assignment, Calendar, Cdrom, Chat, Discussions, Image, Database, Index, Mail, My Grades, My Progress, Student Presentation, Student Homepages, Student Tips, Whiteboard,**
- individual **Organizer Pages and WebCT tools,**
- individual files containing content for tools,
- individual properties files,
- any student or teaching assistant data,
- any information that depends on the type of user or time of delivery.

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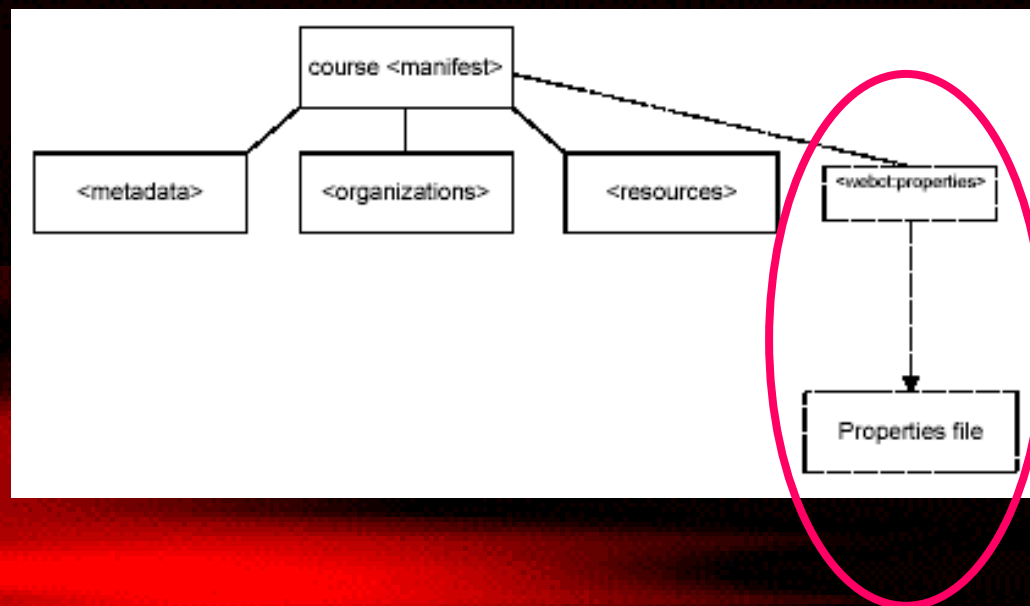
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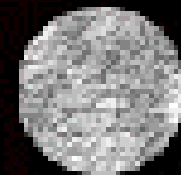


WebCT and Standards

WebCT IMS CMU :: IMS extensions

- `<webct:properties>`,
- QTI `<PRESENTATION>` element extensions,
- `<resprocessing>`,
- Extension for short answer questions:
`<webct:x_webct_v01_var_regex>`.

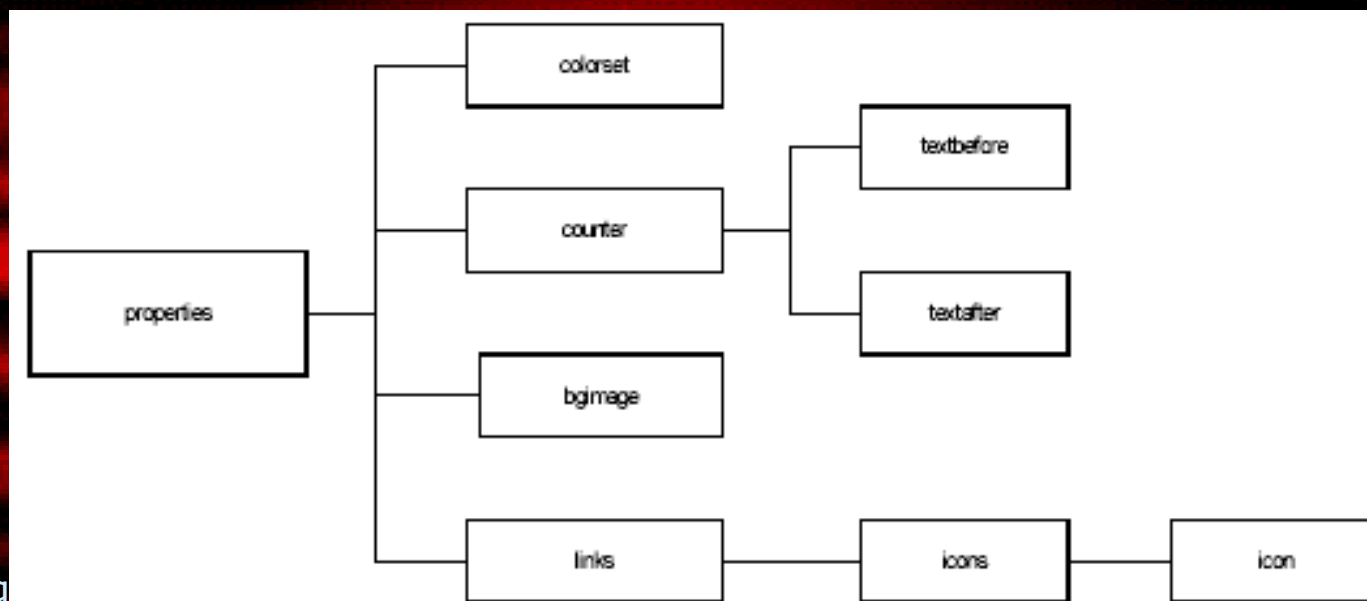




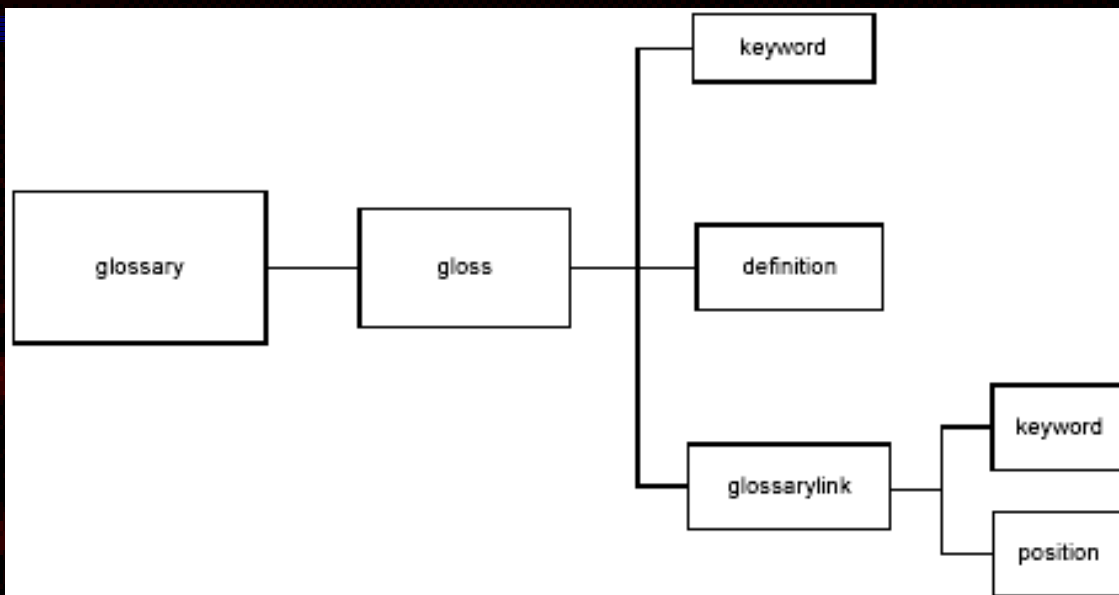
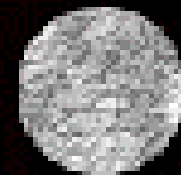
WebCT implementations :: IMS CMU :: Samples

<webct:properties> :: Colorset

```
<colorset type="Content" name="Custom"  
bgcolor="#FFFFFF" textcolor="#000000"  
vlinkcolor="#660066" linkcolor="000099"/>
```



WebCT implementations :: IMS CMU Samples :: Glossary



```

<gloss><keyword>visual file</keyword>
<definition> include image files.</definition>
<glossarylink>
  <keyword>image</keyword> <position>2</position>
</glossarylink></gloss>
  
```

```

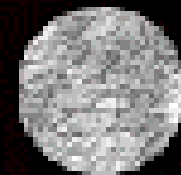
<manifest ...
<metadata>
...
</metadata>
<organizations>
...
</organization>
</organizations>
<resources>
  
```

```

<resource
  identifier="GLY_2825747"
  type="webctglossary">
  <file
    href="COURSE_2825622_M/
    data/GLY_2825747.xml"/>
  </resource>
</resources>
</manifest>
  
```

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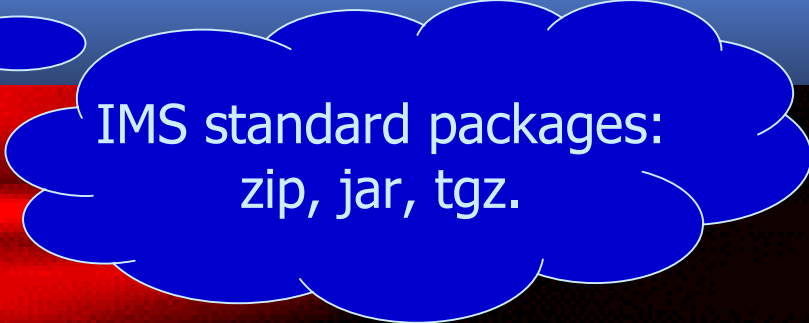
WebCT API's

IMS CMU :: Command line access

- IMS package import (compressed and uncompressed) ,
- IMS package export (compressed and uncompressed).

Syntax:

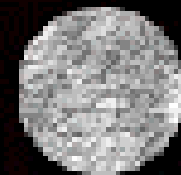
```
<webct_install_dir>/webct/webct/generic/ims/cp_api.pl -action=import  
-course=Biology101  
-pkgloc=test_packages/bio101.tgz  
-passwd=1234
```



IMS standard packages:
zip, jar, tgz.

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WebCT implementations

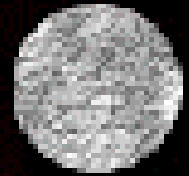
WebCT IMS CMU & External tools

- External tools:
 - Microsoft LRN 3.0
(<http://www.microsoft.com/elearn>),
 - Macromedia Dreamweaver and Extentions,
 - Docent Outliner (<http://www.docent.com>),
 - NETg NLO+ (<http://www.netg.com/>),
 - few more,
 - more coming.

WebCT implementations

WebCT IMS CMU & MS LRN 3.0

<http://www.microsoft.com/elearn>



The screenshot shows two overlapping windows. The background window is titled "LRN Toolpad" and contains a list of functions with corresponding buttons:

- Convert Manifest File
- Convert FrontPage Web
- Convert PowerPoint Presentation
- Edit Manifest File
- Validate LRN Package
- Open LRN Viewer
- Generate LRM File

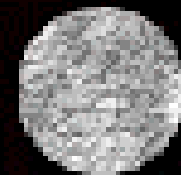
The foreground window is titled "Campus Demokurs - LRN Editor" and displays a hierarchical tree view of course content. The tree structure is as follows:

- Manifest
 - Organizations
 - Organization
 - Organization
 - Resources
 - Manifest
 - Manifest
 - Organizations
 - Organization
 - Firmenstrategie und Schwerpunkte
 - Die Plattform WebCT
 - Das Geschäftsmodell
 - Das didaktische Konzept
 - Der Elearning Markt in Deutschland
 - Das Marketing von Lernangeboten
 - Produktion und Vertrieb
 - Demotest
 - Kursdesign
 - Impressum
 - Resources
 - Resource
 - COURSE_3738048_M/my_files/plattform.htm
 - COURSE_3738048_M/data/properties
 - COURSE_3738048_M/my_files/ge...
 - COURSE_3738048_M/my_files/me...
 - COURSE_3738048_M/my_files/erf...
 - COURSE_3738048_M/my_files/mir...
 - Resource
 - COURSE_3738048_M/my_files/ele...
 - COURSE_3738048_M/my_files/me...
 - Resource

On the right side of the editor, there is a preview area showing a header with a logo and the text "Die Plattform WebCT". Below the header is a paragraph of German text:

Die Entwicklung der **Lerneffekt WBT** erfolgt auf dem seit 1994 existierenden **Elearning Environment**. Die Verbreitung dieser Plattform ausgehend von den USA erstreckt sich mittlerweile auch auf europäische Länder wie Frankreich, Spanien, Schweden, Finnland usw.

Below the text is a diagram showing a box labeled "Nutzer" (User) with an upward-pointing arrow to a larger box labeled "Server und WebCT-Lerneffekt Plattform". Two downward-pointing arrows point from the platform box back towards the user area.



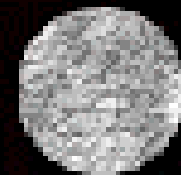
WebCT API's

WebCT IMS CMU :: Solutions

- Content operations (export, editing, import):
 - Exporting existing WebCT course & editing content with external IMS compliant content editor,
 - Preparing stand alone IMS compliant SCO and integrating into existing course using external content packagers,
 - Importing content packages (courses) from other IMS compliant environments.
- Integration to other tools, environments:
 - External content processing in real-time,
 - Exports for external data manipulations, statistical analysis etc.
 - ...

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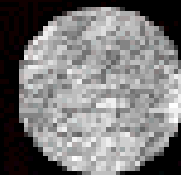
WebCT API's

WebCT IMS standard summary

- IMS standard is developed to a stable working version.
- WebCT has sufficient tools for interoperability with other tools, platforms.
- More is coming...

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WebCT implementations

WebCT Technologies with practice

Subscribe for the course

'WebCT: Technology basics'

http://www.lerneffekt.de/kurse/webct_technology_basics.html

or write an e-mail:

info@lerneffekt.de



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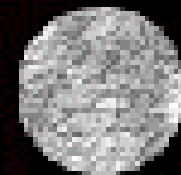
WebCT and Standards

WebCT API's

- ✓ standard API,
- ✓ IMS Enterprise API,
- ✓ IMS Content Migration Utility.

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WebCT and Standards

Contents

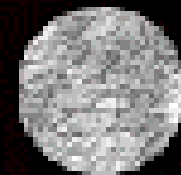
- ✓ 1st part: Meta-data concept,
- ✓ 2nd part: e-learning standards,
- ✓ 3rd part: WebCT implementations,
- 4th part: Questions and Answers.

Workshop resources:

<http://dev.lerneffekt.de/workshop/>

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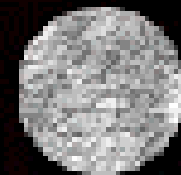


Part 4th:

Discussion

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WebCT and Standards

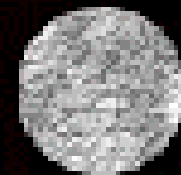
Discussion, Questions & Answers

How these new technologies enrich, enhance learner experience?

What is the future of e-learning? To where it is developing?

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WebCT and Standards

Contents

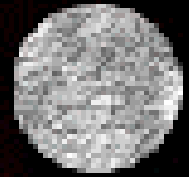
- ✓ 1st part: e-learning standards and WebCT,
- ✓ 2nd part: WebCT API's,
- ✓ 3rd part: WebCT large scale & integration solutions,
- ✓ 4th part: discussion.

Web based version: <http://www.metalot.com/utrecht2002/>

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Renaissance of e-learning is here.
It comes via standards and new technologies.



Welcome to the workshop on:

WebCT and Standards: IMS, SCORM

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