eCMS:
eLearning Content Management Middleware

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Outline

- eCMS Project Objectives
- Educational Content Management Middleware
- Flexible Course Structuring
- Services
- Autonomy and Scalability Considerations
- Statistics Analysis
- Conclusions
eCMS Project Objectives

- eCMS Project Goal:
  To support eLearning through an open, federated network of educational content that promotes resource sharing while maintaining the autonomy of participating institutions

- Specific Objectives
  - Distributed content management through a federated digital library
  - Single point of access through the web
  - Autonomy and scalability
  - Services for learners, content providers, course managers, and repository administrators
eCMS Architecture Features

- Efficient information discovery through metadata, indexing, search, and navigation
- Optional content hosting
- Maximum flexibility in course structuring
- Self assessment tools
- Support towards the creation of a federated library
  - Metadata and content distribution
  - External repository integration
- Support of learning process through a collaboration environment
- Generation of system and educational statistics
Content Management Architecture
Flexible Course Structure

Dynamic representation of:
- Module types
- Course hierarchies
eCMS Metadata

- Designed using previous results in educational content metadata
- Based on Dublin Core, ETB
- **Additional fields** for examination management, credit point management, prerequisites, exercises, software requirements, etc.
Services

- **For learners**
  - Information discovery & retrieval
  - On-line self assessment
  - Personal data management
  - Collaboration
  - Feedback mechanisms

- **For course managers**
  - Course developer & editor
  - Course management
  - Exam developer and editor

- **For administrators**
  - Resource management
  - Metadata indexing
  - Statistics analysis
  - External repository integration
  - Metadata replication
Distribution of Metadata & Content

- **Goal:**
  - Efficient distributed searches
  - Scalability
  - Autonomy

- **Implementation:**
  - Equivalent metadata nodes
  - Metadata replication
  - Off-line synchronization of metadata and course structure information
External Repository Integration

• Goal:
  To enable eCMS installations to evolve into portals through single point of access to entire external collections in addition to standard content

• Implementation:
  - Metadata importing agents
  - Map of external to eCMS metadata
  - Transparent, automatic periodic updates
System Statistics

- Monitoring of system usage aiming at the identification of possible improvements

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Improvements</th>
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<tbody>
<tr>
<td>Keywords used in queries</td>
<td>User interface: thesauri, additional menus, navigation, drop down lists</td>
</tr>
<tr>
<td>Query hits</td>
<td>Metadata: design, descriptions, interface</td>
</tr>
<tr>
<td>Reviewed metadata records</td>
<td>Content and metadata</td>
</tr>
<tr>
<td>Support for module ratings and reviews by learners</td>
<td>Content and metadata</td>
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Collaboration Environment

- Facilitates learner-learner and learner instructor communication
- Built through off-the-shelf tools
- Chat-rooms, forums, application sharing
- Is the basis for possible future extensions for virtual classroom support
Conclusions & Future Work

- **eCMS**: Middleware architecture for heterogeneous, distributed educational content management
- Project funded by Minerva-Socrates program
- Extensions planned for eLearning services for mathematics and natural sciences