



# **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

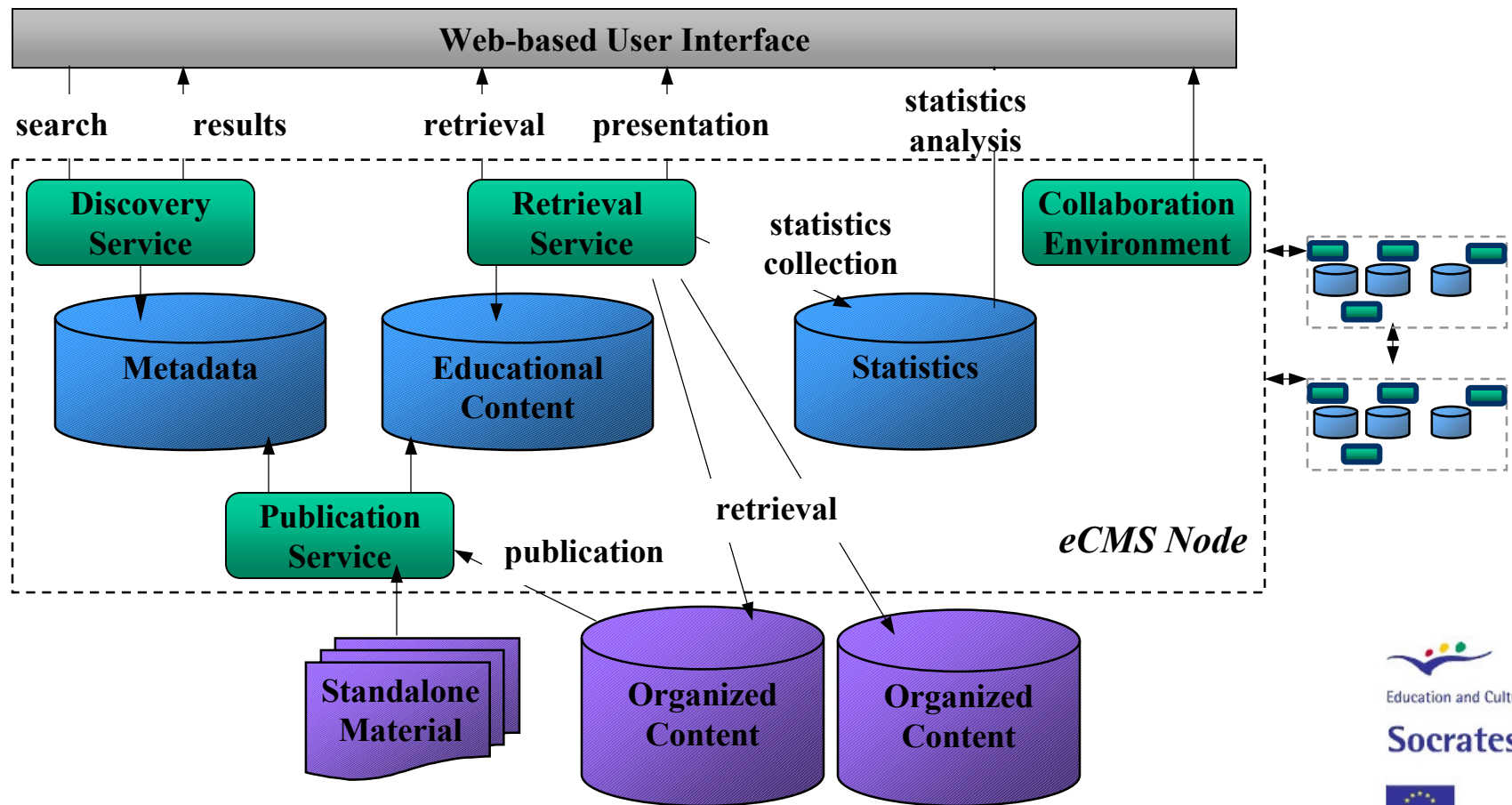
# eCMS Project Objectives

- 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

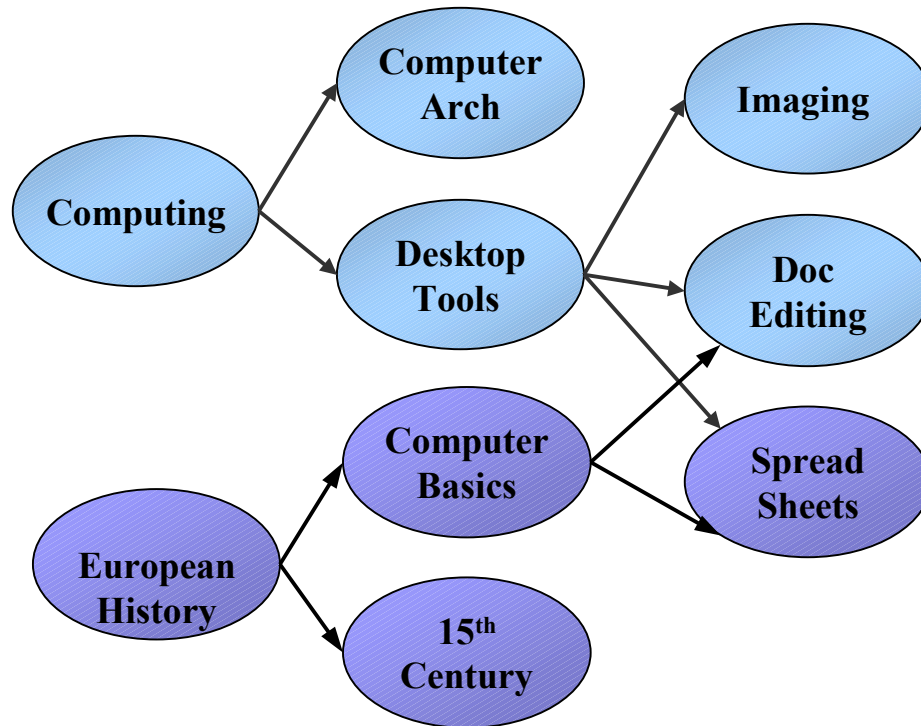
# eCMS Architecture Features

- 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 content providers
  - Metadata management
  - Content hosting
- 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

Statistic	Improvements
Keywords used in queries	User interface: thesauri, additional menus, navigation, drop down lists
Query hits	Metadata: design, descriptions, interface
Reviewed metadata records	Content and metadata
Support for module ratings and reviews by learners	Content and metadata

# 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



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