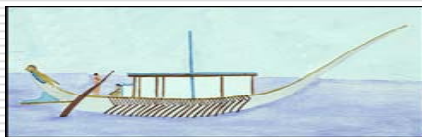


Task 3.10 – CoCoMA

Content & Context Aware Multimedia Content Retrieval, Delivery & Presentation

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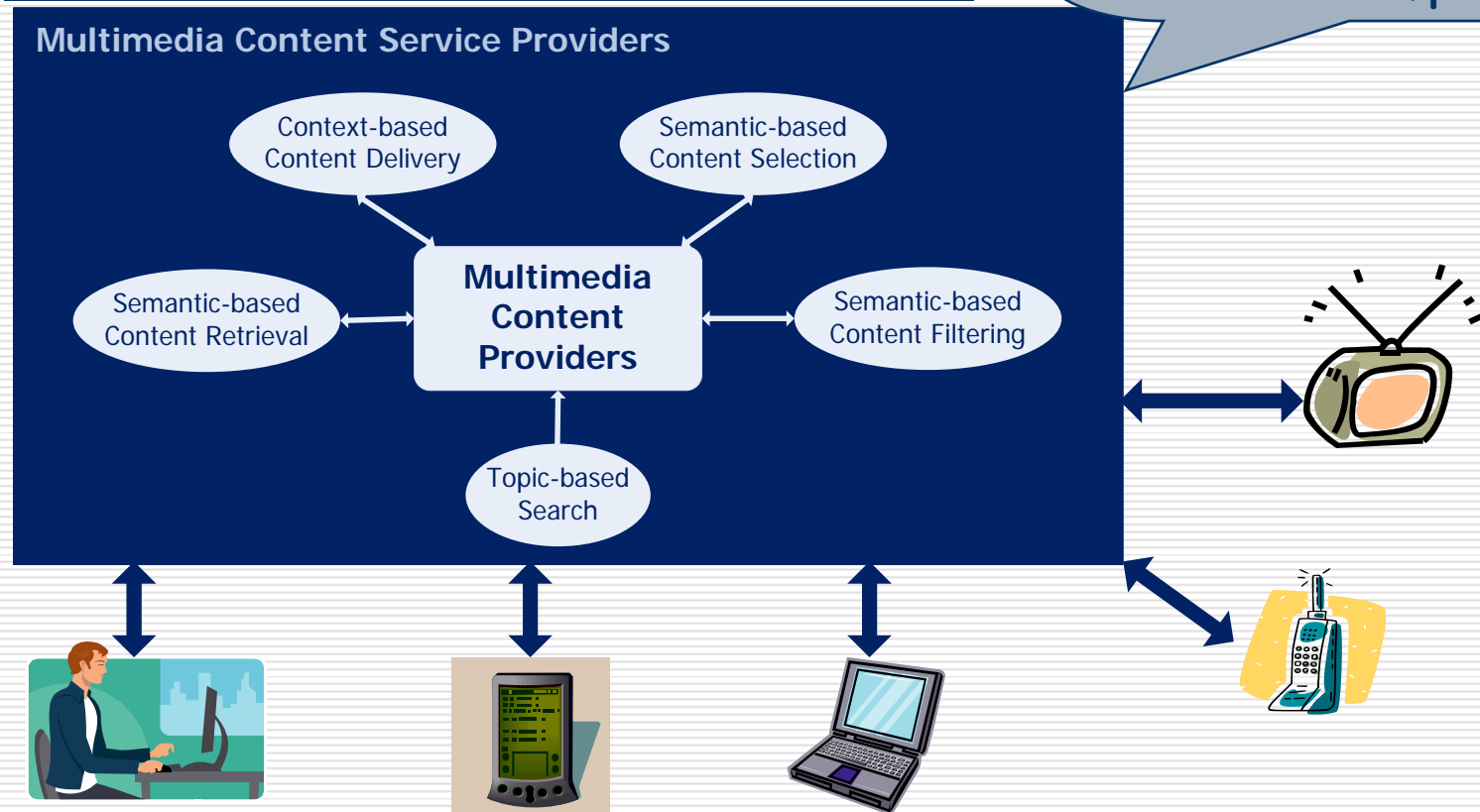
Presentation Overview

- Task 3.10 (CoCoMA) Description
 - Motivation
 - Objectives
- CoCoMA Demonstrator Architecture
 - Components Utilized and Extended in CoCOMA
 - Component Diagram
 - Flow Diagram
- JPA2 Activities
 - Technical Results
 - Task Coordination & Dissemination
 - Next Steps
- Task Extension in JPA3
 - New Research Directions and Objectives

Task 3.10 (CoCoMA) Description

Motivation

CoCoMA will support this scenario through the integration of **semantic content and context-based multimedia retrieval** with **personalized delivery and consumption**



Ideal Multimedia Content Consumption Scenario

Task 3.10 (CoCoMA) Description

Objectives

- Establishment of an MPEG-7/21 based Framework that:
 - Allows Content and Context –based Multimedia Retrieval
 - Supports Semantic User Preferences in MPEG-7/21
 - Supports Personalization of the Presentation Flow and Duration
 - Allows Context-based Audiovisual Content Adaptation

Task 3.10 (CoCoMA) Description

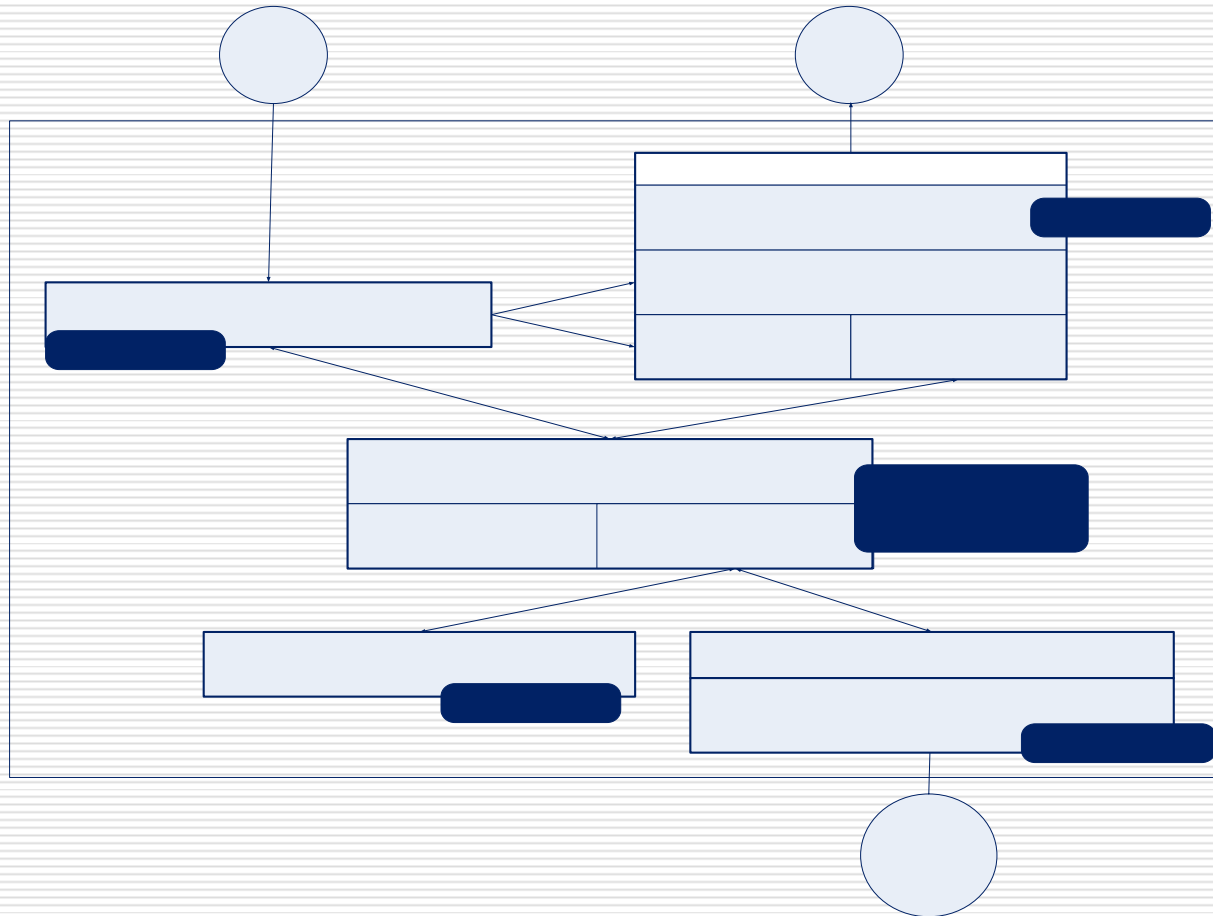
Objectives

- Development (in JPA2) of a Demonstrator that:
 - Allows Multimedia Content Retrieval and Delivery based on the Content Semantics
 - Includes advanced components developed by the partners for Multimedia Content Selection, Delivery and Personalization
 - Includes an innovative Semantic Multimedia Content Description Model and a Semantic Multimedia User Preference Model
- Exploit (in JPA3) better the strengths of the Demonstrator Architecture:
 - Evolution and integration of the Semantic Multimedia Content Description Model and the Semantic Multimedia User Preference Model with a Semantic Context Model
 - Exploitation of those models in all the aspects of the Multimedia Content Retrieval, Delivery and Personalization in Multimedia Content Networks

Components Utilized and Extended in CoCoMA

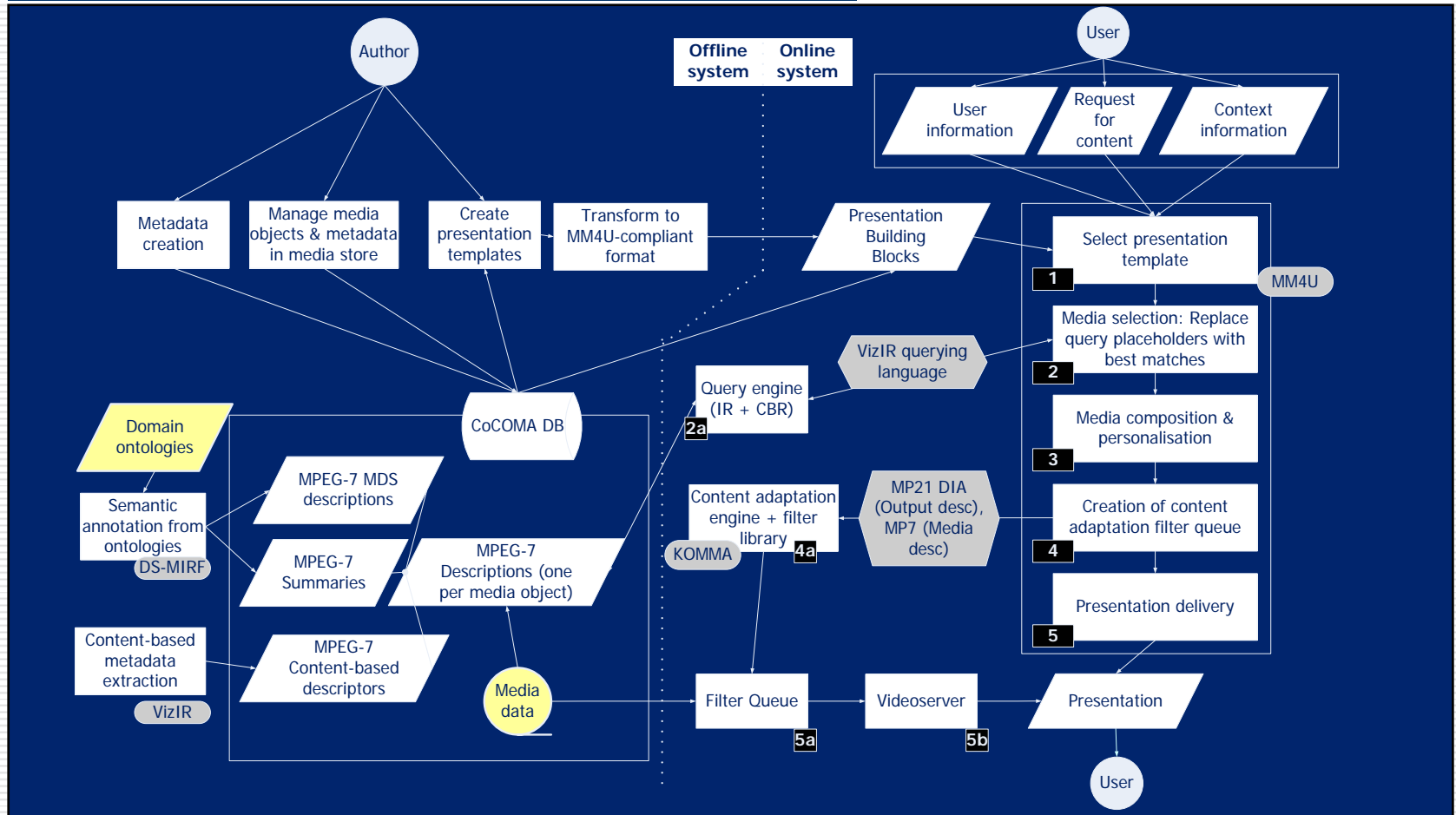
- ❑ **DS-MIRF (TUC/MUSIC):** Framework that allows OWL/MPEG-7 interoperability, domain ontology integration and supports semantic-based multimedia content retrieval and filtering
- ❑ **MM4U (OFFIS):** Generic and modular framework that supports multimedia content personalization applications
- ❑ **VizIR (TUV):** Content-based multimedia retrieval framework that also provides tools for media and media metadata visualization
- ❑ **Multimedia Authoring System (UNIMI):** Support for multimedia object presentation personalization according to users' preferences and skill levels
- ❑ **KoMMa (Klagenfurt University):** Open, extensible, and intelligent adaptation framework for multimedia data based on MPEG-7/21

CoCoMA Component Diagram



CoCoMA Demonstrator Architecture

CoCoMA Flow Diagram



Technical Results

- CoCoMA Architecture Specification & Agreement (Component Diagram)
- Specification of the Interactions of the CoCoMA Components (Flow Diagram)
 - Software Integration of the different Components is undergoing
- Design and Implementation of a Binding of VizIR to MM4U
 - Paradigms and Software for Dynamic Presentation Generation from CBR Queries
 - First Prototype (Personalized Photo Album Application)

Technical Results

- Design of an Authoring Model for Multimedia Presentation Specification and Generation
 - Implementation in a Prototype System
- Investigation of the potential use of Object Annotations for Presentation Personalization with respect to:
 - Presentation Duration
 - Content Preferences of the Users
- Ontology-based Semantic Annotation of MM Content
- Provision of an API to the CoCoMA DB (MPEG-7 Metadata Repository)
- Development of an OWL Ontology for Content Adaptation that partially captures the MPEG-21 DIA

Technical Results

- Specification of a Semantic User Preference Model for MPEG-7/21 that:
 - Follows the MPEG-7/21 Hierarchical Structure
 - Allows the utilization of Semantic Entities in User Profiles
 - Example: “I am interested in Zuninho’s goals”
 - Allows the explicit specification of Boolean Operators
 - Both between the Filter Hierarchy Components and inside the same component
- Implementation of the Semantic User Preference Model in:
 - MPEG-7 Syntax (Available at: <http://elikonas.ced.tuc.gr/ontologies/MPEG7ext/semUP.xsd>)
 - OWL (Available at: <http://elikonas.ced.tuc.gr/ontologies/AppOntos/SUserPreferences>)
 - Semantic User Preference Support for MPEG-7/21 in DS-MIRF is undergoing

Task Coordination & Dissemination

- ❑ CoCoMA Poster [1] in the DELOS Poster Session held in conjunction with ECDL 2005
- ❑ 2 Co-ordination Meetings in Vienna (25/4/2005 & 20/9/2005)
- ❑ 2 Researcher Exchanges:
 - Doris Divotkey (TUV ⇒ OFFIS)
 - Ansgar Scherp (OFFIS ⇒ TUV)
- ❑ 1 External (Univ. of Klagenfurt) Interested to become CoCoMA member
- ❑ Several Publications in National and International Conferences and Journals

Next Steps

- ☐ Software Integration of the remaining CoCoMA components
- ☐ Component Integration Testing
- ☐ Demonstrator Setup
- ☐ Design Report for the CoCoMA Demonstrator

New Research Directions and Objectives

- ❑ Integration of CBR (Content-Based Retrieval – based on low-level features) and SBR (Semantic-Based Retrieval)
- ❑ Development of a novel and innovative User Interface to formulate CBR and SBR Queries and access the result sets
- ❑ Optimize the Queries utilizing the User Preferences
- ❑ Automatic Media Transcoding and Adaptation Support

New Research Directions and Objectives

- ❑ Specification of a Presentation Personalization approach with respect to the Presentation Duration
- ❑ Specification of a Presentation Personalization approach according to the User Preference Descriptions
- ❑ Development of a Semantic Context Model
- ❑ Support for User Preference Description updates based on the Usage History

CoCoMA Publications

1. Stavros Christodoulakis, Chrisa Tsinaraki, Christian Breiteneder, Horst Eidenberger, Doris Divotkey, Susanne Boll, Ansgar Scherp, Elisa Bertino, Andrea Perego. "CoCoMA: Content and Context Aware Multimedia Content Retrieval, Delivery and Presentation", DELOS poster session in conjunction with ECDL 2005, September 2005, Vienna, Austria.
2. Elisa Bertino, Elena Ferrari, Andrea Perego, Diego Santi. "A Methodology for the Authoring of Multi-topic Multimedia Presentations". In: Proc. of the 1st DELOS International Workshop on Audio-visual Content and Information Visualization in Digital Libraries (AVIVDiLib 2005), Cortona (Italy), May 4-6, 2005, pp. 91-94.
3. Bertino E., Ferrari E., Perego A., Santi D., "A Constraint-based Approach for the Authoring of Multi-topic Multimedia Presentations". In: *Proc. of the IEEE International Conference on Multimedia & Expo (ICME 2005)*, Amsterdam (The Netherlands), July 6-8, 2005.

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4. Elisa Bertino, Elena Ferrari, Andrea Perego, Diego Santi. "Multimedia Presentation Authoring by using Content Constraints". In: Proc. of the 1st Italian Research Conference on Digital Libraries (IRCDL 2005), Padova (Italy), January 28, 2005
5. Scherp A., Boll S., "MM4U - A framework for creating personalised multimedia content". In: Managing Multimedia Semantics. Surya Nepal, Uma Srinivasan (Hrsg.). Idea Group, Inc., 2005
6. Tsinaraki C., Polydoros P., Kazasis F., Christodoulakis S., "Ontology-based Semantic Indexing for MPEG-7 and TV-Anytime Audiovisual Content". In Special issue of the Multimedia Tools and Application Journal on Video Segmentation for Semantic Annotation and Transcoding, August 2005
7. Divotkey, D., and Eidenberger, H., Content-based Querying Embedded in Multimedia Presentations, IEEE Multimedia Signal Processing Workshop, Shanghai, China, 2005

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8. C. Tsinaraki, S. Christodoulakis: "A Multimedia User Preference Model that Supports Semantics and its Application to MPEG 7/21", to appear in MMM 2006, Beijing, China, January 2006
9. C. Tsinaraki, S. Christodoulakis: "Semantic User Preference Descriptions in MPEG-7/21", In Proc. of HDMS 2005, Athens, Greece, August 2005
10. Leopold K., Jannach D., "A multimedia adaptation framework based on Semantic Web technology". In Proc. of the Multimedia and the Semantic Web Workshop, Hersonisos, Crete, June 2005
11. Eidenberger, H., Descriptor Evaluation for Visual Information Retrieval using Self-Organising Maps and other Statistical Methods, Multimedia Tools and Applications (accepted)
12. Divotkey, D., Eidenberger, H., and Divotkey, R., Artificial Intelligence and Query Execution Methods in the VizIR Framework, Journal of the Austrian Artificial Intelligence Society (ÖGAI), Vol. 24, No. 2, pp. 17-27, 2005

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13. Ansgar Scherp, Susanne Boll: "A lightweight process model and development methodology for component frameworks", Tenth International Workshop on Component-Oriented Programming (WCOP) Glasgow, Scotland, July 25–29, 2005
14. Wilko Heuten, Ansgar Scherp, Jörg Baldzer, Susanne Boll, Sabine Thieme, Palle Klante, Jens Krösche" "Advances in User-Centered Mobile Multimedia Applications", In: Handbook of Research on Mobile Multimedia, Ismail Kahlil Ibrahim (Ed.). To appear.
15. Ansgar Scherp, Susanne Boll: "Context driven smart authoring of multimedia content", ACM Multimedia Conference 2005, Singapore, November 6-11, 2005
16. Sabine Thieme, Ansgar Scherp, Melanie Albrecht, Susanne Boll, "Media Gallery TV - view and shop your photos on interactive digital television", ACM Multimedia Conference 2005, Singapore, November 6-11, 2005