Multimedia Metadata Management and t-learning Applications

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Objectives and context

- **Objectives of research:** Metadata management for audiovisual content to support intelligent video-content retrieval and e-learning services in digital TV (t-learning)
- **Context:** TV-Anytime framework, MPEG-7 and SCORM
  - Personal digital recorders
  - TVA servers
  - Mobile access
  - Integration of educational and video metadata
- **UPTV** and **KNOSOS** projects

Outline

- Ubiquitous Personalized TV Framework

- Metadata Management

- Semantic Metadata Management

- Support for t-learning

- Ongoing Work

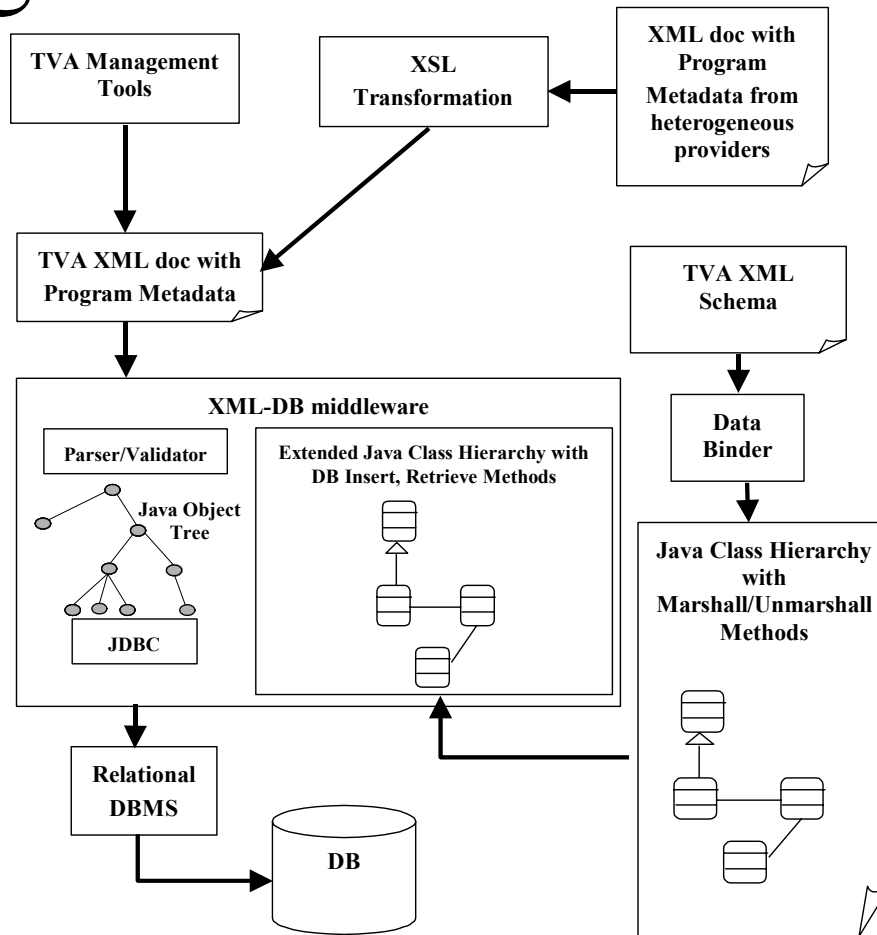# Ubiquitous Personalized TV Framework
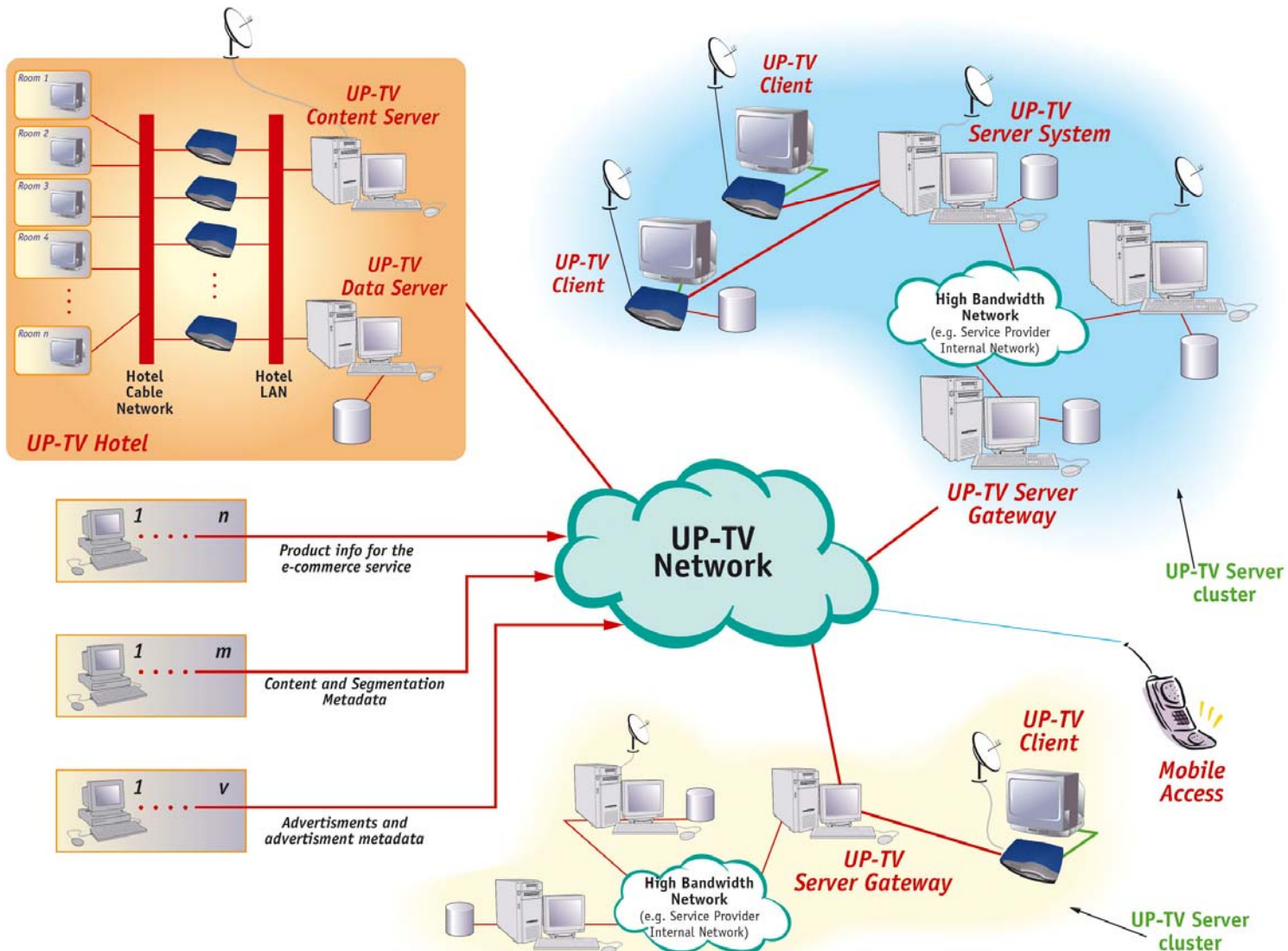
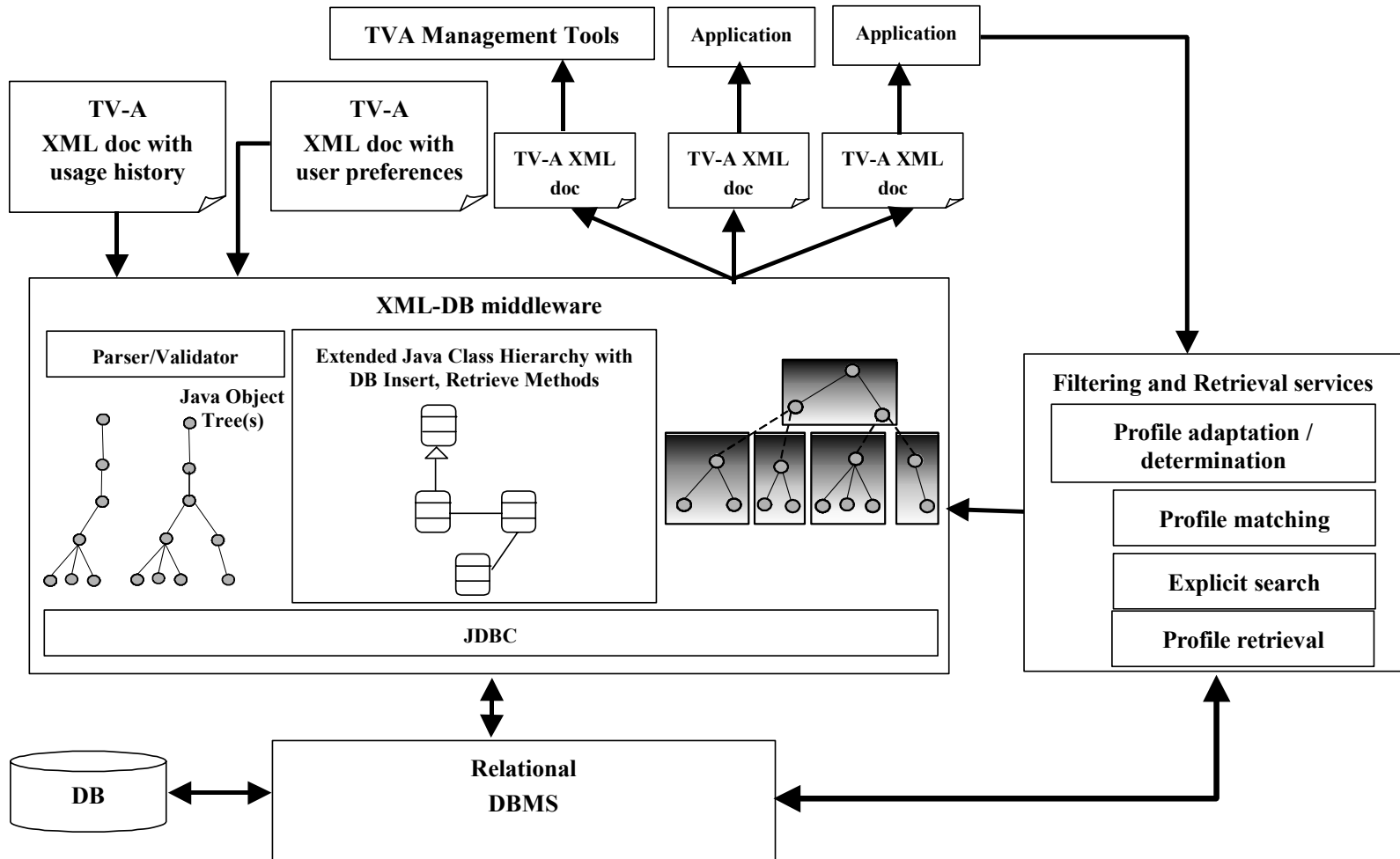# Metadata Management
Basic parts of TVA, MPEG7

- Programs – segments – summaries
- Filtering preferences – browsing preferences – usage histories
- Semantic metadata & ontologies
- Integration of SCORM metadata on program segments
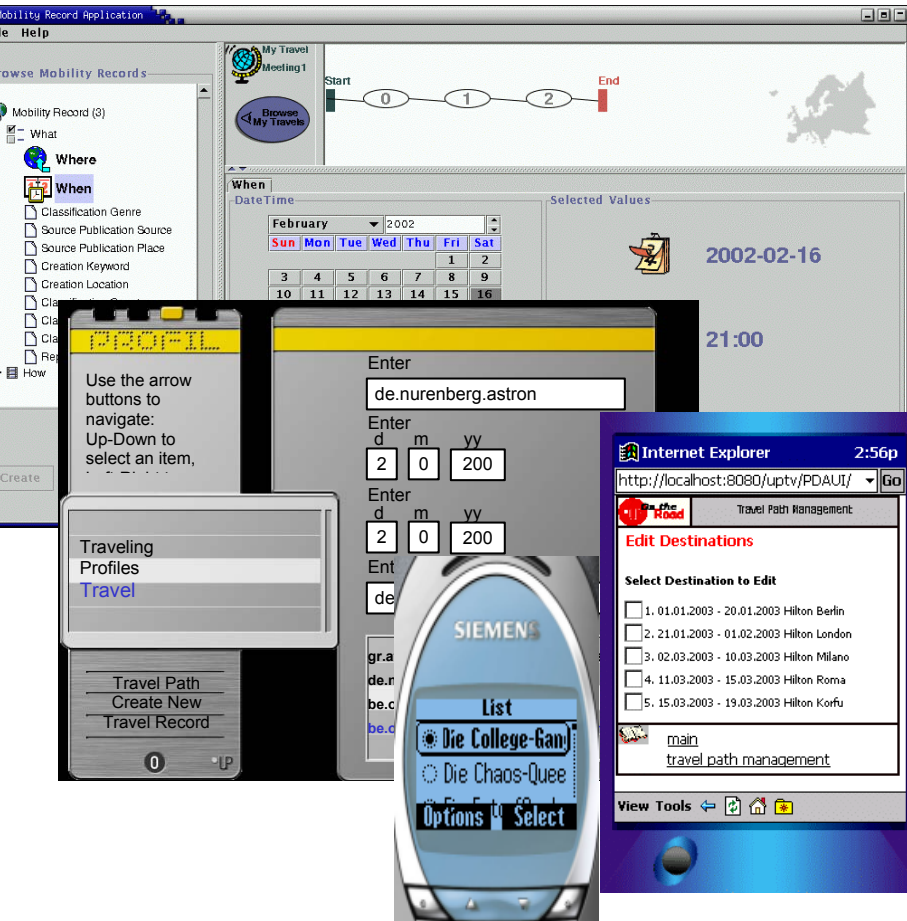
Metadata management Program metadata handling

Workshop on Metadata Management in Grid and P2P systems

Metadata Management
Personalization

TVA Management Tools

Application

Application

TV-A
XML doc with
usage history

TV-A
XML doc with
user preferences

TV-A XML
doc

TV-A XML
doc

TV-A XML
doc

XML-DB middleware

Parser/Validator

Extended Java Class Hierarchy with
DB Insert, Retrieve Methods

Java Object
Tree(s)

Filtering and Retrieval services

Profile adaptation /
determination

Profile matching

Explicit search

Profile retrieval

JDBC

DB

Relational
DBMS

Metadata Management Mobility support

- Mobile user profile (what, where, when, how)

- Profile migration & routing

- Distributed filtering

- Mobile/PDA as a remote control & browsing tool

- Quality adaptation mechanisms

Semantic Metadata Management An ontology driven framework

- TV-Anytime keywords are the only means to describe program segments

- The MPEG-7 semantic model is used to build domain specific ontologies. Transparent use by MPEG-7 applications.

- Coupling of OWL and MPEG-7 MDS for interoperability has been implemented

- Ontologies are used for filtering and retrieval of MPEG-7 multimedia content

- Semantic annotations are transformed into TV-Anytime segment keywords

Semantic Metadata Management

Overall workflow
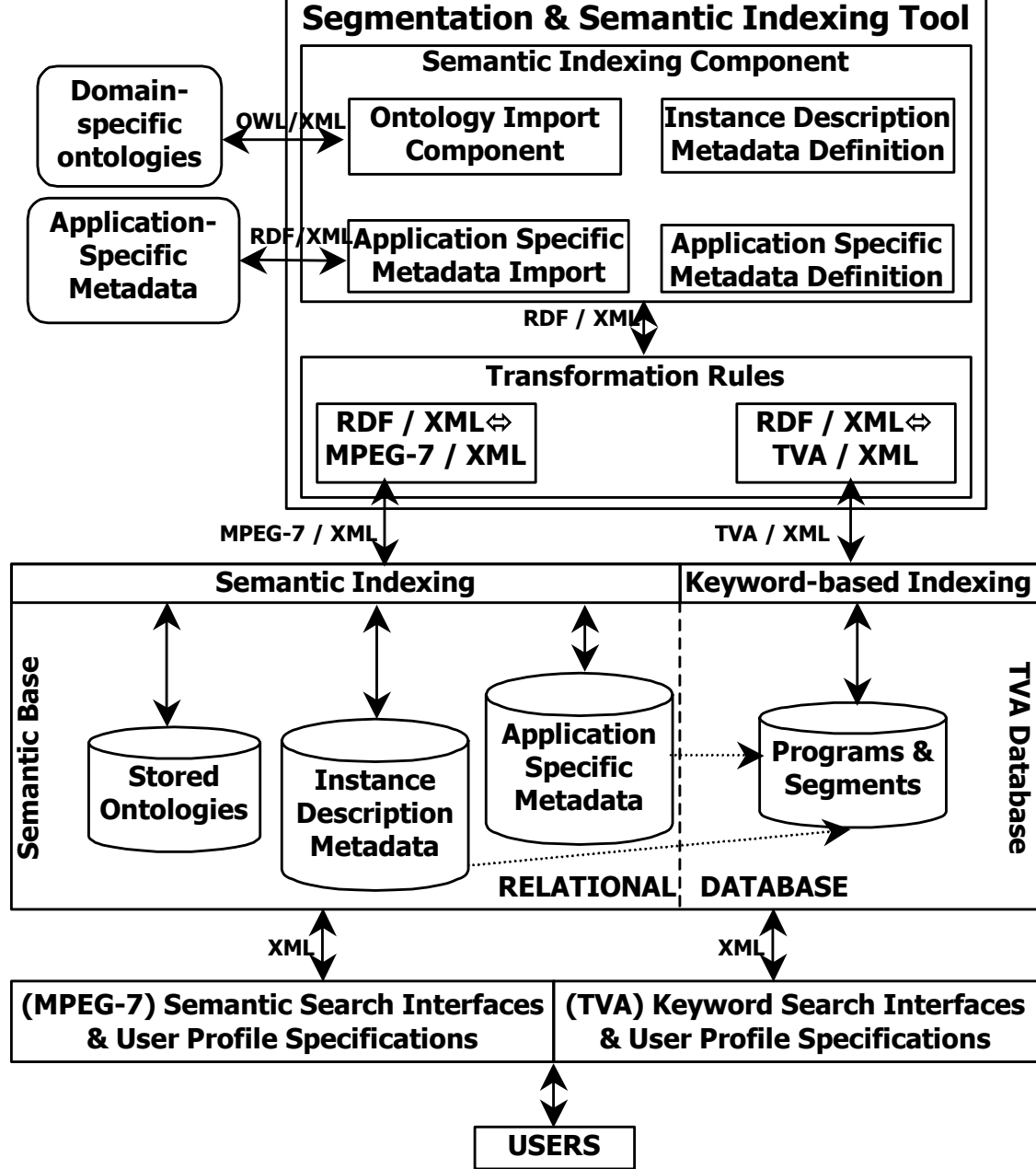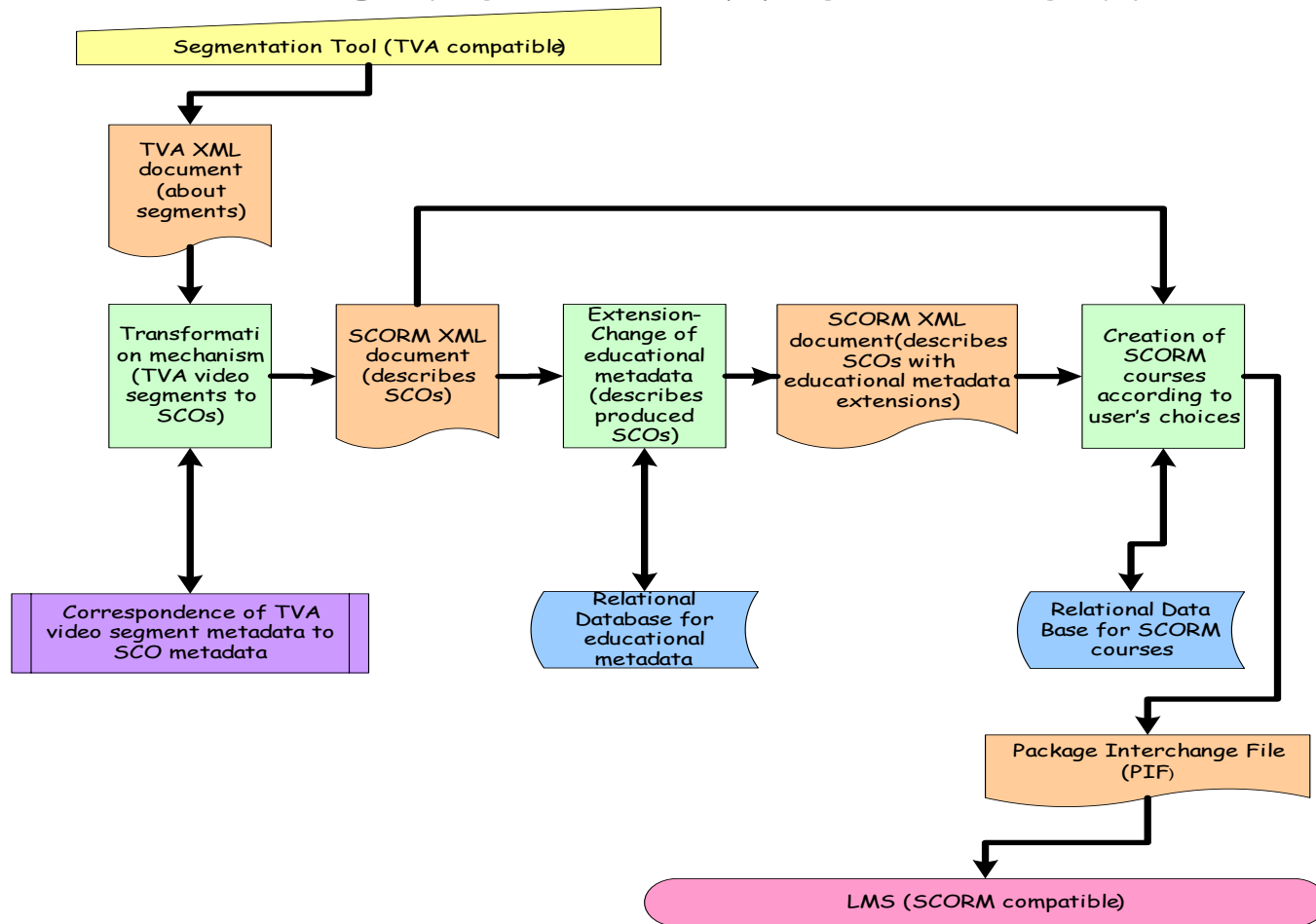
Support for t-learning Issues

- t-learning refers to the offering of e-learning services using digital TV technologies
- t-learning exploits the advantages of TV technologies and leverages on the already established TV infrastructure
- Objectives:
  - Provide interoperability for educational applications in different e-learning and digital TV environments
  - Creation of metadata for digital TV for educational purposes in order to offer educational experiences exploiting usual TV programs

Support for t-learning Metadata Management

- Baseline:
  - TV-Anytime
  - SCORM
- TV-Anytime program segmentation descriptions are integrated with SCORM descriptions
- TV-Anytime – SCORM mappings
- Additional educational metadata on TV-Anytime segments (SCORM parts not mapped on TV-Anytime)

Support for t-learning Overall Workflow

Segmentation Tool (TVA compatible)

TVA XML document (about segments)

Transformation mechanism (TVA video segments to SCOs)

SCORM XML document (describes SCOs)

Extension-Change of educational metadata (describes produced SCOs)

SCORM XML document (describes SCOs with educational metadata extensions)

Creation of SCORM courses according to user's choices

Correspondence of TVA video segment metadata to SCO metadata

Relational Database for educational metadata

Relational Data Base for SCORM courses

Package Interchange File (PIF)

LMS (SCORM compatible)

Ongoing Work

- Mapping SCORM educational metadata to the MPEG-7 semantic model (KNOSOS)
- Rich retrieval and personalization mechanisms for audiovisual libraries (DELOS NoE)
- Grid and P2P architectures for Digital Business Ecosystems (DBE IP)

References

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- Tsinaraki C., Fatourou E., Christodoulakis S., An Ontology-Driven Framework for the Management of Semantic Metadata describing Audiovisual Information, proceedings of CAiSE 2003 pp 340-356, 16-20 June 2003, Klangefurt-Velden
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