

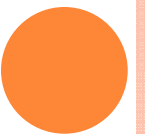
ADOPTION OF THE MPEG-21 DIGITAL BROADCAST ITEM MODEL (DBIM) TOWARDS QoS METADATA MANAGEMENT

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- (4) T-Systems Intl., [wolfi](mailto:wolfi@bernhard.feiten@t-systems.com) | bernhard.feiten@t-systems.com

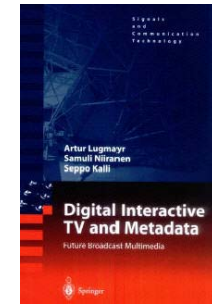
AGENDA

- Related Work
- Digital Broadcast Item Model (DBIM)
- ENTHRONE 2
- Mapping of ENTHRONE 2 and the DBIM
- Conclusion



ABOUT...

- o **Artur Lugmayr**
 - *creating entertainment experience technology*
 - www.cs.tut.fi/~lartur, lartur@acm.org
- o **NAMU – New AMBient MULTimedia research lab**
 - founder & head
 - Tampere Univ. of Technology / Dept. of Signal Proc. / Finland
 - focusing on ambient media & production technology
 - >3 projects (EU, nat., industry), >10 people, 12 MSc/year, 1-2 PhD/year, > 5 lectures
 - Centre of Excellence (CoE) Signal Processing, NOKIA Innovation Centre
 - <http://namu.cs.tut.fi>
- o **Dept. of Signal Proc. / Tampere Univ. of Technology (TUT)**
 - 200 people, 13 Professors, 50 M Euro budget
 - DVB-H/C/T testbed, High-Def. Prod. Lab, Audio Lab., ...
- o **School of Motion Picture, TV and Production Design (ELO), Helsinki, Finland**
 - student & 'freelance researcher
- o **News:**
 - www.portable-personality.org
 - www.mindtrek.org
 - www.uxtv2008.org
 - www.euroitv2008.org
 - **Suominator**



My vision is to create technologies for future entertainment experience systems



EuroITV.2008
6th European Interactive TV Conference - EuroITV2008
3 - 4 July 2008 in Salzburg, Austria

LugyTV brings together researchers and practitioners from diverse disciplines that include human-computer interaction, media studies, computer science, telecommunications, audiovisual design and management. The organizing committee invites you to submit original high quality papers addressing the theme „changing TV environments“.

Important Dates:

Tutorial and Workshop Proposals	December 7th, 2007
Full Papers	January 11th, 2008
Short Papers, Posters, Doctoral consortium, Demos	February 29th, 2008
Industrial Case Studies	April 25th, 2008

<http://www.EuroITV2008.org>

EuroITV2008 is organized by the HCI & Usability Unit, ICT&S Center of the University of Salzburg. General Chair: Manfred Tscheligi (University of Salzburg); Conference Co-Chairs: Marianna Obrist (University of Salzburg) & Artur Lugmayr (Tampere University of Technology)

MINDTREK

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MindTrek Competition

MindTrek Competition is arranged for the 11th time. We will give awards to the best and most innovative digital media products and services. The MindTrek Competition categories 2007 are:

- MindTrek Grand Prix (20 007€)
- Elisa Labs MindTrek Awards (10 000€)
- Nokia Usability MindTrek Awards - International (7 000€)
- Tampere MindTrek Awards (4 000€)
- My Tampere (2 000€)
- Student Awards (1 000€)

The winners celebrate in the MindTrek Awards Party, on Wednesday October 3rd. All conference guests are invited to the party. The Awards party will be held in Grandis Hotel&Spa.

Welcome to uxTV 2008!
First International Conference on Designing Interactive User Experiences for TV and Video

October 22 - 24, 2008
Silicon Valley (San Francisco Bay Area), California, USA

The **uxTV 2008** conference will bring together researchers and designers of interactive user experiences for TV and Video from academia and industry. The Silicon Valley is home to top companies in new video and television technologies. Outstanding papers, demos and speakers will make **uxTV 2008** the best conference for designers and researchers in this field. Join us in Silicon Valley in October 2008.

Invited Speakers

 Jakob Nielsen Principal Nielsen Norman Group	 Elissa Lee Senior Director Research Group TUC	 Gunthar Harwig Senior UX Designer YouTube	 Dale Herigstad Chief Creative Officer Schematics
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> Second call for papers (March 3, 2008)

> Now accepting submissions for

- long papers
- short papers/posters
- tutorials
- workshops
- doctoral consortiums
- demos

Portable PERSONALITY

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WELCOME TO THE PORTABLE PERSONALITY HOMEPAGE

Thursday, 27 September 2007 14:00

The **Portable Personality**, also called **PP**, is an extensive research project hosted by the New Ambient Multimedia Research Group embedded in the Centre of Excellence of Signal Processing (SPAG) at the Tampere University of Technology in Finland. The key-idea of the development is to create an intelligent digital environment of invisible technology surrounding a mobile consumer. The central technologies are intelligent systems and mobile devices such as PDAs and mobile phones.

Get a glimpse at the **PP** concept by watching a short introduction presentation. Once opened you can navigate through the slides by using the arrows in the upper corners.

 a short introduction

Yohar Bruus, Simon Neymann / Tampere University of Technology
New Ambient Multimedia Research Group

RELATED WORK

○ Standards, Associations, and Initiatives

- MAF for Digital Multimedia Broadcasting. (ISO/IEC 23000-9 : FCD).
- Moving Picture Experts Group (MPEG), <http://www.chiariglione.org/mpeg/>.
- MXF, "Material eXchange Format (MXF)," <http://www.mxf.org/>, <http://www.mxf.org/>.
- Pro-MPEG Forum, "Asset Management: Working together with MXF."
- TV-Anytime Forum, "TV-Anytime," <http://www.tv-anytime.org>.
- L. Yutu, H. N. Anne, and Z. Z. Liang, "QoS computation and policing in dynamic web service selection," in *Proceedings of the 13th International World Wide Web Conference on Alternate Track Papers & Posters* New York, NY, USA: ACM Press, 2004.

○ Digital Broadcast Item Model (DBIM)

- Future TV, Future Interaction TV Project, HCTV Project (500k, TEKES, 1999-2004)
- I. Kaneko, A. Lugmayr, S. Kalli, A. B. Touimi, J.-N. Kim, C. Alberti, S. Yona, J. Kim, and M. T. Andrade, "MPEG-21 in Broadcasting - Role in the Digital Transition of Broadcasting," in *Proceedings of the 1st International Conference on E-Business and Telecommunication Networks (ICETE)*, 2004
- A. Lugmayr, S. Niiranen, and S. Kalli, *Digital Interactive TV and Metadata - Future Broadcast Multimedia*: Springer New York, 2004, <http://www.springeronline.com/sgw/cda/frontpage/0,10735,5-175-72-26593988-0,00.html>
- A. Lugmayr, A. B. Touimi, I. Kaneko, J.-N. Kim, C. Alberti, S. Yona, J. Kim, M. T. Andrade, and S. Kalli, "MPEG-21 in broadcasting: the novel digital broadcast item model," in *Real-Time Imaging*, California, 2004.

○ ENTHRONE 2

- L. Artur, "The ENTHRONE 2 Metadata Management Tool (MATool)," in *WISE 2008 in association with the AICCSA 2008*, 2008.
- M. Berg and A. Pohl, "ENTHRONE - End-to-End QoS through Integrated Management of Content, Networks and Terminals," IFA 2005, 2005
- ENTHRONE, "End-to-End QoS through Integrated Management of Content, Networks and Terminals," IBC 2005, 2005.
- <http://www.enthrone.org>



OBJECTIVES OF THE DIGITAL BROADCAST ITEM MODEL (DBIM)

The conceptual framework of the Digital Broadcast Item Model (DBIM) is a novel purely metadata driven approach introduced by Artur Lugmayr on top of existing metadata standards (e.g. MPEG-21, TV-Anytime, MPEG-7) in broadcast context to distribute, create and harmonize metadata based digiTV services.

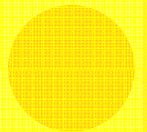
- **harmonize and combine existing opened metadata standards;**
- **sharing, development and exchange of broadcast related multimedia assets between contributing parties by transparent data interchange levels;**
- **provision of an abstract workflow framework for life-cycle management;**
- **open ofr integration, interoperability, and harmonization of emerging definitions;**
- **enabling and supporting ontology and taxonomy development;**
- **rapid content development and distribution;**
- **provision of broadcast focused services and use scenarios;**

The DBIM framework especially focuses on metadata families for consumer oriented service design, newly emerging digiTV service types, rapid deployment and creation of services for broadcast and feedback channel, and MPEG-21 system implementation for broadcast context.

The framework consists of several elements, including architectural building blocks, metadata categories, MPEG-21 broadcast life-cycle, metadata building blocks, linkage metadata definitions, local facilities, and service architecture development.

Spatial and temporal aspects are packaged into MPEG-21 Digital Items (DIs), where sub-elements and components are introduced for different service aspects (e.g. feedback channel services). The goal is the presentation of a unified life-cycle of a metadata driven digiTV environment.

*The research work was carried out within the future, interaction TV project
(www.cs.tut.fi/~fiTV)*



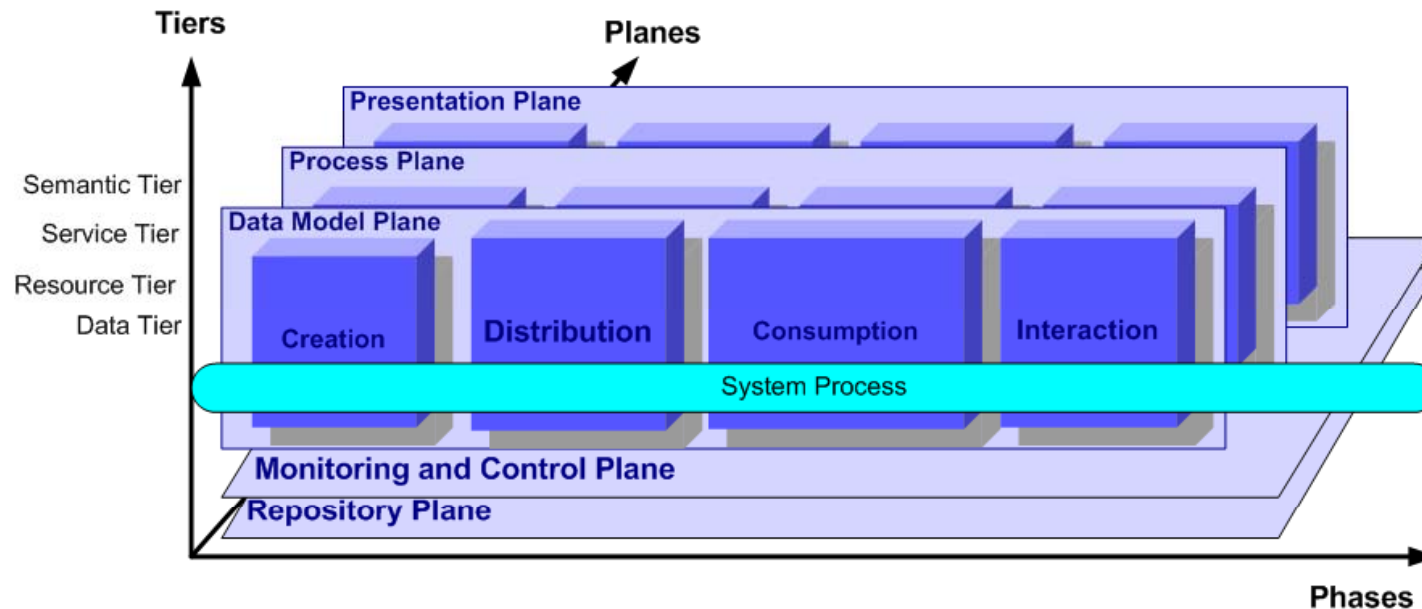
DIGITAL BROADCAST ITEM MODEL OVERVIEW

○ Approach

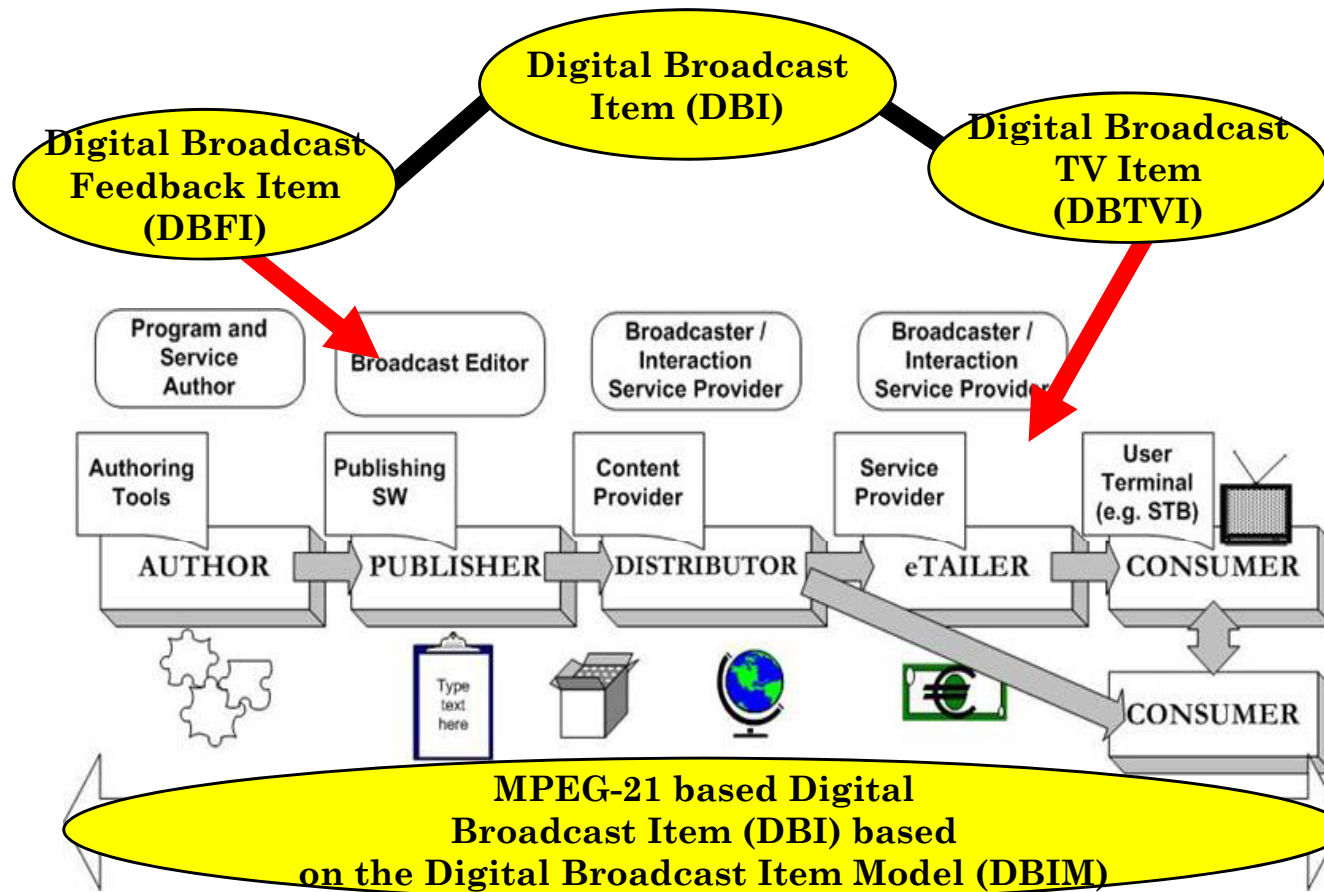
- System analysis approach
- Abstract service architecture
- Unified work-flow model for broadcasting
- Metadata building blocks
- Multimedia broadcast profiles
- Behaviour & functionality description

○ Components

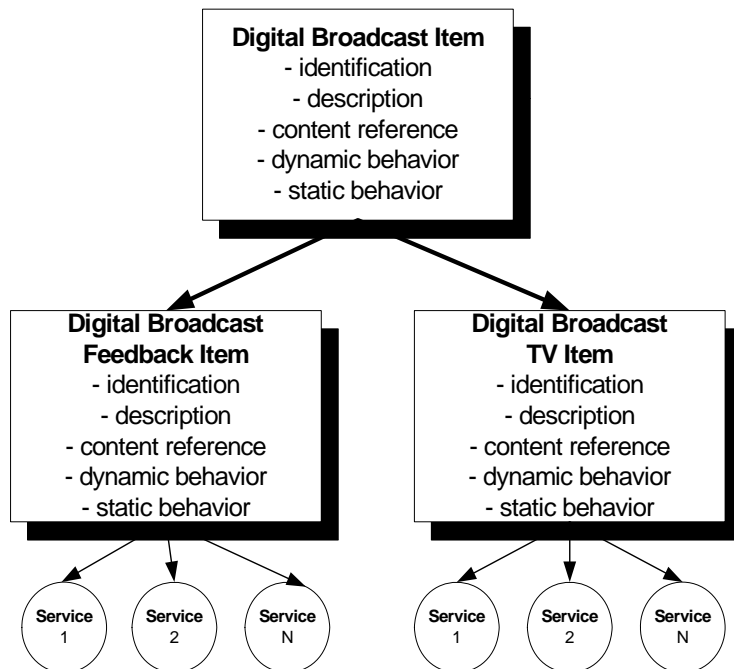
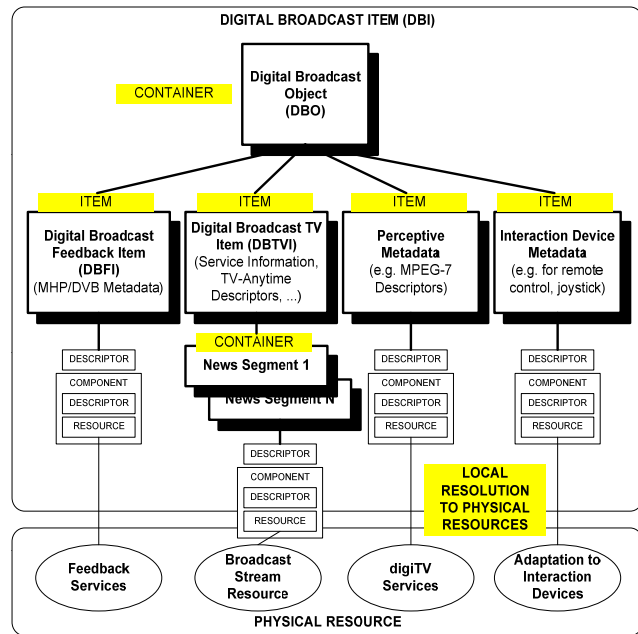
- Content centric workflow
- System reference architecture
- Metadata driven data model
- Metadata templates



DIGITAL TV VALUE CHAIN



DIGITAL BROADCAST ITEM MODEL (DBIM)



“The development of an MPEG-21 based Digital Broadcast Item (DBI), which is a configurable, uniquely identified, described by a descriptor language, logical unit for structuring relationships among elements of broadcasted content by referencing to concrete resources of individual broadcast related assets. The end-user perceives it as one entity and as access point to a distributed service pool. DBIs are DIs, that are especially configured for broadcast use.”

[IEEE-ICME 2002, Applying MPEG-21 in digital television – Example Use Scenarios: ePostcard, eGame, eTicket, Lausanne, Switzerland, 2002]

E-Ticket User Registration

You can automatically register yourself to be an user of our E-Ticket service by filling out and submitting this form. Only registered users are allowed to avail the facilities of the various E-Ticket services. This information will be kept in a secure database. We assure you that any information you provide through this form will be kept confidential.

Registration Form

(Please note that all the fields have to be filled in)

Surname: First Name(s):

Sex: Male Female Age:

Address:

Telephone:

E-mail:

After you have completed filling
After this you will get

Login

If you have already registered with us, please enter your email address and password to login. Your email is required as means of validating you as a user.

Email:

Password: [Forgot your password?](#)

If you are not registered with us please use the [New User Registration form](#)

E-Ticket System

Ice Fishing Competition Tampere 2002 **MTV5**

Analysis:
Olli the Fishmaster
3 kg fish / 2 h
4 holes

Competitors
[1] Olli
[2] Anurag
[3] Satu
[4] Sami

Legend:
● Hyperlinks (Red)
● Active Graphics (Green)
● Menu (Yellow)
● (Blue)

Hyperlinked TV

nTV Active Content

File Edit Control Help

Bounding Box Hyper Link Preferences Load Metadata Load Movie File Simulate

Run-Time Project Video Editing Broadcast Metadata

Project Explorer

Preferences & Customizations

Run-Time Preferences and Settings

Stream Source Metadata Run-Time Visualization

Source RTP

RTP Configuration

IP Address 130.230.12.235

Base Port 15500

File Configuration

1. Browse File...

OK Cancel

Visualization View

RTP Streaming with MPEG-7 Overlay

Service List

Icon	Id.	Service Name	Description	Status	Manage Options
	4	Thales Management			<input type="button" value="Manage"/>
	3	Movie Database			<input type="button" value="Manage"/>
	2	Stream MPEG-7 BiM Files			<input type="button" value="Manage"/>
	1	Chat Server			<input type="button" value="Manage"/>

[Remove Service] [Add New Service] [Update Service]

Description: Currently following services are available for managing. New additional services can be updated by the menu bar below.

Interpretation: A green button (●) means service is up, a yellow button (●) means service is being processed or paused, and a red button (●) means there is a fatal error with this service.

Status Information

Image	Date/Time	Event	Description	Ref. Number
	24/09/2002-10:05	Chat server exception.		
	24/09/2002-10:01	Chat server started.		

[Update Status Information]

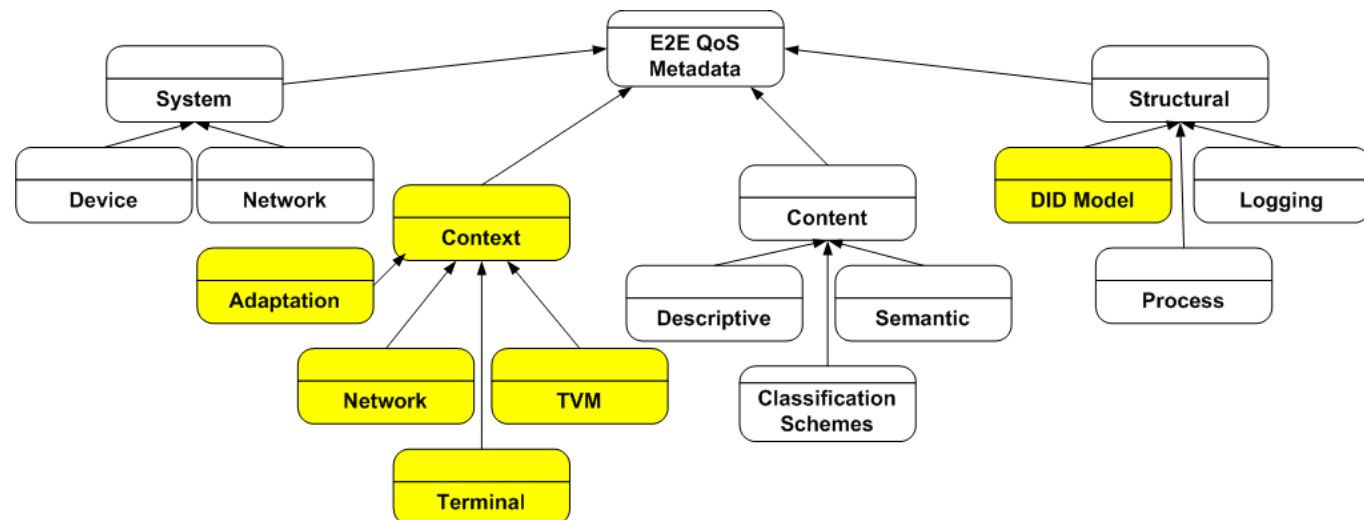
Description: This is the log file of the most five recent events happened during the previous time.

Interpretation: This information is the current status log of the broadcast service architecture. A (●) means a normal log event, a (⚠) is a critical system bug, and (●) requires end user interaction for this service.

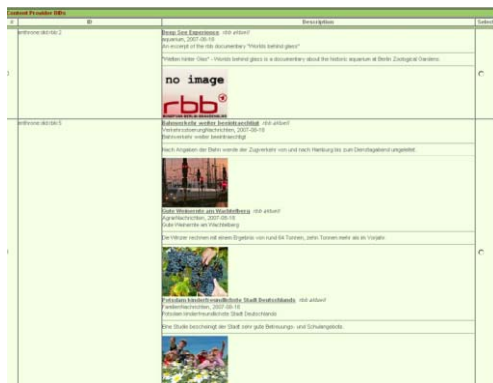
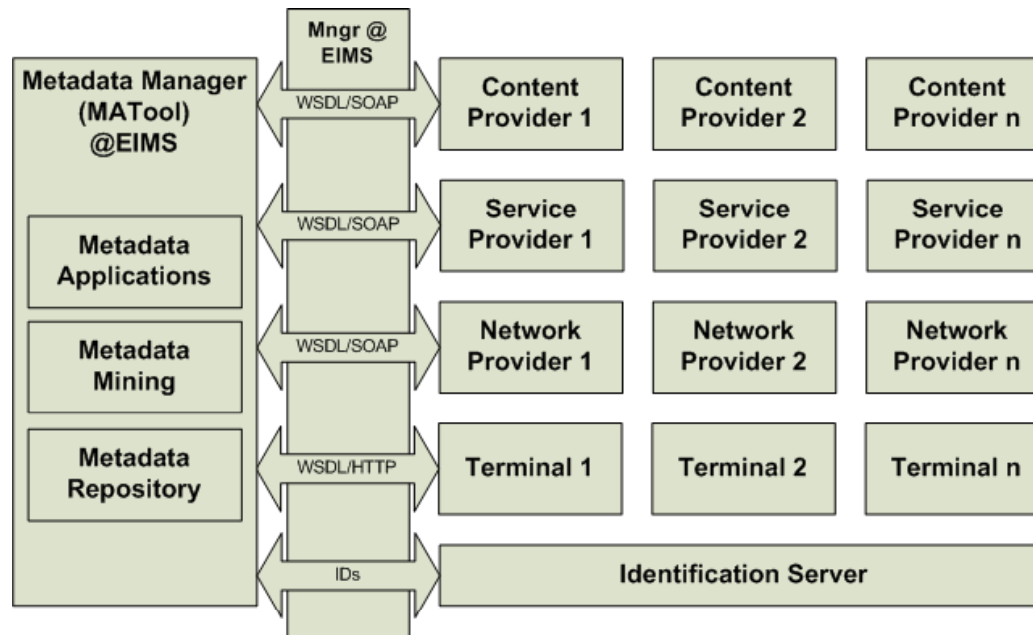
Asset and Server Management

ENTHRONE 2 E2E QoS METADATA TYPES

- *content metadata*
instantiated at the content provider or service provider side (e.g. content descriptions, TV-Anytime metadata of program descriptions);
- *context metadata*
instantiated at the consumer side. Examples are terminal information (MPEG-21 UED), consumer information, or perceivable QoS (PQoS) metadata;
- *network metadata*
is instantiated at the network provider side and includes information to be capable of coping with content adaptation and network capabilities;
- *service metadata*
instantiated at the service provider side. Often consumer metadata is collected by the service provider, as the service provider is the first access portal for the consumer (e.g. PQoS is forwarded by the terminal);
- *process metadata*
instantiated by processes within the system. Examples are adaptation decisions as output from the ADTE, network monitoring information, TV-Anytime personalization decisions, or adaptation node monitoring.



METADATA MANAGEMENT IN ENTHRONE 2



```

MetadataAggregatorWS
  listMPEG7
  uploadMPEG7
  downloadMPEG7
  deleteMPEG7
    
```

```

MetadataAggregatorWSPortBinding soap doc
transport: http://schemas.xmlsoap.org/soap/http
  listMPEG7 def
  uploadMPEG7 def
  downloadMPEG7 def
  deleteMPEG7 def
    
```

```

MetadataAggregatorWSService
MetadataAggregatorWSPort
Location: http://localhost:8080/IMATool3/MetadataAggregatorWS
    
```

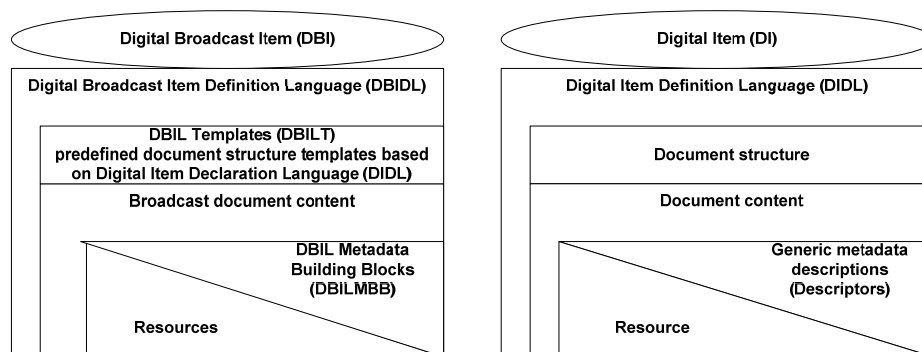
MATool FUNCTIONALITIES

- **metadata aggregation**
(EIMS Metadata Aggregation Manager):
 - aggregation and enrichment of metadata from different metadata sources, verified by the offline interface based service provider workflow demonstrator;
- **metadata collection**
(EIMS Metadata Collection Manager)
 - collection of contextual metadata and providing the metadata to different components of the EIMS, verified by the online real-time interface for the collection of contextual information demonstrator;
- **metadata conversion**
(EIMS Metadata Conversion Manager)
 - conversion of metadata between different metadata formats, verified by the offline interface MXF2TVA converter.



COMPARING THE DBIM WITH ENTHRONE 2 METADATA MODEL (1)

- focus on asset/service management
- provides fixed typing of MPEG-21 DIDs
- generic metadata dictionary based
- DVB-C/T/S as distribution channel
- management platform centralized
- strongly broadcaster requirements focused
- management of production metadata (e.g. MXF)
- focus on QoS parameter management
- loose typing of MPEG-21 DIDs
- additional metadata blocks for QoS management
- new workflow models for coping with end-to-end
- specific metadata dictionary
- IP as distribution channel
- distributed EIMS as management platform
- not clearly broadcaster centered
- no production workflow integrated



COMPARING THE DBIM WITH ENTHRONE 2 METADATA MODEL (2)

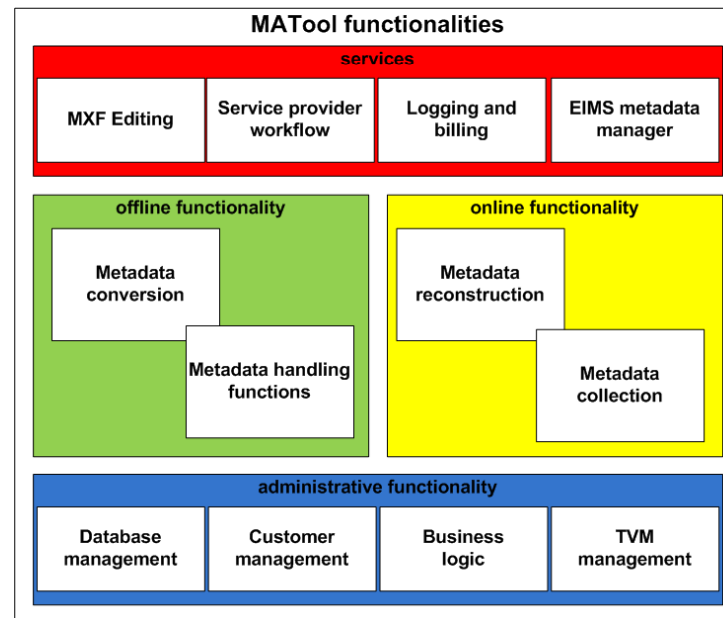
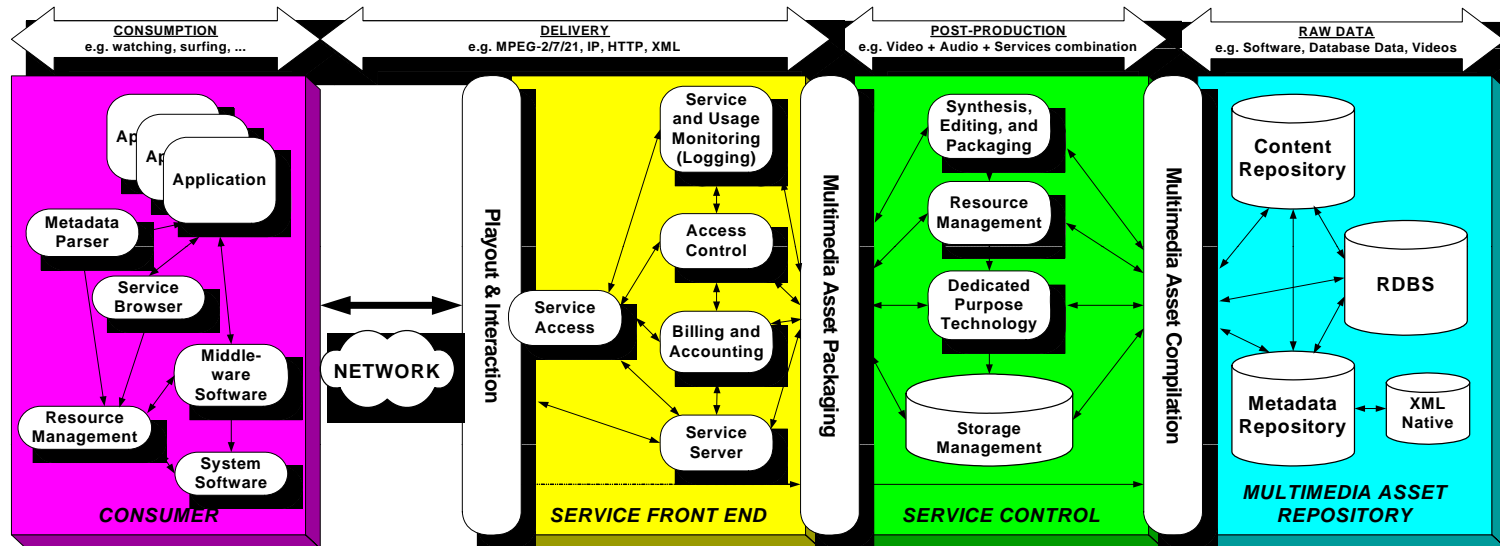
- adaptation only as one functionality
- easy management/collection/synchronization of metadata
- full system model
- protocol and underlying system architecture driven
- adaptation as main functionality
- synchronization/collection/management of metadata tricky
- partial system model
- web-service driven

DBI Type Templates	Description	Potentials for ENTHRONE 2
DBI Creation Type (DBI-CT)	DI for content management, packaging and binding of metadata to resources <i>(similar to the ENTHRONE 2 CP DID)</i>	Extension towards ingest related metadata, especially focusing on the use of MXF for TVMs
DBI Multimedia Home Type (DBI-MHT)	Metadata sent to consumer devices with any document structure but mandatory consumer device metadata	Currently not used in ENTHRONE 2
DBI Feedback Type (DBI-FT)	Metadata to enable feedback channel services with any document structure but mandatory feedback channel descriptors	Currently not used in ENTHRONE 2
DBI TV Type (DBI-TVT)	Metadata in complete form ready for playout, obligatory playout information <i>(similar to the ENTHRONE 2 SP DID)</i>	Extension towards service provider related metadata, especially focusing on the service provider workflow e.g.
DBI Generic Type (DBI-GT)	Metadata for generic usage, any structure and metadata in form of descriptor/value types are required	Basic DID for the management of content



METADATA MANAGEMENT ARCHITECTURE

DBIM vs. ENTHRONE 2



CONCLUSION

- Adoption of the DBIM to ENTHRONE 2 promises a content centric workflow
- The content centric workflow allows each value-chain partner to have unified interfaces to access content packaged together with metadata.
- The DBIM is mostly focused on content/asset management not purely on QoS
 - The implementation of the MATool solved this issue by separating the metadata collection with a real-time metadata management interface
- The DBIM uses strictly structured and typed DIs, it is more suitable for systems requiring specific metadata formats and types
 - ENTHRONE 2 DID templates are focusing in the EIMS use-case which is too generic
- DBIM provides a system wide solution in the case of broadcasting from production to consumption

