
Digital Archiving of Audiovisual Material Pilot Projects in Europe

Fraunhofer Digital Cinema

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Joint Technical Symposium 2010
Digital Challenges and
Digital Opportunities
in Audiovisual Archiving

Oslo, May 2 – 5, 2010



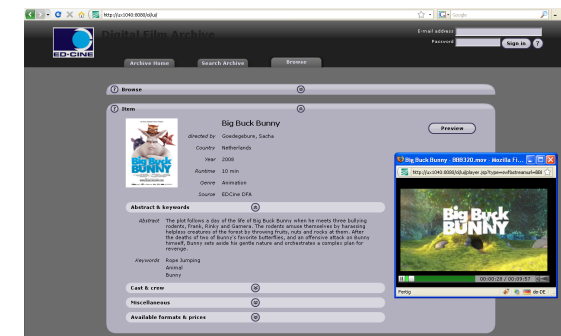
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1. Introduction

What happened before?

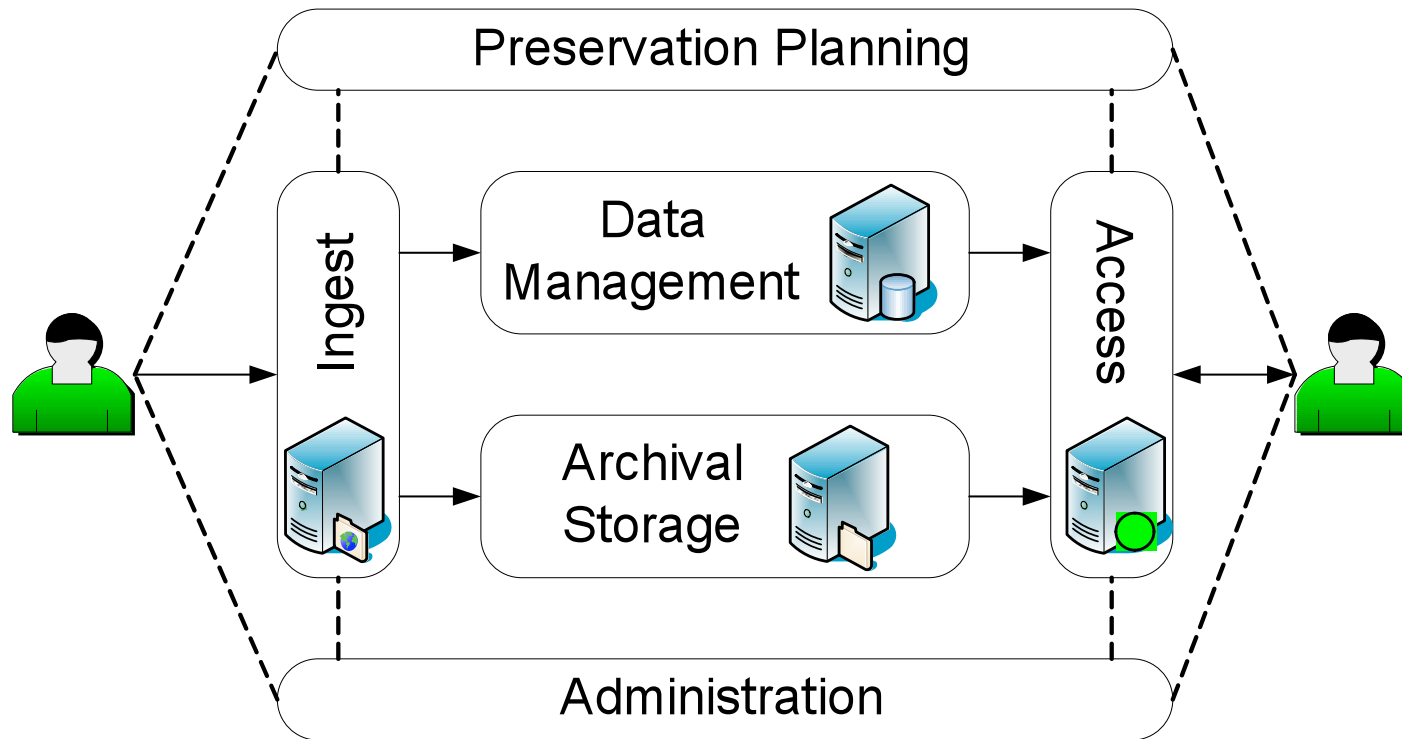
The EDCINE project

- User requirements, specification
- General process and system concept developed
 - use of open standards: JPEG 2000 and MXF
 - sustainable (as far as possible)
- JPEG 2000 profiles for film archiving standardised in ISO
- Demonstration system developed and tested
- EDCINE ran from August 2006 to July 2009



2. EDCINE for Archives – the general concept

Ingest – Preservation – Access



OAIS Reference Model (ISO Standard 14721:2003)

2. EDCINE for Archives – the general concept

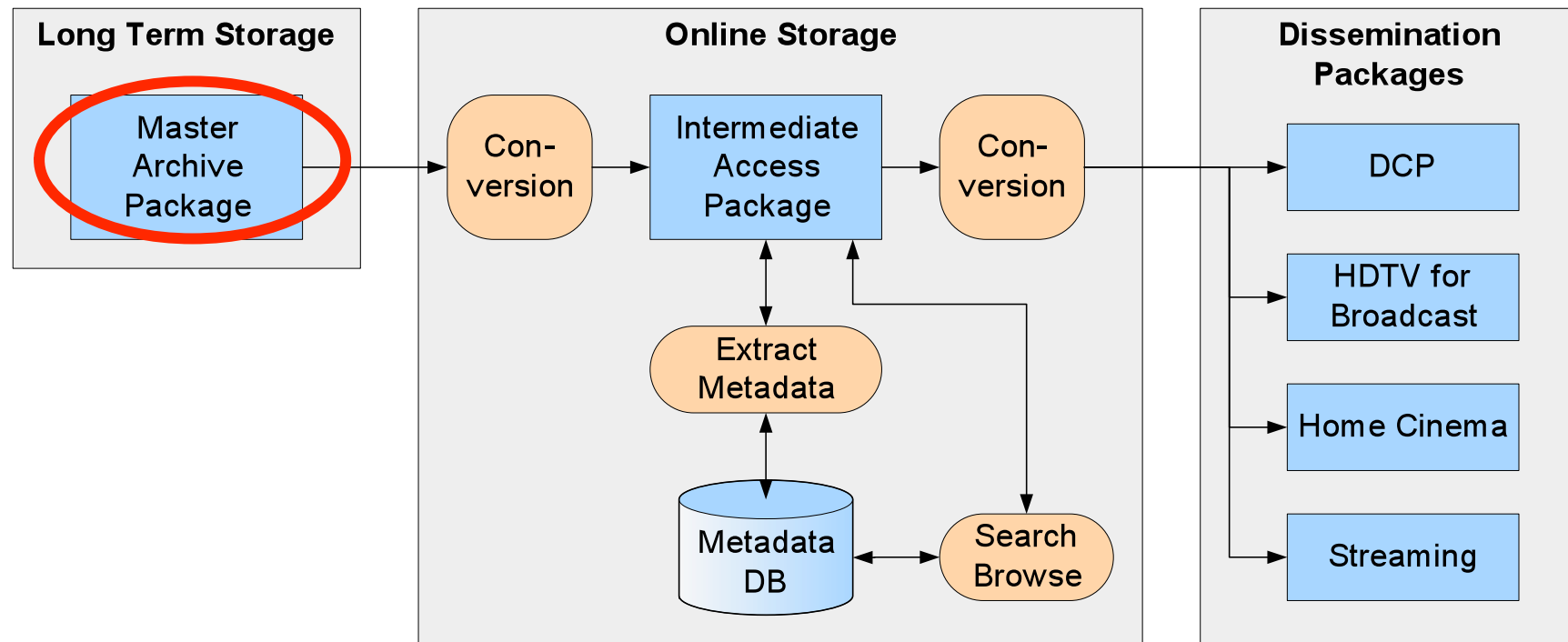
JPEG 2000 – MXF – 2-Tier Storage Approach

How does it work?

- Use of standardised formats
- JPEG 2000 for image compression
- Uncompressed multi-channel, multi-language audio
- MXF for
 - Wrapping of images and sound, time code etc.
 - Metadata
- Two storage packages:
 - for long-term preservation: Master Archive Package (MAP)
 - for access: Intermediate Access Package (IAP)

2. EDCINE for Archives – the general concept

Two-tier storage data format, access on demand



2. EDCINE for Archives – the general concept

JPEG2000 ISO Profiles Relevant for Digital Movies

Profile	2k Distribution Profile	4k Distribution Profile	2k scalable Archive Profile	4k scalable Archive Profile	Master Archive Profile
Profile Indicator	3	4	5	6	7
Max Resol.	2048x1080	4096x2160	2048x1080	4096x2160	16384x8192
Quality Layer	1	1	2	2	<=5
Components	3	3	3	3	<=8
Bitrate	<=250MBit	<=250 MBit/s	<=250MBit/s for Layer0 <=500MBit/s for Layer1	<=250MBit/s for Layer0 <=500MBit/s for Layer1	Lossy and lossless
Purpose	DCP	DCP	IAP (compatible with Profile 3)	IAP (compatible with Profile 4)	MAP

3. Digital A/V Archiving Pilot Installations

A joint approach of several European archives

Goal: gain experience with file-based digital A/V archiving

- Bring EDCINE concept to life in different environments
- Collect practical experience with a small collection first
- Identify problems and opportunities; evaluate processes
- Participating archives:
 - Cinémathèque Royale de Belgique
 - National Audiovisual Archive, Finland
 - Danish Film Institute
 - Imperial War Museum, UK
- Working name: "**FIAF Archival Transcoding Engine**"

3. Digital A/V Archiving Pilot Installations

The idea

What do we want to do?

- Digitise, scan and convert material into the JPEG 2000 archive formats
- Store, handle and manage the archive packages
 - Online: hard disks
 - Offline: data tapes
 - Migration
 - Quality control
- Search, browse, preview archived material
- Create different end-user formats from archive packages
- Everything in a compact, affordable system that is easy to use

3. Digital A/V Archiving Pilot Installations Requirements

What do the participating archives need?

- Support for different source formats: film, video, files etc.
- Support for different output formats: DPX, DCP, H.264, Flash etc.
- Quality control during ingest and in the archive
- Playback of archived material
- Data management
 - Management of files on disks, tapes in robot, tapes on shelf
 - Database with metadata and connection to existing catalogues
- In general: defined processes and workflows for all important tasks
- Guidelines for compression settings, necessary preservation metadata, ...
- Definition of “sub-profiles” for different source media types

3. Digital A/V Archiving Pilot Installations Requirements – Source Fomats

We start with these formats:

- For scanned film: DPX and TIFF
- Digital Cinema Packages (DCPs)
- Analogue and digital tape-based SD and HD video formats
- Audio: BWAV (multi-channel)
- Samma MXF files and other JPEG 2000 varieties
- Several multimedia file formats: MPEG2, H.264, AVI, Quicktime, JPEG (details yet to be defined)
- XML for metadata, sub-titles etc.

3. Digital A/V Archiving Pilot Installations Requirements – Output Fomats

We start with these formats:

- Uncompressed for highest quality: DPX and TIFF
- Audio: BWAV (multi-channel)
- Digital Cinema Packages (DCPs)
- H.264 for preview and high quality home use (Blu-ray Disc)
- MPEG2 for PC and DVD Video
- Professional broadcast file formats (details yet to be decided)
- XML for metadata, sub-titles etc.

3. Digital A/V Archiving Pilot Installations

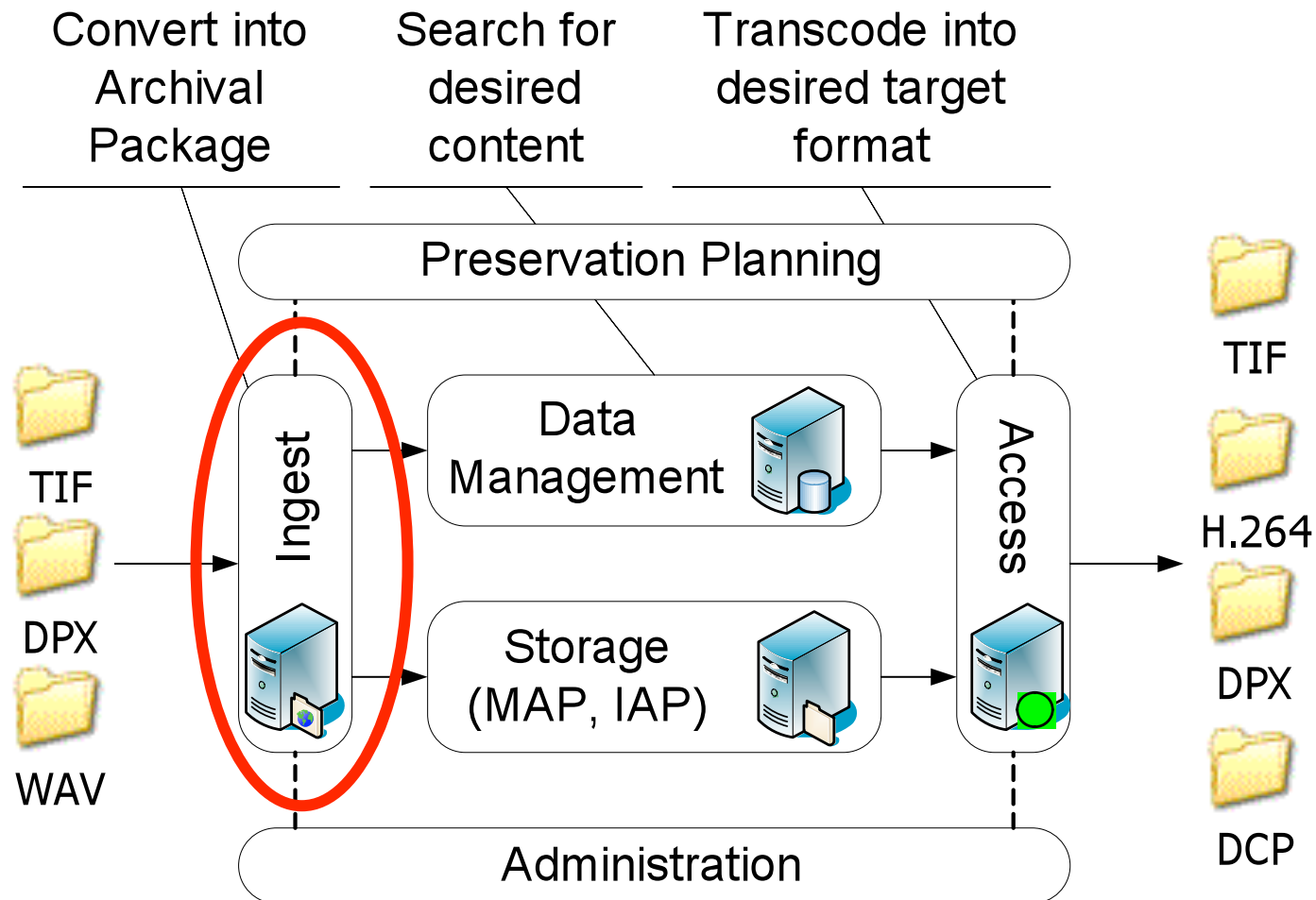
Additional general requirements

What other capabilities must the system have?

- Easy to use, even by non-techies
- “Big knob” interface to adjust important parameters
- Possibility to burn-in information in output formats
- Flexibility: each archive has different requirements in detail
 - Formats
 - Processes
 - Processing parameters

4. Practical Realisation

How do we do it?



4. Practical Realisation

Main software components

Key feature: modular archi

The image displays two software interfaces. The top window, titled "easyDCP Player DEMO (by Fraunhofer IIS)", shows a black video player with the text "No Codec loaded" and a large "easyDCP™" logo. The bottom window, titled "JPEG2000 Transcoding System", features a queue of jobs on the left, a module library on the bottom left, and a central workflow diagram. The workflow diagram shows a sequence of modules: File Source, Demux, JPEG2000 Decoder, Color Trafo, Scaler, H264 Encoder, File Sink, Wave Decoder, AAC Encoder, and MP4 Mux. On the right side of the transcoding system, there are settings for graph parameters (Basic color transformer, Image scaler), image dimension (640), and global parameters (Input Folder, Output File).

easyDCP Player DEMO (by Fraunhofer IIS)

No Codec loaded

easyDCP™

692λDCb IW

0 0 fps

Queue

- Job 18452 DPX2H264Previe...
- Job 18670 DPX2JPE2000M...
- Job 19085 JAP2H264Distribu...
- Job 19137 JPE2000Transco...
- Job 30564 JAPCreation (Cre...
- Job 3526 JAP2DCP (Created)

Module Library

- DPX2H264Preview
- DPX2JPE2000MAP
- JAP2DCP
- JAP2H264Distribution
- JAPCreation
- JPE2000Transcoding

Graph parameters

- Basic color transformer
- ☐ Bypass

Image scaler

- Scaling type
- ☐ By factor
- ☒ Fixed width
- ☐ Fixed height

Scaling factor

1

Image dimension

640

Global Parameters

Input Folder

A:/48 FPS Link Test 1

Output File

_Test/Link Test.mp4

File Source

Demux

JPEG2000 Decoder

Color Trafo

Scaler

H264 Encoder

File Sink

Wave Decoder

AAC Encoder

MP4 Mux

ut, Avid, ...)

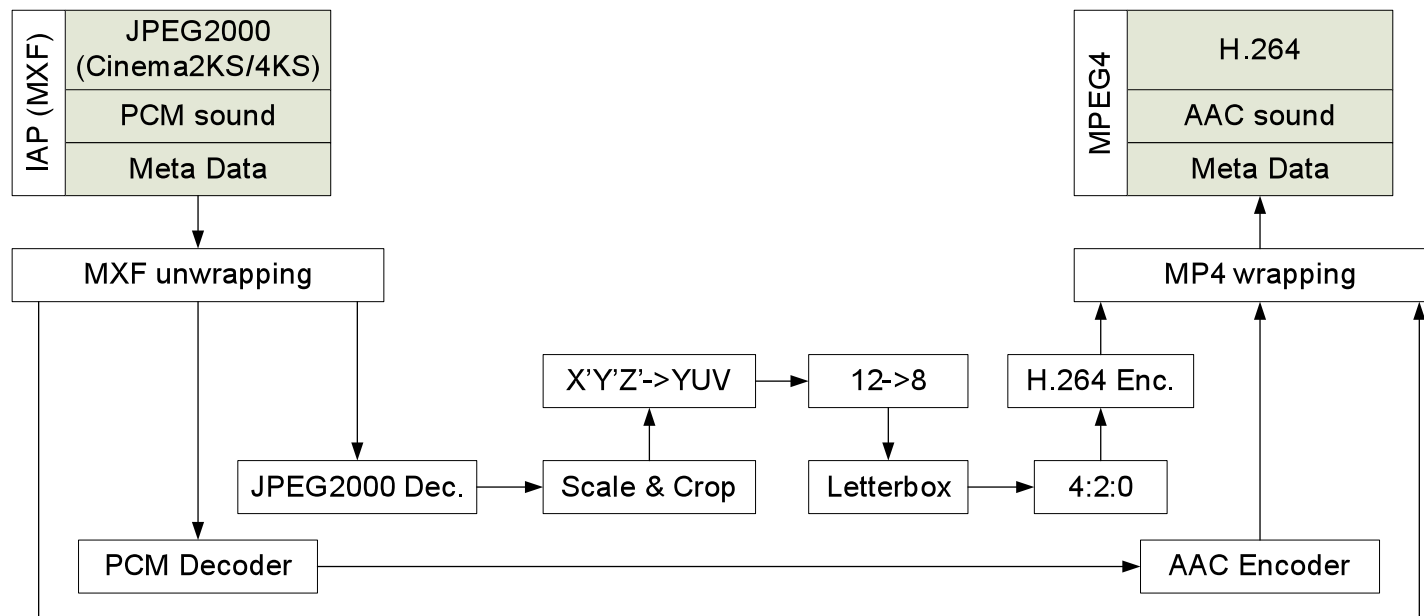
5. Conclusion

- We start with a small system
- Modular and flexible: can grow with the archives' needs
- Gain experience: for the developers and the users
- Define “sub-profiles” and documented processes for different types of material to be archived
- Collect information, educate users, archives and ourselves
- Build knowledge base for participating archives

5. Is everything done ... ?

Universal Archival Package

- Generation of dissemination format requires multiple processing steps
- Processing chains are configured by user
- Goal: Automatic, meta data controlled transcoding



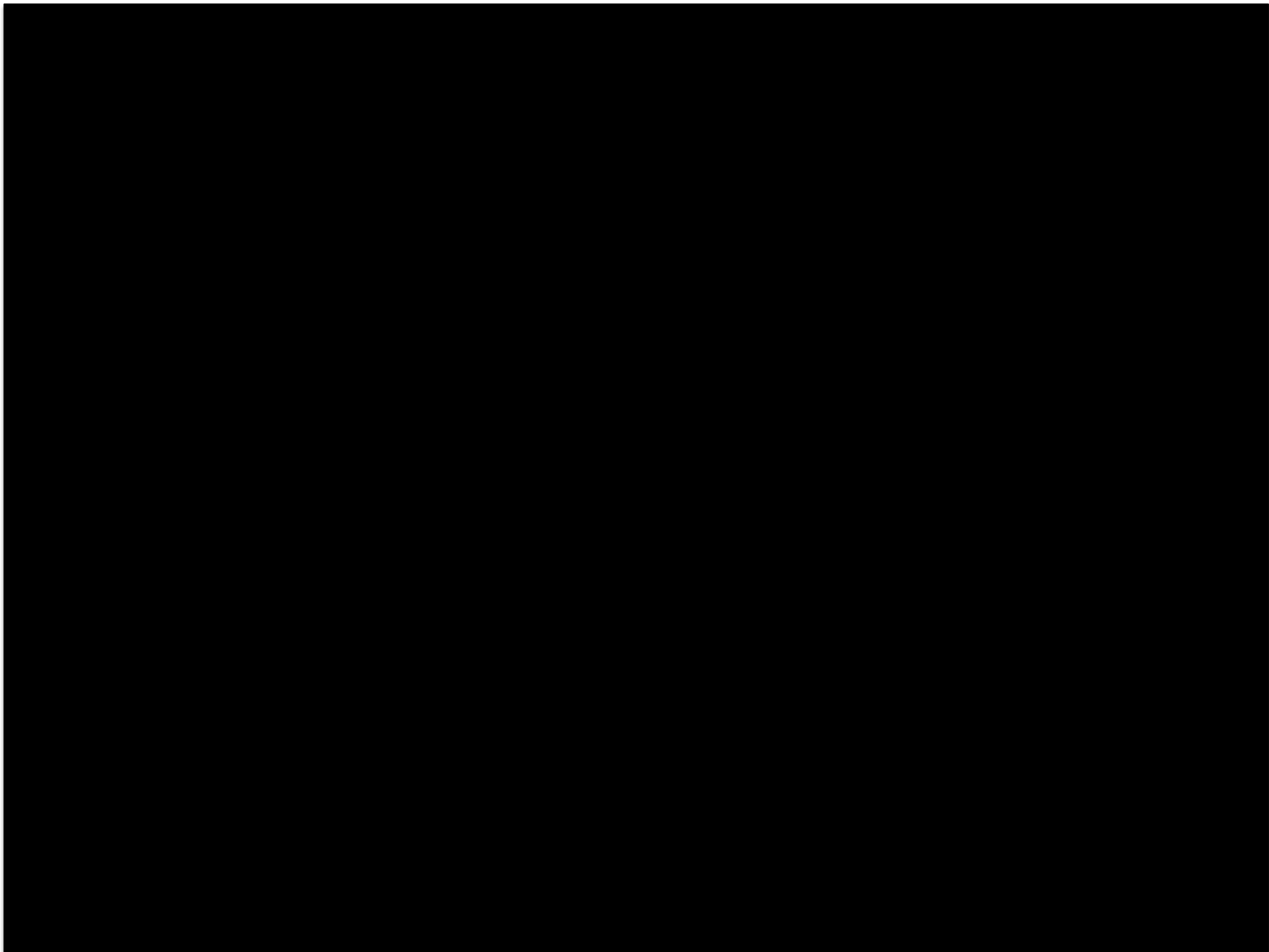
Thank you for your attention!

Questions?

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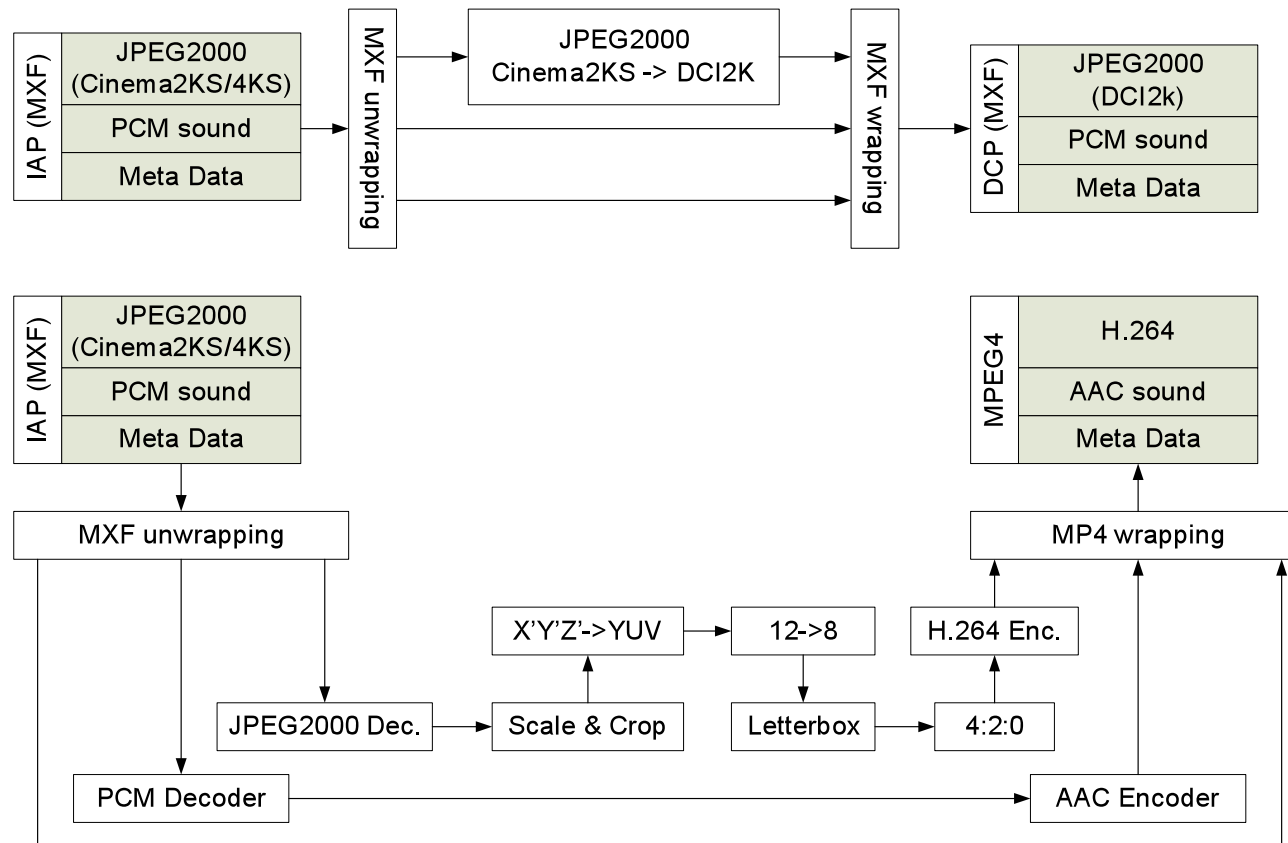


The EDCINE project was funded by the European Union in the FP6 program.



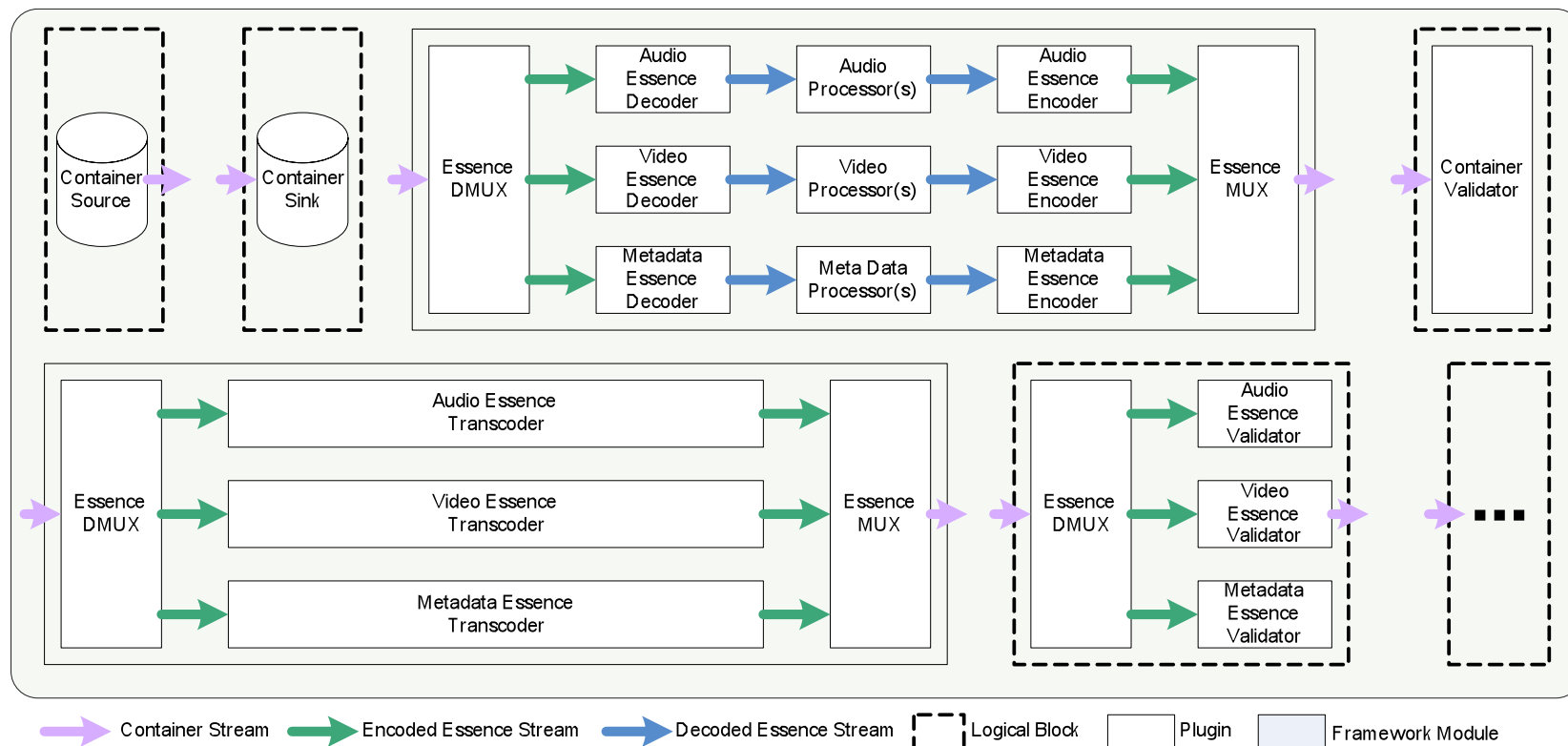
Transcoding System

Distribution processing chain



Transcoding System

Modular Approach



Demonstrator System

The Prototype



Demonstrator System

Database Interface

The screenshot displays the Digital Film Archive (ED-CINE) website. The browser address bar shows `http://ux1040:8080/ol/ui/`. The website header includes the ED-CINE logo, the title "Digital Film Archive", and login fields for "E-mail address" and "Password" with a "Sign in" button. Navigation tabs for "Archive Home", "Search Archive", and "Browse" are present.

The "Browse" tab is active, showing a list of items. The selected item is "Big Buck Bunny", with a thumbnail image and a "Preview" button. The item details are as follows:

- directed by**: Goedegebure, Sacha
- Country**: Netherlands
- Year**: 2008
- Runtime**: 10 min
- Genre**: Animation
- Source**: EDCine DFA

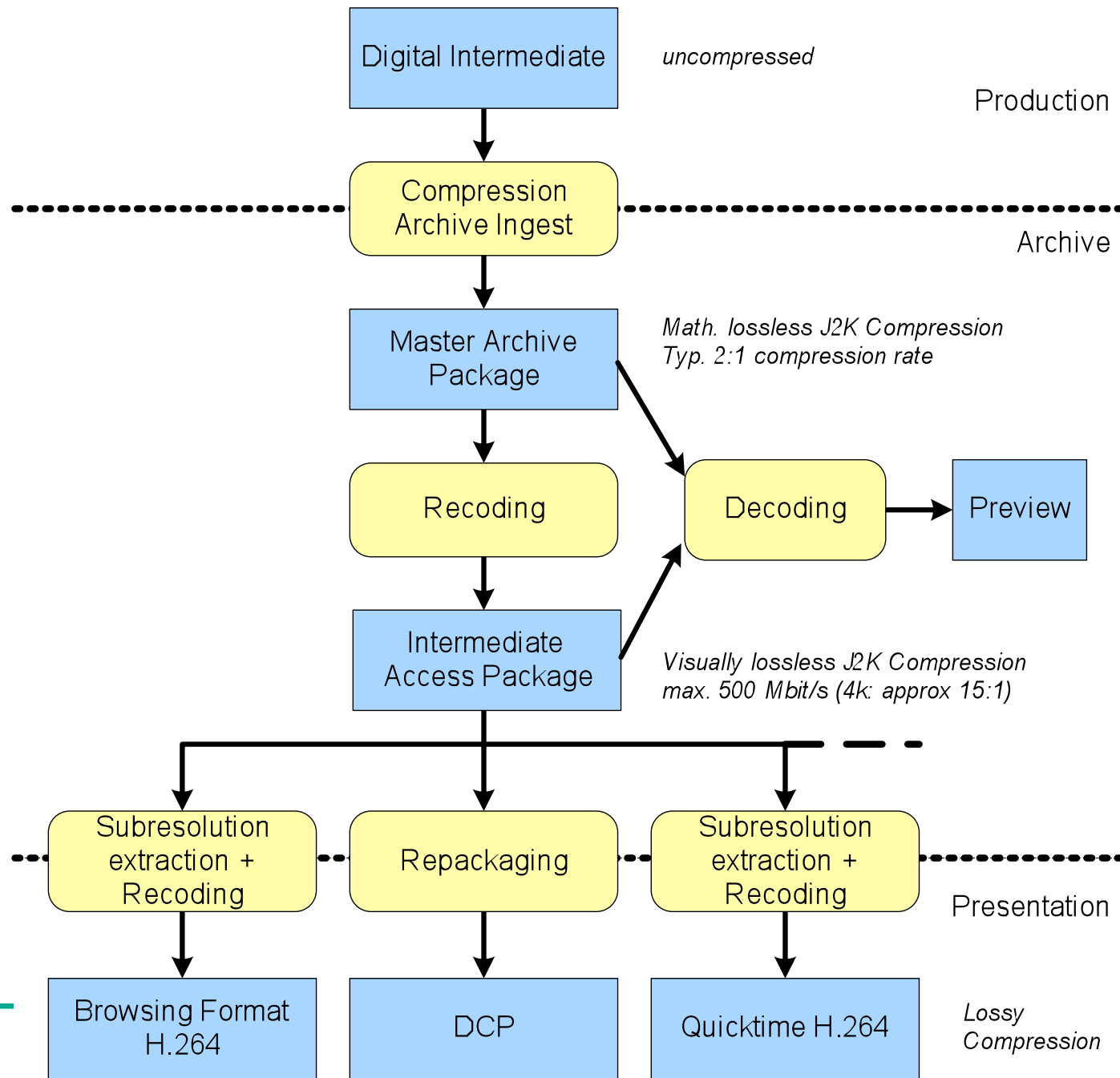
Below the details is the "Abstract & keywords" section:

Abstract: The plot follows a day of the life of Big Buck Bunny when he meets three bullying rodents, Frank, Rinky and Gamera. The rodents amuse themselves by harassing helpless creatures of the forest by throwing fruits, nuts and rocks at them. After the deaths of two of Bunny's favorite butterflies, and an offensive attack on Bunny himself, Bunny sets aside his gentle nature and orchestrates a complex plan for revenge.

Keywords: Rope Jumping, Animal, Bunny

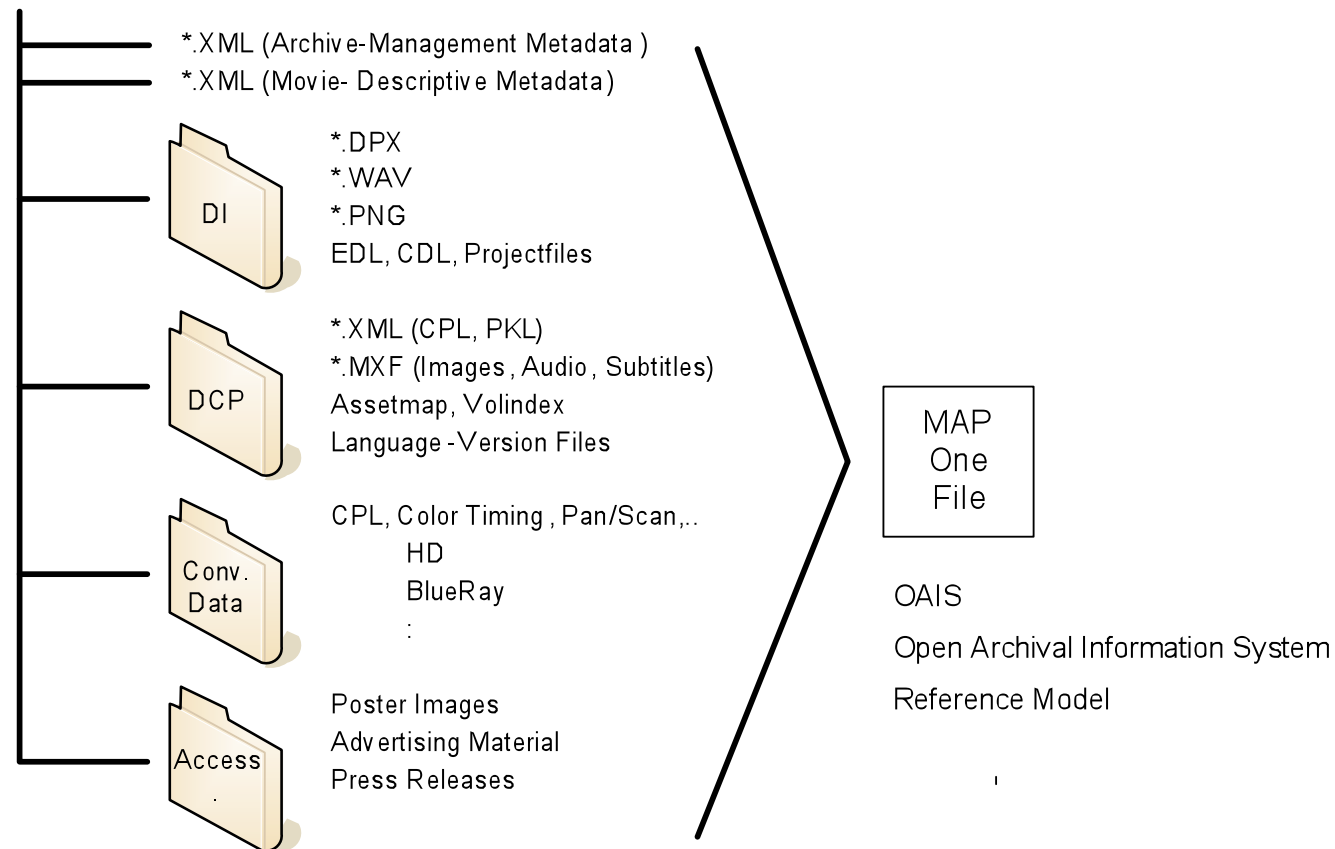
At the bottom of the item page are expandable sections: "Cast & crew", "Miscellaneous", and "Available formats & prices".

On the right side, a video player window titled "Big Buck Bunny - BBB320.mov - Mozilla Fi..." is open, showing the video content. The player interface includes a progress bar (00:00:28 / 00:09:57) and a "Fertig" button.



Archive Package Usage Scenarios

Master Archive Package



Archive Package Usage Scenarios

Intermediate Access Package

