ED·CINE

Fraunhofer Digital Cinema

IIS

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The EDCINE Project for Archives:

A System for Conservation and Access based on MXF and JPEG 2000

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JTS 2007, June 28-30 2007, Toronto, Canada

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The EDCINE Project

European project with 16 Partners

Optimization, enhancement and interoperability issues of D-Cinema Standards

3 application fields:

- Content streaming to cinemas
- Advanced movie experience
- Digital archives and access to archives

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The Problem

Conservation of digitally produced films

- Open data formats: image encoding & metadata storage

Access to archived films

- Easy search and retrieval of films on various quality levels

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Project Goals

Develop a system concept for a digital film archive

- Define and evaluate data formats
- Define a system architecture

Build a demonstrator

- Validate overall concept
- Gain experience with real-world content
- Collect feedback from archives

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The System Concept

Two-tier data format

- Master Archive Package for conservation
- Intermediate Archive Package for access

Asset store approach (OAIS Reference Model)

Dissemination Packages created on demand

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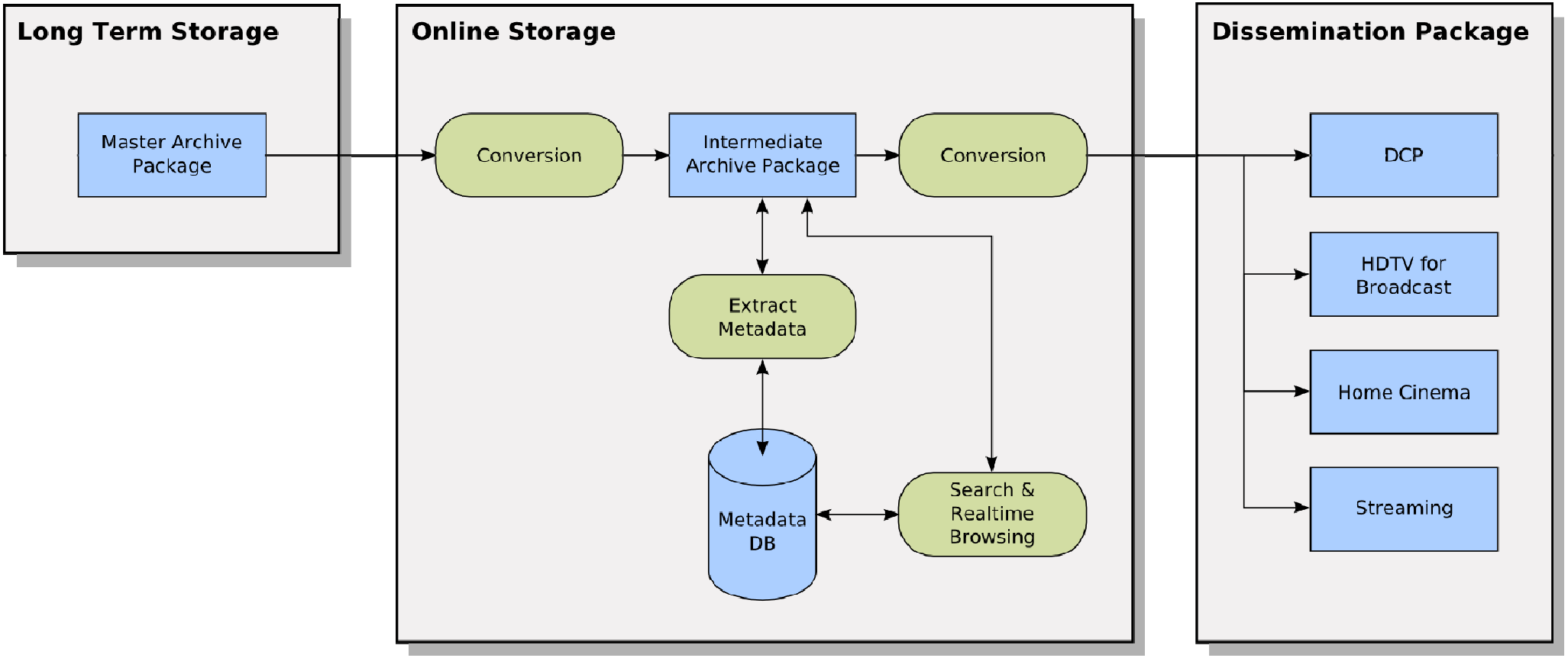
System Concept



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Data Formats

Image Encoding

- Open and well-documented standard
- Possibility to store lossless and lossy
- Conversion to other resolutions, quality levels, formats etc. → scalability

Metadata

- Open standard
- Extendable

Packaging / Wrapping

and: audio, subtitles, text, still images, …

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Image Encoding

JPEG 2000

- Standard: ISO/IEC 15444-1:2004
- Intra-frame compression
- Wavelet-based compression
- EBCOT entropy encoding
  → Scalability: resolution & quality
- "Profiles" for D-Cinema; in the future possibly also for archives
- No royalties or license fees for part 1

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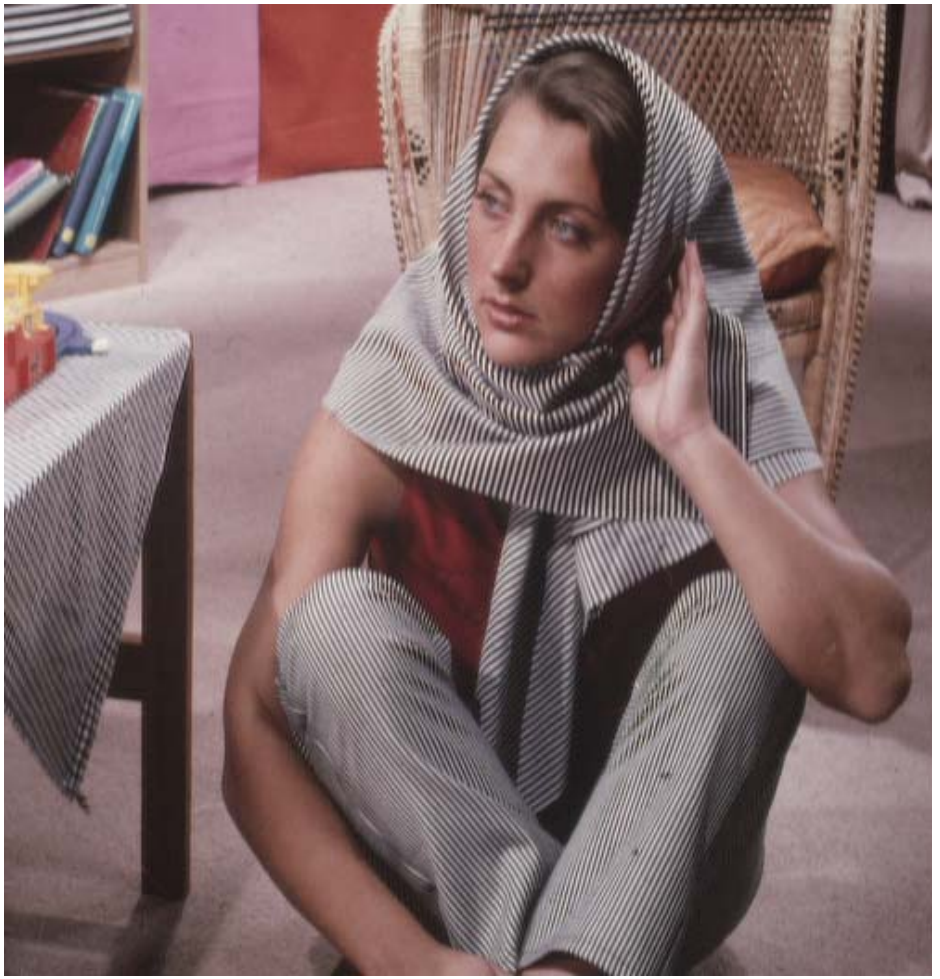
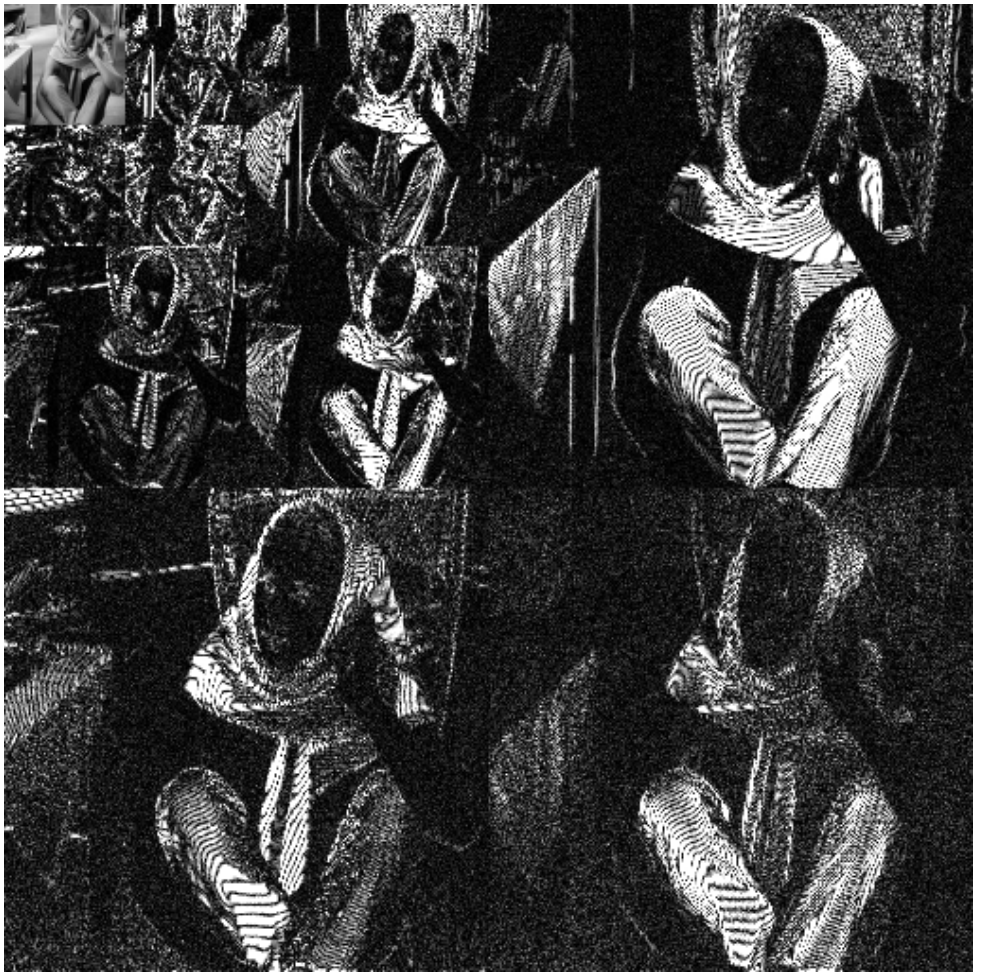
Data Formats





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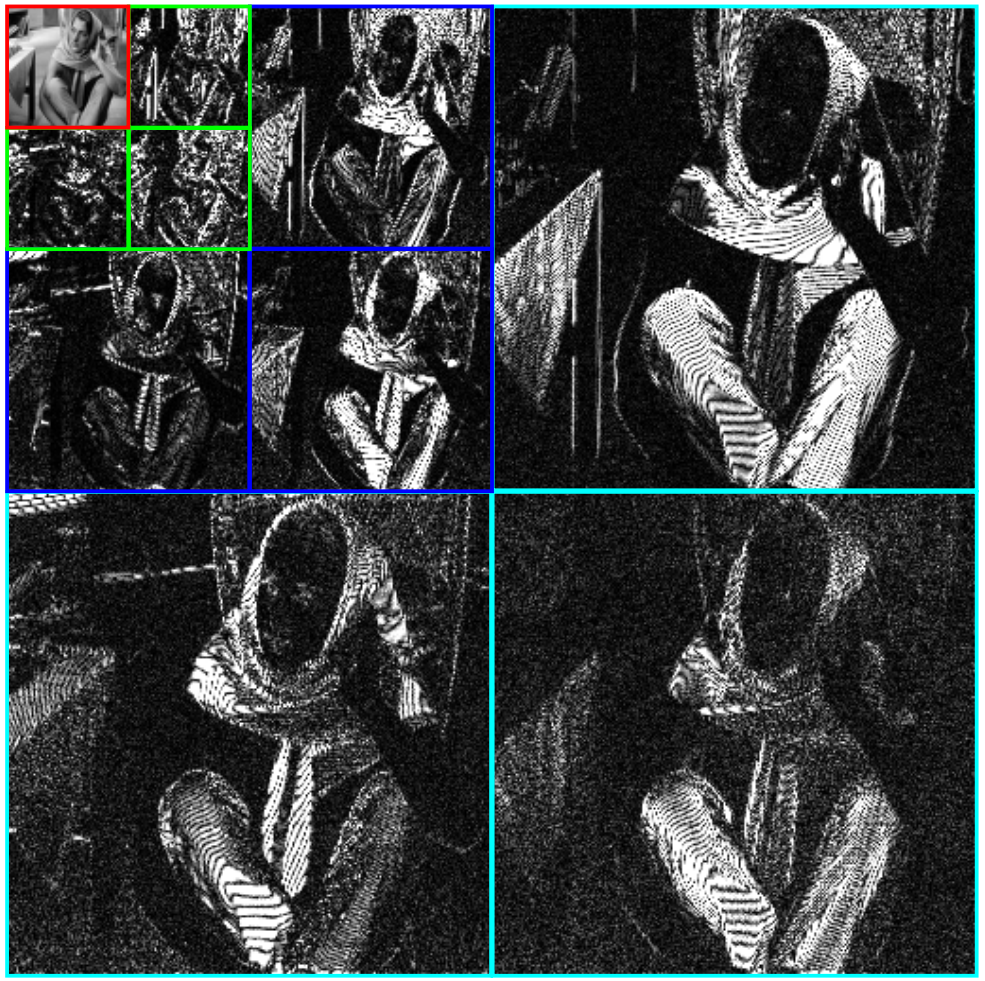

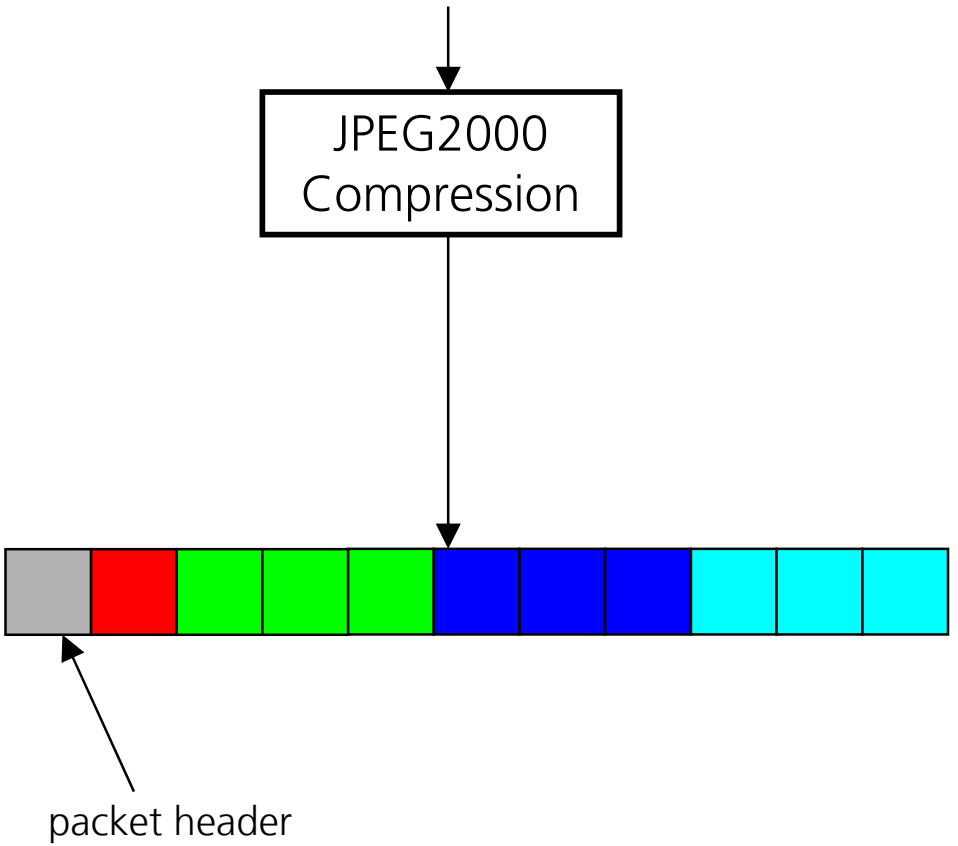

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Metadata & Packaging / Wrapping

Material Exchange Format MXF

- Wrapping format for essence & metadata
- Open and well-documented SMPTE standard
- Agnostic to essence encoding and metadata representation

Asset store: everything in one MXF file

- Images
- Audio (multiple languages and channels)
- Metadata (descriptive, technical and historical)
- Explicit and unique references to other items

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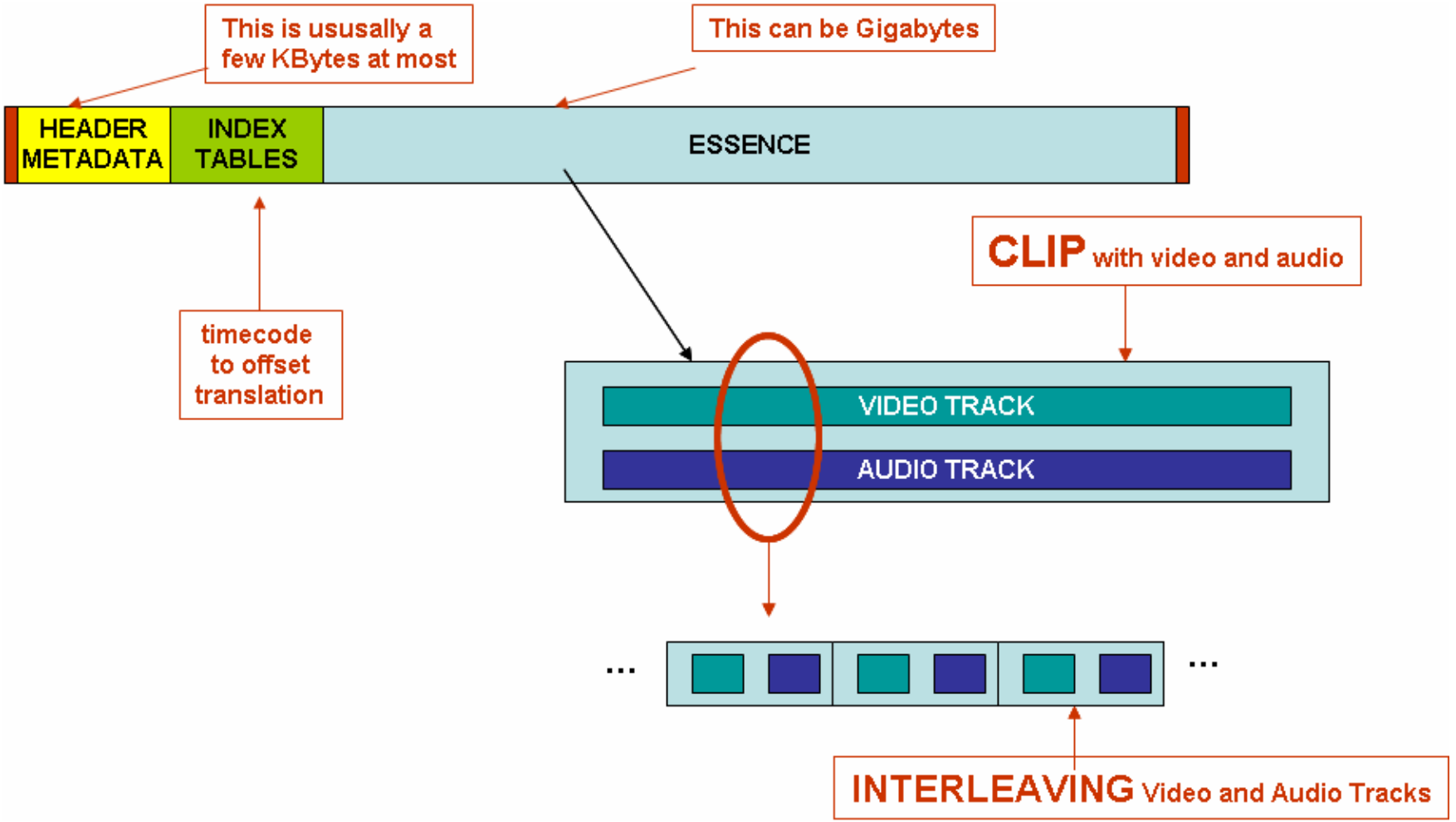
Data Formats
The Media Exchange Format



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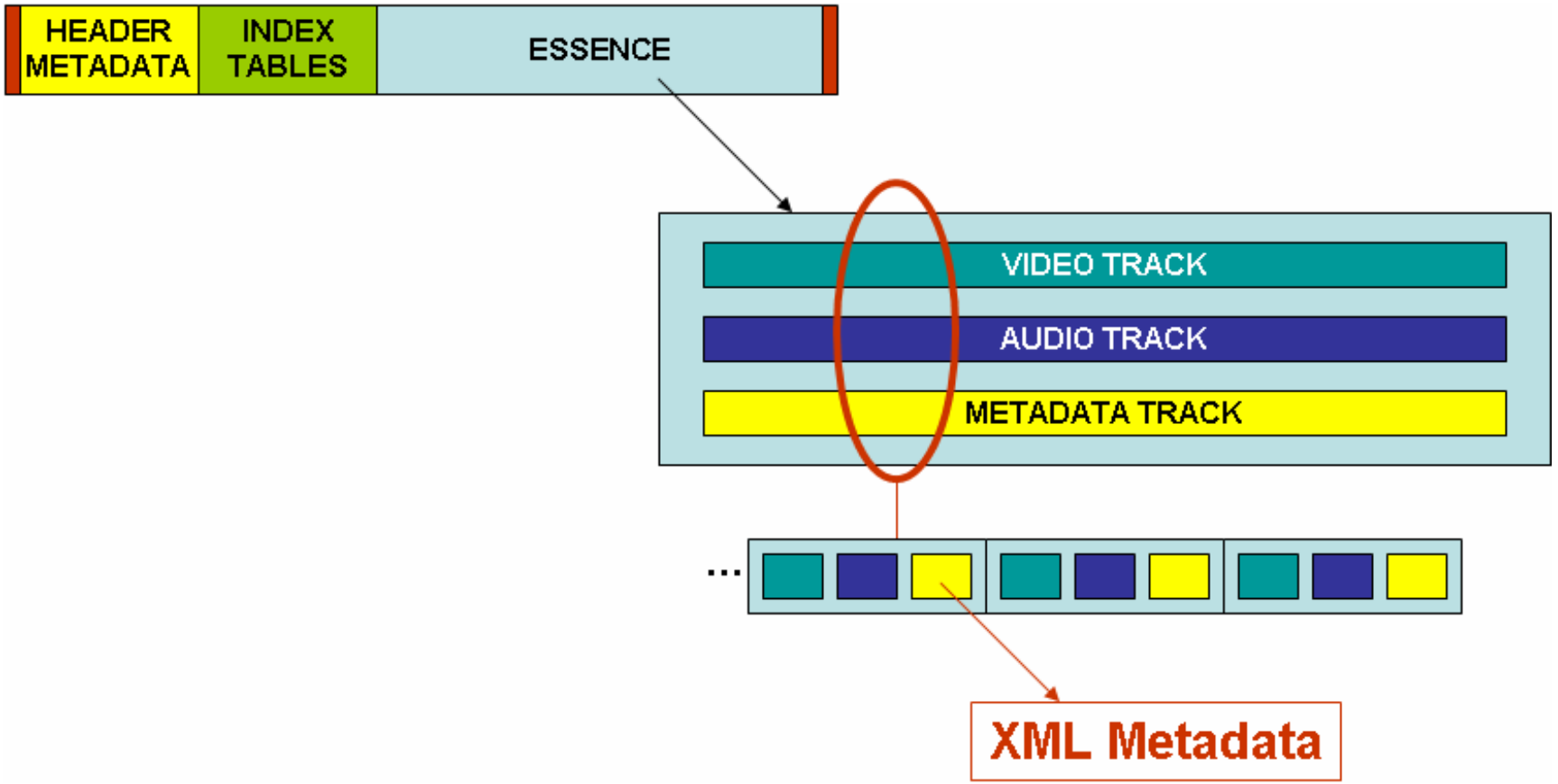

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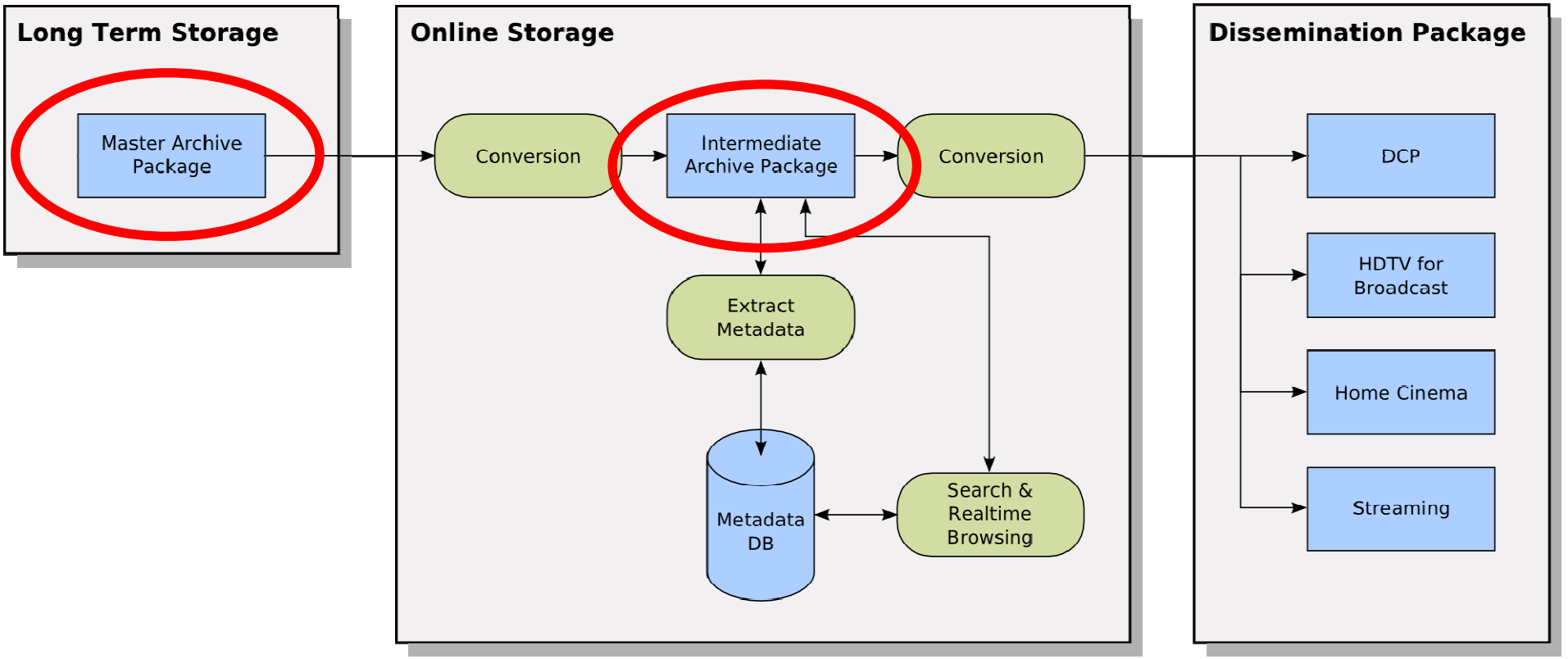
The Archive Packages



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The Master Archive Package

Digitally archived item

Typical characteristics:

- Lossless compression
- Arbitrary (highest justifiable) resolution
- Original frame rate of the source
- Can contain the whole film area, including soundtrack, sprocket holes etc.

The Intermediate Archive Package

Digital viewing copy of archived item

Typical characteristics:

- Lossy compression (up to 250MBit/s)
- Fixed resolution (e.g. 2048 x 1080)
- 24 or 48 FPS
- Contains only projectable image area
- Compatible to SMPTE DC28 standards

→ DCPs can be created without image recoding; ideal to generate dissemination packages

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Other Options

Parameters can be changed according to special needs

Extended Intermediate Archive Package:

- Arbitrary frame rates
- Allows anamorphotic representation
- Other resolutions possible
- Shall be directly playable

→ Most useful for archive cinemas and special venues

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Some thoughts on the system architecture

Two-tier storage concept

- Conservation vs. Access
- Open and well documented standards

JPEG 2000 & MXF

- Easy access to lower quality version
- Flexible and extendable
- Seems to become common in D-Cinema

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Some thoughts on the system architecture (II)

Asset store approach

- Everything that belongs together is stored together
- Metadata cannot get lost
- Easier mirroring and migration

Automatic creation of Dissemination Packages

- For different user groups
- Upgradeable to new formats

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Conclusions

Digital archive system concept

- For conventional and digital archives
- For all sizes of archives

Using open and established standards

- JPEG 2000 Profile for archives
- Specification of MXF operational pattern

Demonstrator in development

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Thank you very much for your attention!

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