WebWise 2007
Preserving Digital Television

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Overview

- Profile of public television

- Preserving digital television from three perspectives: production, distribution and collecting institution.

Public Television

- PTV - 354 noncommercial stations in US
- PBS - acquires and distributes ptv programs from member stations, independent producers and other sources.
- WGBH and Channel Thirteen - Boston and New York-based public broadcasting stations.

Analog & Digital Videotape

- Since 1956 over 100 analog formats on magnetic media
- Since 1986 over 14 digital formats on magnetic media or optical disc
- Over time, format size drastically reduced; chemical composition changes; deterioration accelerated.

Playback Equipment

- Formats require special playback equipment
- Hardware obsolescence/replacement issues
- Engineering expertise issues

Definitions 1

- Format - physical videotape that has specific way analog or digital data is recorded on the tape.

- Digital file format - way the data is represented in the file and how it is stored.

Definitions 2

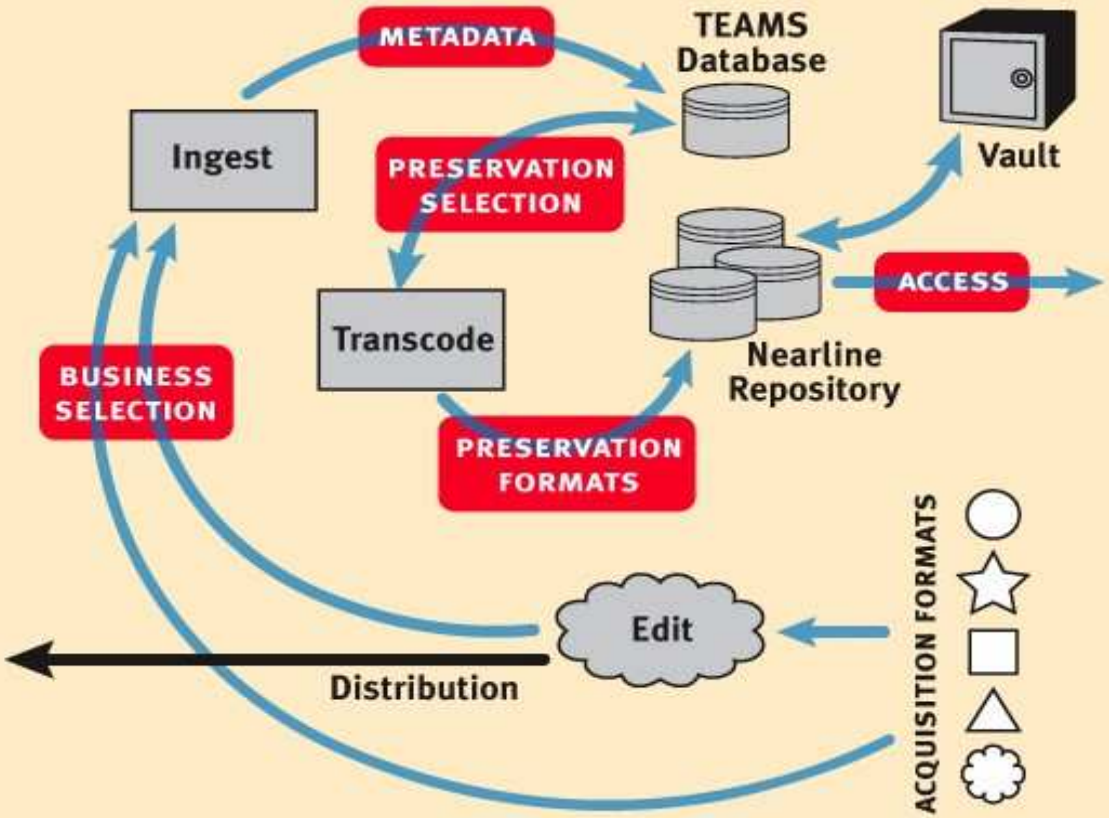
- Wrapper - file includes many parts (tracks) which may contain text and/or essence data. E.g. QuickTime, MXF, Motion JPEG2000.
- Essence - audio and video bits
- Codec - concatenation of terms coder and decoder. Codec method of encoding video data.

Digital Production

- Production footage and master programs created on analog since 1956 and and digital tape since 1993.
- Today most public television stations create using both analog and digital options

Preserving Digital Public Television

PRESERVATION PATH



Compression/data rate/storage

- VHS compression 9:1; data rate (MBps) 2 and storage (minutes/GB) 8 min.
- Digita Beta compression ?; data rate (MBps) 33.75; storage (minutes/GB ?
- DVD compression ?; data rate (MBps)?; storage (minutes/GB)

Preservation Concerns 1

- Appraisal and selection
- Integrity of original content and intent
  - Compression can compromise original intent and artistic authenticity
  - Analog transfers to digital and pixel augmentation

Preservation Concerns 2

- Copyright and access
- Metadata and identifiers
- Packaging standards
- Transcodinig technology
- Storage impact with large files

PTV Production

- Stations deliver Digital Beta to PBS
- Digital Beta records as a DCT- compressed component video signal at 10bit YUV 4:2:2 sampling in NTSC (720-486)
  - Component means video is split into to two or more components (instead of single line level signal)
  - YUV defines color space in terms of one luminance and two chrominance components
  - Chroma sub-sampling 4:2:2

PTV Production 2

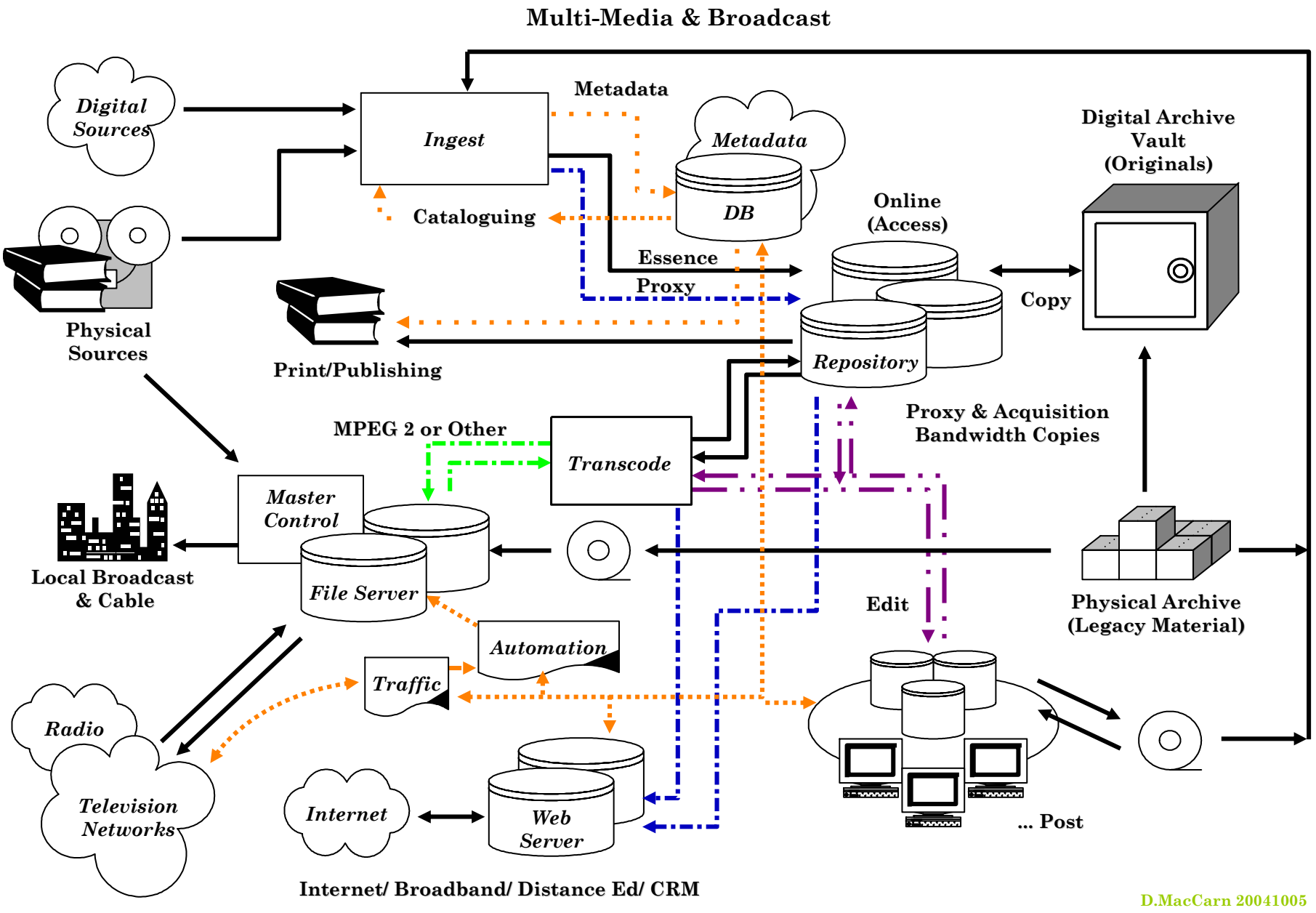
- Productions will vary in their use of analog and digital cameras for shooting footage. These become “source” tapes
- Analog videotape - BetaSP,
- Digital videotape - DV, DVCAM, DVCPRO, Digital Betacam

Production Work Flow 1

- Source tapes digitized for offline edit workstation
- Depending on workstation manufacturer, type and settings, a number of different digital file formats could be created.
- Digital file at at this stage is heavily compressed.

Production Work Flow 2

- On line edit point the source tapes digitized again at higher resolution
  - Avid Meridien FJIF compressed codec 2:1 at WGBH
  - Master edited program printed back to Digital Betacam


Multi-Media & Broadcast
Digital Sources
Ingest
Metadata
Metadata
DB
Cataloguing
Digital Archive Vault (Originals)
Online (Access)
Essence
Proxy
Copy
Physical Sources
Print/Publishing
Repository
Proxy & Acquisition Bandwidth Copies
MPEG 2 or Other
Transcode
Master Control
File Server
Local Broadcast & Cable
Edit
Physical Archive (Legacy Material)
Automation
Traffic
Radio
Television Networks
Internet
Web Server
... Post
Internet/ Broadband/ Distance Ed/ CRM
D.MacCarn 20041005

Archives 1

- Original footage tapes will be on variety physical analog and digital formats
- Some will be selectively digitized for DAM as DVCPRO50 with QT wrapper with MPEG 4 as proxy?
- Original physical format preservation master

Archives 2

- Master program tape on Digital Beta
  - Digitized by Master Control to DVCPro50 file for access.
  - DVCPro50 is …
  - No “born” digital master or original footage files to date

Archives 3

- Identifier and Metadata
  - PBCore - a ptv specific metadata schema
- Packaging
  - AAF and MXF
  - METS
  - Administrative

Archives 4

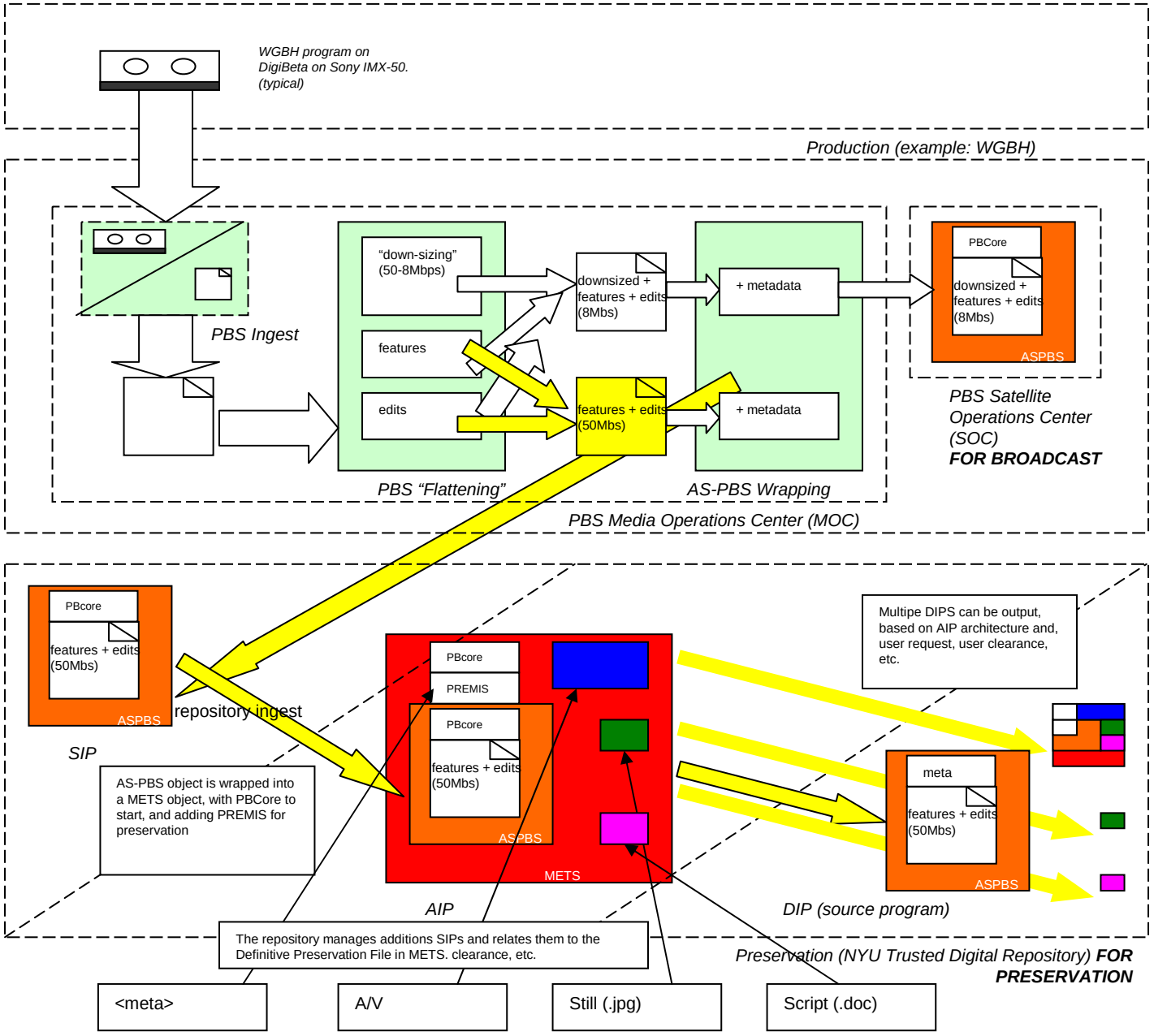
- Preservation object issues
  - AS (application specs) defining an object for OAIS submission package

PTV Distribution

- High Definition HDCAM
- Standard Definition Digital Beta
  - Encoded to a 50Mbps IMS in a Material eXchnge Format (MXF) OP Atom wrapper-ed file
  - Second conversion to 8 Mbps MPEG Long GOP files for satellite uplink.
- NGIS routing
- Library of Congress file delivery

NDIIPP PTV Project

- Goal is to design a digital environment that will store files in packages and put them in an open-source storage application that will be maintained and refreshed.
  - Develop cooperative model for preservation
  - For “born” digital and digitally transferred assets - masters and production elements


WGBH program on
DigiBeta on Sony IMX-50.
(typical)
Production (example: WGBH)
PBS Ingest
"down-sizing"
(50-8Mbps)
features
edits
downsized +
features + edits
(8Mbs)
features + edits
(50Mbs)
+ metadata
+ metadata
PBCore
downsized +
features + edits
(8Mbs)
ASPBS
PBS Satellite
Operations Center
(SOC)
FOR BROADCAST
PBS "Flattening"
AS-PBS Wrapping
PBS Media Operations Center (MOC)
PBcore
features + edits
(50Mbs)
ASPBS
repository ingest
SIP
AS-PBS object is wrapped into
a METS object, with PBCore to
start, and adding PREMIS for
preservation
PBcore
PREMIS
PBcore
features + edits
(50Mbs)
ASPBS
METS
AIP
Multipe DIPS can be output,
based on AIP architecture and,
user request, user clearance,
etc.
meta
features + edits
(50Mbs)
ASPBS
DIP (source program)
The repository manages additions SIPs and relates them to the
Definitive Preservation File in METS. clearance, etc.
Preservation (NYU Trusted Digital Repository) FOR
PRESERVATION
<meta>
A/V
Still (.jpg)
Script (.doc)

Digital File challenges

- Challenges include
  - Programs as “disembodied” assets with metadata
  - File format and metadata requirements for submission to Library of Congress
  - Storage
  - Global digital format registry

Digital preservation?

- Ideal format would be encoded without compression or compressed in a lossless manner
- Ideal not here yet