



# FIAT/IFTA World Conference 2018

*The Archive's Renaissance: Navigating the Future, Channelling the Past*  
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## RAI - Radiotelevisione Italiana

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**Teche**

## *The experience of RAI DigiMaster Project, in progress..*

October 9<sup>th</sup> 2018, presentation at workshop  
"Mass digitisation with a focus on film"

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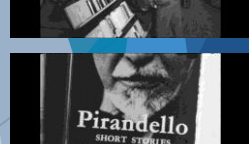
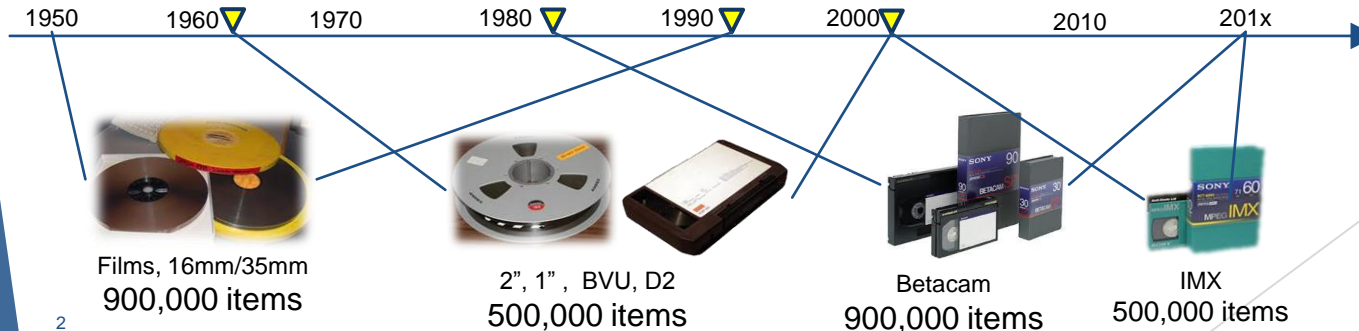
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# RAI analogue archive is made of..

- ▶ Rai TV broadcast began in 1954 .. now there are 13 channels
  - ▶ Millions hours of content have been transmitted
  - ▶ Hundreds thousands programmes produced internally
- ▶ Rai archive represents:
  - ▶ The history of television
  - ▶ And that of the Country
- ▶ Amount of items limited to Roma, via Salaria store



# Now digitisation is in progress..

- ▶ In Roma via Salaria, in service since 2017
  - ▶ Up to 30 digitisation lines for Betacam/IMX
    - ▶ Automated, by use of Robotics; process including Tape Cleaning
    - ▶ Capable to digitise up to 600 tapes per day
    - ▶ Target is 2100 tapes per week
  - ▶ Up to 7 digitisation lines for Film 16mm
    - ▶ A lot of manual work
    - ▶ Not yet a realistic target rate
    - ▶ One line can work on 35mm as well
- ▶ Other system now active in Torino (6 lines)
  - ▶ And up to further 36 Betacam lines for the regional archives are going to start in 2019

## However..

- ▶ Process is slow to reach the wished speed
- ▶ Time plays against
- ▶ Awareness of actual risks



## .. and we cannot be sure to get it at 100% successful end

- ▶ The context now is reasonably good shape
  - ▶ Video tapes are quite good condition
  - ▶ Players are still available in working condition
  - ▶ Skilled staff
- ▶ New troubles may arise before end of digitisation process
  - ▶ Film situation may turn worse
  - ▶ Equipment and skilled staff availability
  - ▶ Quality of result in future context



## Decisions and criteria

- ▶ The target file formats
- ▶ Work-flow
- ▶ Equipment
- ▶ Priority and selections
- ▶ What is meant by “massive”
- ▶ Exploitation perspectives

### File formats must:

- comply to standards
- fit immediately in the current TV production process
- ensure to keep the original quality

### Work flow must:

- integrate at both ends with organisation
- allow modular deployment
- permit to manage exceptions

### Equipment must:

- be purchased via public tender

## Decisions and criteria

- ▶ The target file formats
- ▶ Work-flow
- ▶ Equipment
- ▶ Priority and selections
- ▶ What is meant by “massive”
- ▶ Exploitation perspectives

### Priority

- editorial interest
- danger of loss
- better result

### Copy selection

- master
- better result
- better use of resources

### *Massive* means

- Not be pedantic with quality
- Simpler first - Digitisation only
- Alternative WF for problematic cases
- Output not ready to “on-air”

### Exploitation perspectives

- Re-injection into documentation work-flows
  - greater re-use probability
- Some re-uses are already expected
  - digital restoration work-flows



## Betacam highly automated process

- ▶ Work module is “the Chain”, i.e. whatever is around a Robotic
  - ▶ 60 shelf video tape bins
  - ▶ One cleaner, 3 Players IMX/eVTR
    - ▶ i.e. 3 digitisation lines
  - ▶ 4 servers
    - ▶ 1 server/line + 1/chain
- ▶ Overall process can work with as many Chains as wished





# Betacam highly automated process

Robotic detail



Cleaner with dry cleaning tissue



## Betacam highly automated process

- ▶ Target File Format is MXF/D10
  - ▶ Storage requires ~30 GB/hour
- ▶ Approach based on IMX/eVTR as player, when possible
  - ▶ Baseband (SDI or Component) otherwise



Sony MSW-2000 e-VTR



eVTR BKMW-E3000



# Betacam highly automated process

- ▶ eVTR allows FTP access over Ethernet connection

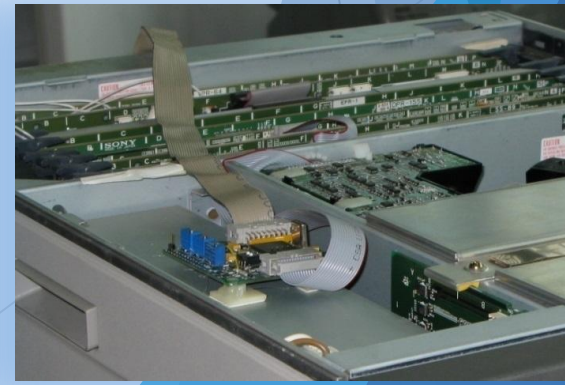


Sony MSW-2000 e-VTR



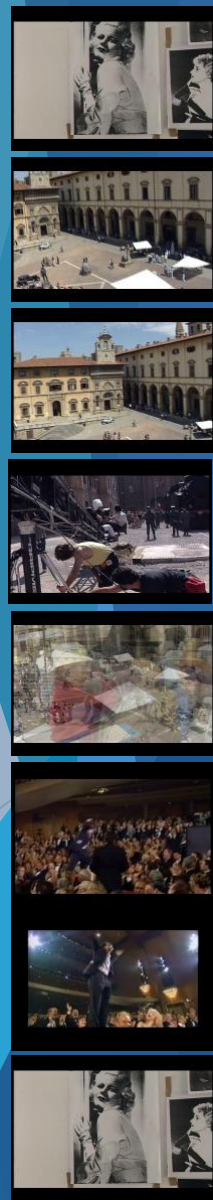
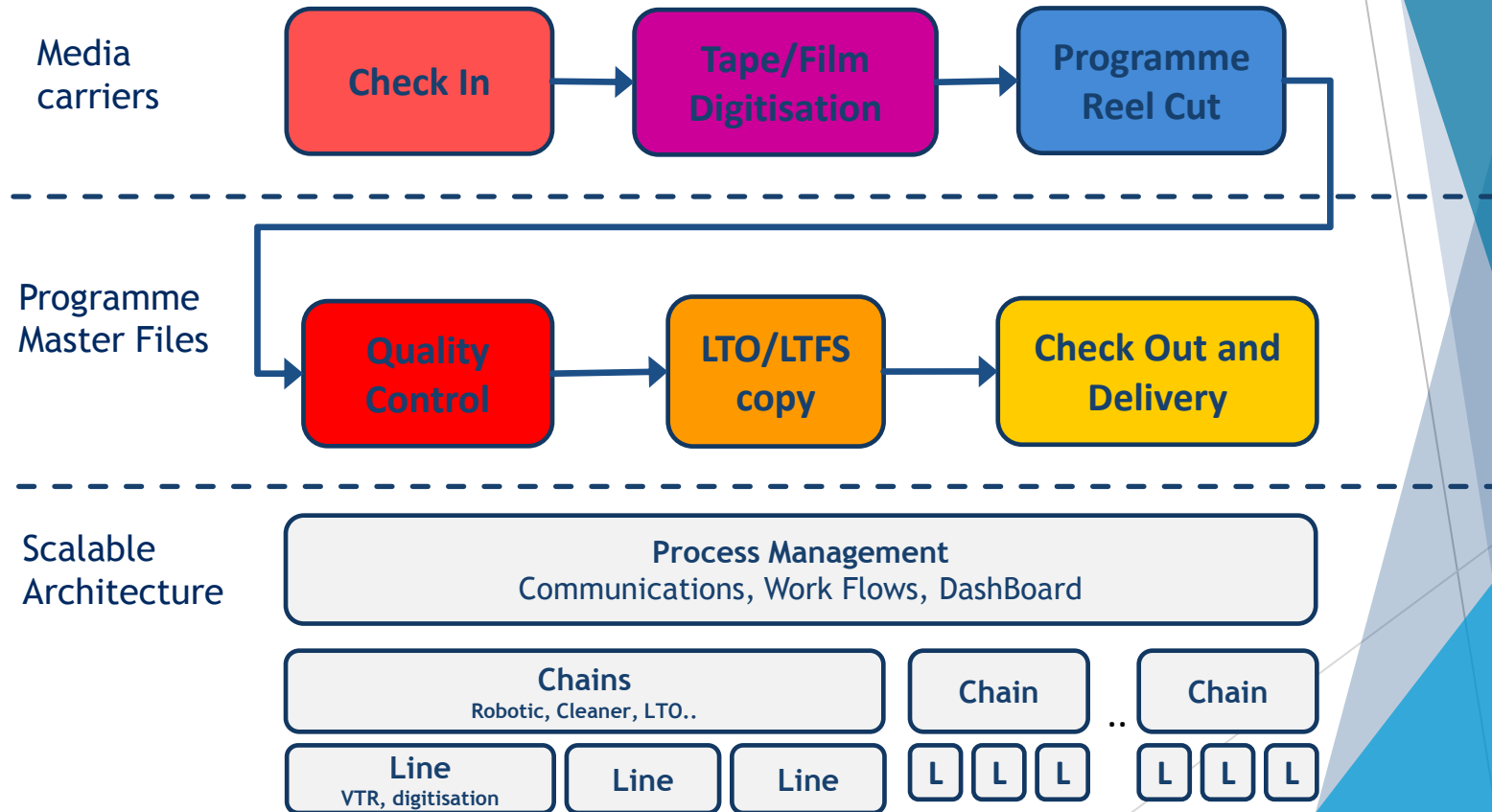
- ▶ Quality data board

- ▶ Y+C RF level
- ▶ Y+C drops
- ▶ Control Track
- ▶ timecode





# The workflow



## Regarding the films, the troubles are..

### ► Films conditions

- Most films have not been handled for decades
- You may smell vinegar.. syndrome is around
- Vinegar syndrome evaluated on samples with AD-strip
- Time plays against
  - Part of collection has reached auto catalytic point
  - For part of the collection this is likely the last and only digitisation opportunity



## Regarding the films, the troubles are..

- ▶ A lot of manual work
  - ▶ Time consuming and expensive
- ▶ Levels of work Preparation and cleaning
  - ▶ Basic checking
  - ▶ and Repairing
  - ▶ and/or Assembling
- ▶ Difficult to forecast needed time
  - ▶ From 4 to 10 hours per hour of film

Evaluate general state and quality

Put leaders and cores (if required)

Clean manually hard trace

Repair splices and damages

Check I/S synchronization (when SEPMAG)

Assemble small reels (if needed)

Edit a list of assembly (if needed)

Provide a technical report

Clean in a film cleaner



## Regarding the films, the troubles are..

- ▶ A chaos of copies
  - ▶ Programme made of reels
  - ▶ SEPMAG
  - ▶ Copy or production in a Video Tape format
- ▶ What about assembling small rolls?
  - ▶ We want to, esp. for News films (50s-80s)
  - ▶ Not yet in place



### Disadvantages

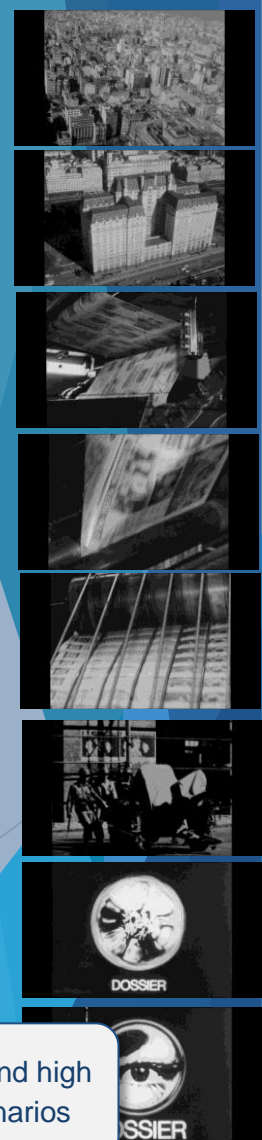
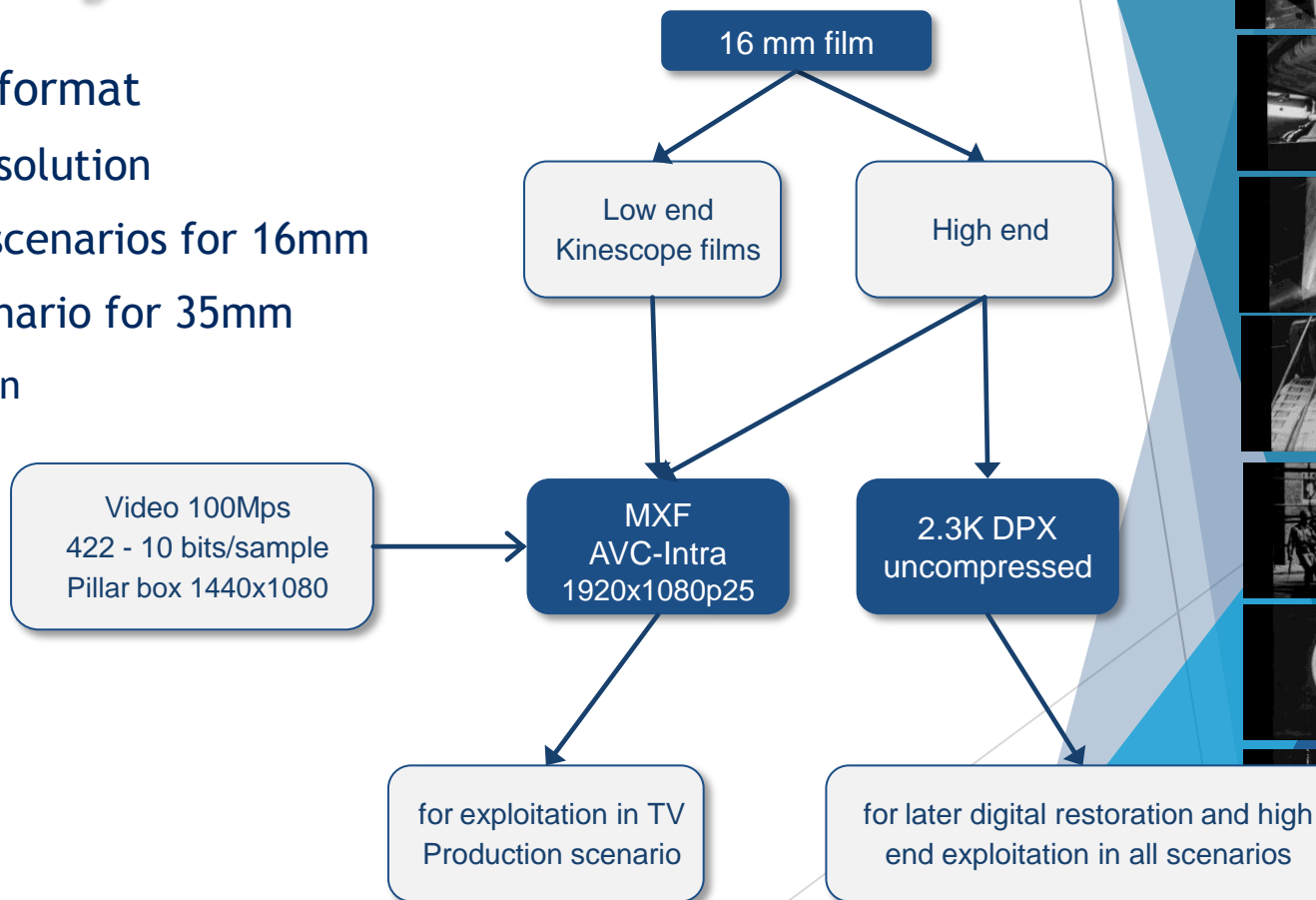
Preparation longer and more expensive  
Additional trouble with SEPMAG  
Needs new material with edit list

### Advantages

Easier and faster process  
Easier and safer storage  
Lower use of leader and cores

## Regarding the films, the troubles are..

- ▶ Target file format
  - ▶ Image resolution
  - ▶ Current scenarios for 16mm
  - ▶ Next scenario for 35mm
    - ▶ 4K scan



# Quality of results



- ▶ **Quality along the digitisation chain**
  - ▶ Media carrier preparation
  - ▶ Players in well condition
  - ▶ Well consolidated software
  - ▶ Skilled personnel for monitoring and closed-loop tuning of devices
- ▶ **Quality assessment of produced master files**
  - ▶ Use of content analysis software
  - ▶ Eyeballs check by skilled personnel

## Quality of results



- ▶ The primary goal is to preserve the content
- ▶ Keeping the original quality
  - ▶ If the original video or audio was scratchy, the file will also be
  - ▶ Master Files not suited for direct broadcast without a further check and/or post-production process
- ▶ A compromise with the pace of work is necessary
  - ▶ Time plays against
    - ▶ Better preserving everything with 95% quality that just half archive at 99,9%

# Quality along the digitisation chain

- ▶ **Media carrier preparation**
- ▶ **Players in well condition / maintenance**
  - ▶ including head cleaning, replacement or regeneration
  - ▶ unexpected problems on the player can be detected during the assessment of master files
- ▶ **Well consolidated software**
  - ▶ avoids re-encoding when possible (e.g. eVTR for IMX digital tapes)
  - ▶ minimum loss of quality using state of the art encoding when passing through baseband
  - ▶ standard compliance checking of output master files
  - ▶ fixity checking of files when transferred or manipulated
- ▶ **Skilled personnel for monitoring and closed-loop tuning of devices**
  - ▶ Personnel with long experience in A/V, they know very well the typical defects of the specific formats



# Quality assessment of produced master files

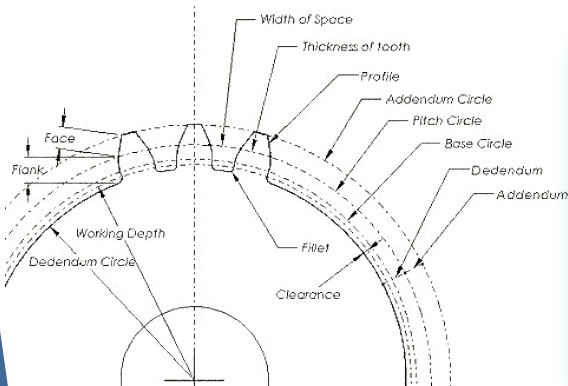


- ▶ Use of content analysis software
  - ▶ formal check of wrapper (e.g. MXF) and bitstream (e.g MPEG2) layers
  - ▶ baseband analysis to detect audio silence and video major breakouts
- ▶ Eyeballs check by skilled personnel
  - ▶ aided by previous content analysis, RF VTRs measurements, and pre-existent technical sheets
  - ▶ limited to critical parts plus few random intervals
- ▶ Expertise of technicians allows to
  - ▶ Identify carriers to be digitised again (including cleaning) because of possible
    - ▶ VTR trouble / process fault
    - ▶ Critical carrier
  - ▶ Comparison between file and original media only in case of doubt
    - ▶ Otherwise too expensive



## Other aspects into account..

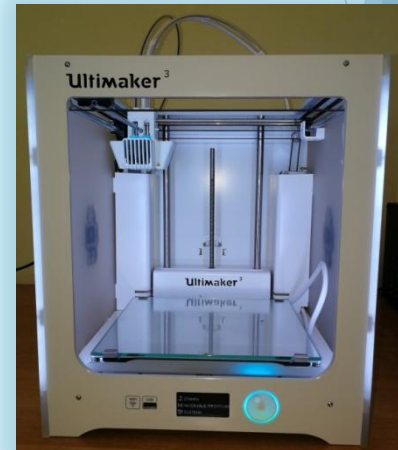
- ▶ How to find spare parts for obsolete equipments?  
An experimental approach..
- ▶ Do it yourself with 3D printing technology
- ▶ A solution that allows replacing broken parts meeting original specifications at reasonable prices
- ▶ Model either by CAD or by 3D Scanning



work on CAD



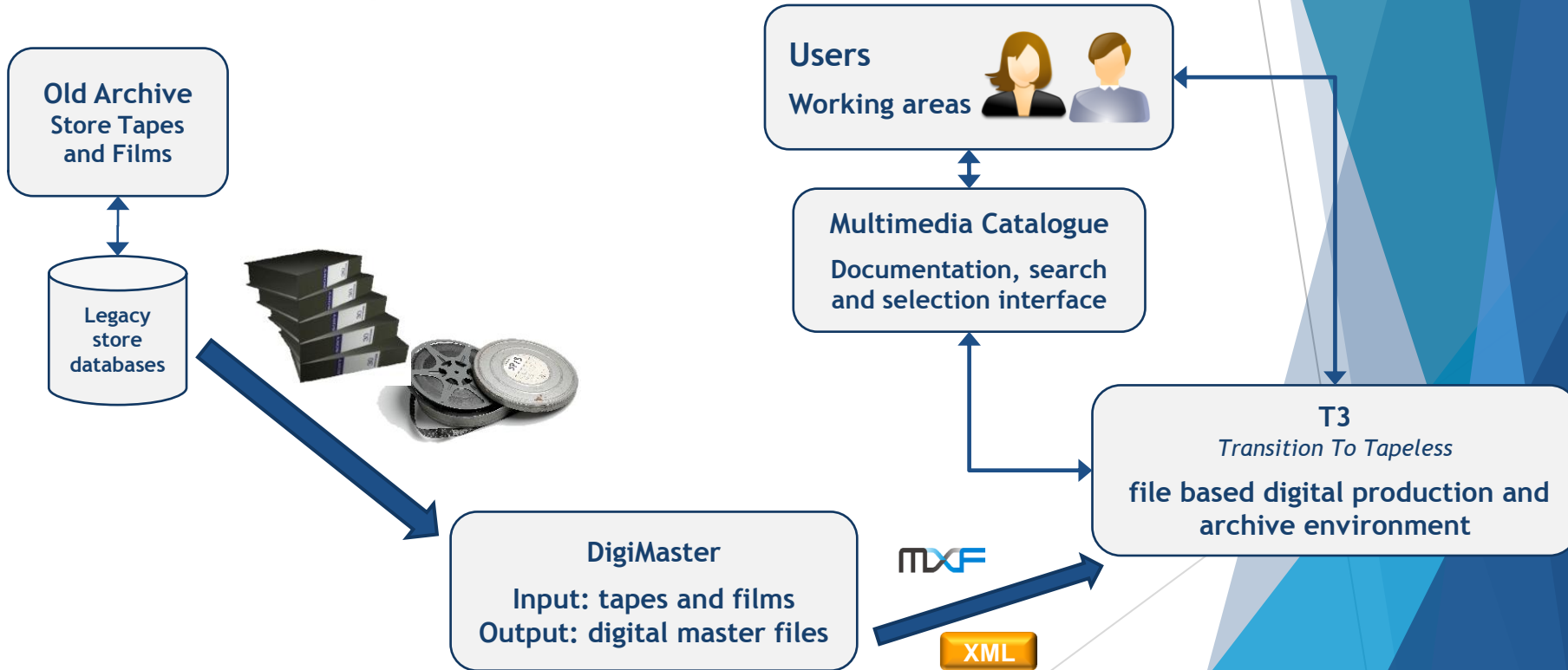
model from 3D scanner



3D printer



## .. Sifting the archive..



## Conclusions

- ▶ RAI directly takes care of its archive digitisation because of the strategic importance of this mission
- ▶ Archive preservation will not end with the full transition to files
  - ▶ Conversion to other file formats
  - ▶ Further metadata enrichment for better search and use
  - ▶ Digital restoration of valuable content
  - ▶ Evolution of storage and access technologies
- ▶ And the archive will grow with new, digital born productions

*The DigiMaster team thanks for your attention*

