

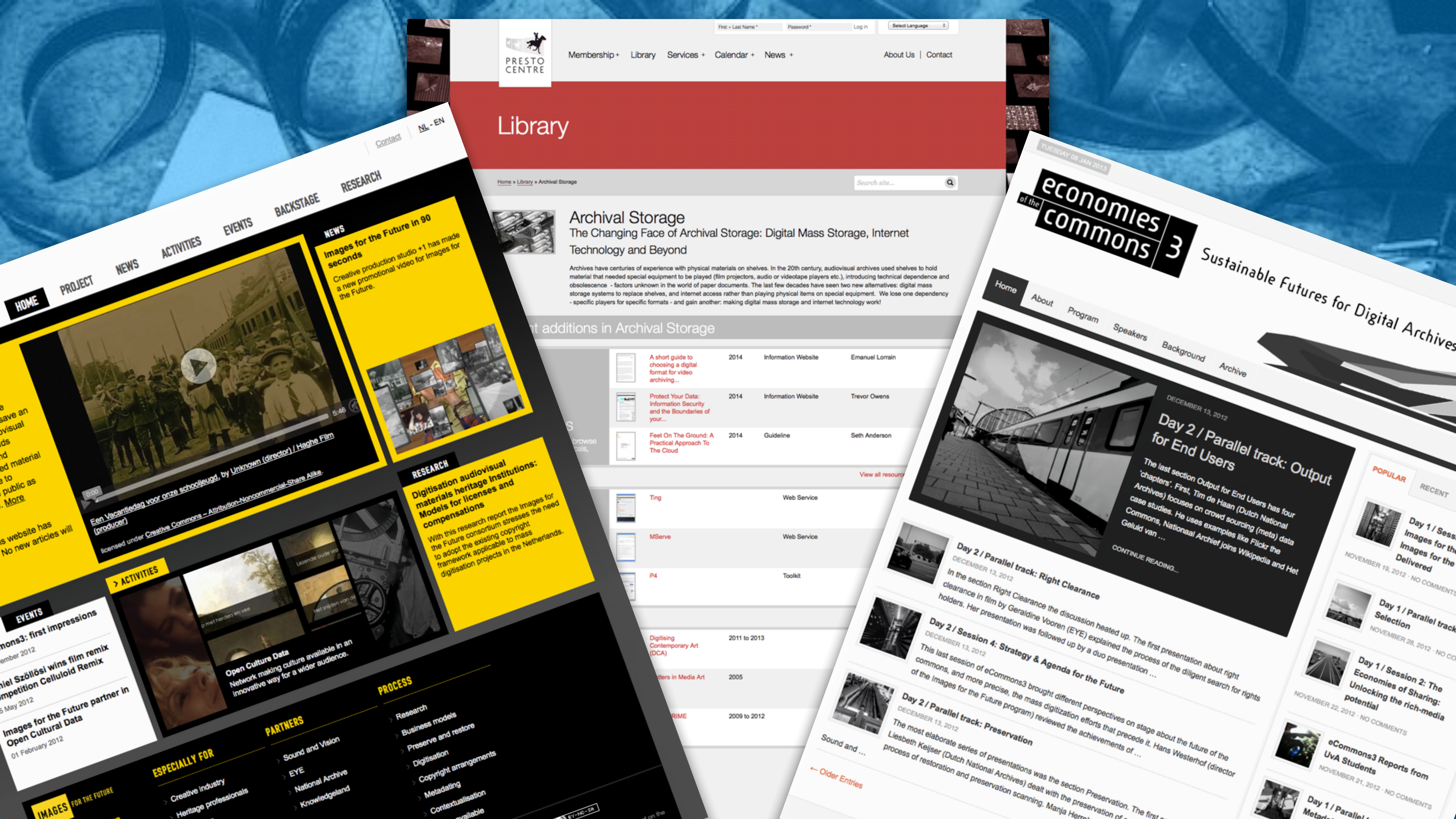
Separate Pasts, Common Futures

Digital film preservation in a
broadcast environment

Erwin Verbruggen

Netherlands Institute for Sound and Vision





Library

Home » Library » Archival Storage



Archival Storage The Changing Face of Archival Storage: Digital Mass Storage, Internet Technology and Beyond

Archives have centuries of experience with physical materials on shelves. In the 20th century, audiovisual archives used shelves to hold material that needed special equipment to be played (film projectors, audio or videotape players etc.), introducing technical dependence and obsolescence - factors unknown in the world of paper documents. The last few decades have seen two new alternatives: digital mass storage systems to replace shelves, and internet access rather than playing physical items on special equipment. We lose one dependency - specific players for specific formats - and gain another: making digital mass storage and internet technology work!

Recent additions in Archival Storage

	A short guide to choosing a digital format for video archiving...	2014	Information Website	Emanuel Lorrain
	Protect Your Data: Information Security and the Boundaries of your...	2014	Information Website	Trevor Owens
	Feet On The Ground: A Practical Approach To The Cloud	2014	Guideline	Seth Anderson

[View all resources](#)

	Ting		Web Service	
	MServe		Web Service	
	P4		Toolkit	

[Digitising Contemporary Art \(DCA\)](#) 2011 to 2013

[Artists in Media Art](#) 2005

[PRIME](#) 2009 to 2012

eCommons3

Sustainable Futures for Digital Archives



Day 2 / Parallel track: Output for End Users

DECEMBER 13, 2012
The last section Output for End Users has four 'chapters'. First, Tim de Haan (Dutch National Archives) focuses on crowd sourcing (meta) data case studies. He uses examples like Flickr the Commons, Nationaal Archief joins Wikipedia and Het Geluid van ...

Day 2 / Parallel track: Right Clearance

DECEMBER 13, 2012
In the section Right Clearance the discussion heated up. The first presentation about right clearance in film by Geraldine Vooren (EYE) explained the process of the diligent search for rights holders. Her presentation was followed up by a duo presentation ...

Day 2 / Session 4: Strategy & Agenda for the Future

DECEMBER 13, 2012
This last session of eCommons3 brought different perspectives on stage about the future of the commons, and more precise, the mass digitization efforts that precede it. Hans Westerhof (director of the Images for the Future program) reviewed the achievements of ...

Day 2 / Parallel track: Preservation

DECEMBER 13, 2012
The most elaborate series of presentations was the section Preservation. The first presentation by Liesbeth Keijser (Dutch National Archives) dealt with the preservation of ...

[Sound and ...](#)

[Older Entries](#)

POPULAR

RECENT

Day 1 / Session 2: Images for the Future: Images for the Future Delivered
NOVEMBER 19, 2012 - NO COMMENTS

Day 1 / Parallel track: Selection
NOVEMBER 28, 2012 - NO COMMENTS

Day 1 / Session 2: The Economies of Sharing: Unlocking the rich-media potential
NOVEMBER 22, 2012 - NO COMMENTS

eCommons3 Reports from UvA Students
NOVEMBER 21, 2012 - NO COMMENTS

Day 1 / Parallel track: Metadata
NOVEMBER 21, 2012 - NO COMMENTS

NEWS

Images for the Future in 90 seconds
Creative production studio +1 has made a new promotional video for Images for the Future.



RESEARCH

Digitisation audiovisual materials heritage institutions: Models for licenses and compensations
With this research report the Images for the Future consortium stresses the need to adopt the existing copyright framework applicable to mass digitisation projects in the Netherlands.

HOME

PROJECT

NEWS

ACTIVITIES

EVENTS

BACKSTAGE

RESEARCH

Contact

NL - EN

EVENTS

eCommons3: first impressions
November 2012

Andri Szöllösi wins film remix competition Celluloid Remix
5 May 2012

Images for the Future partner in Open Cultural Data
01 February 2012

Open Culture Data
Network making culture available in an innovative way for a wider audience.

PARTNERS

ESPECIALLY FOR

- Creative industry
- Heritage professionals

- Sound and Vision
- EYE
- National Archive
- Knowledgeland

PROCESS

- Research
- Business models
- Preserve and restore
- Digitisation
- Copyright arrangements
- Metadataing
- Contextualisation

IMAGES FOR THE FUTURE

EY-NC-SA

PLANNING VS. REALITY

Project planning 2007

6 Partners

Fonds Economische Structuurversterking

Runtime Jul 2007 to Jul 2014

6 partners

Received by Jul 2014: € 154 mln

Refund 2014 – 2026: € 64 mln

⇒ Government provides €90 mln

Share Sound and Vision:

Receives: € 113 mln

Refunds: € 44 mln

Project update 2010

4 Partners

Received by 2010: € 82 mln

End of FES: OCW administers the budget of € 90 mln.

OCW finances € 25 mln

⇒ Total budget now € 115 mln

Share Sound and Vision:

Receives: € 84 mln

Refunds: -

adjustments made



105.000 HOURS OF VIDEO

18.000 HOURS OF FILM

19.000 HOURS OF AUDIO

1.200.000 PHOTOGRAPHS

DIGITISED THANKS TO *IMAGES FOR THE FUTURE*

BEELD EN GELUID



1. Film Digitisation
2. Trusted Storage
3. File Compliance



FILM DIGITISATION



TIMELINE OVERVIEW



IMAGES FOR THE FUTURE

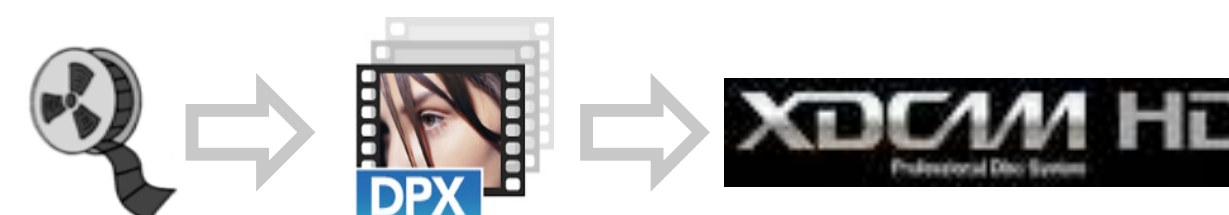
SD digitisation (video)



news broadcast
amateur (small-gauge)

WF & format research

HD digitisation (data)



other broadcast
newsreels
other collections
nitrate
“treasures” (academy)

“film finale”

TBD

Digitisation target:

Acetate 17.500 h
Nitrate 900 h

Status Sept 2014:

18.300 h digitised

Of which about:

7.300 h in SD
11.000 h in HD

2.800 h HD internal
8.200 h HD external



FILM COLLECTIONS

Collections:

- Broadcast archive
- Polygoon news reel archive
- Film archive of the RVD
- Film and science foundation
- Small gauge (amateur)

A variety of characteristics:

Formats

Colour / B-W

Cinematographic quality

Physical state:

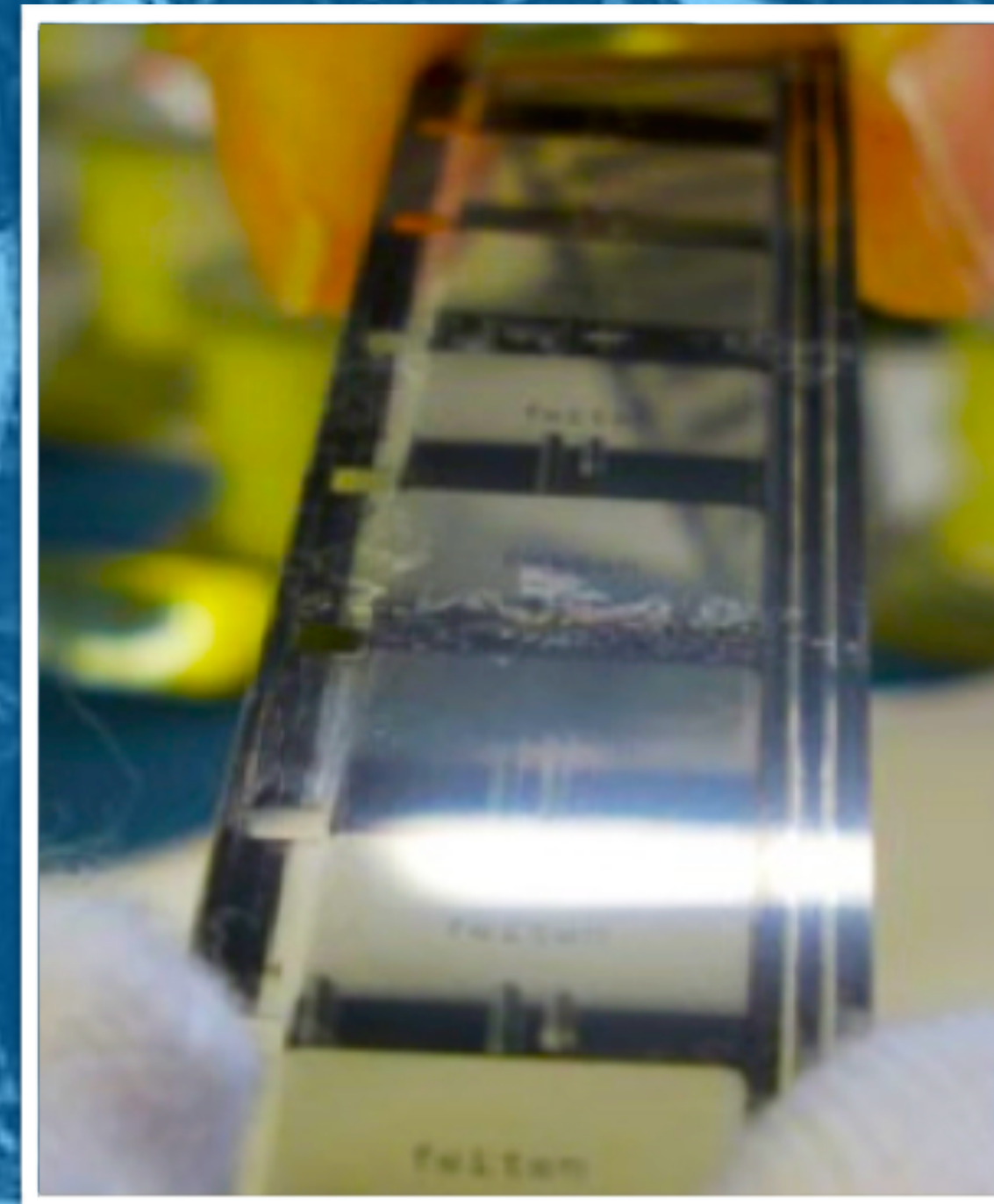
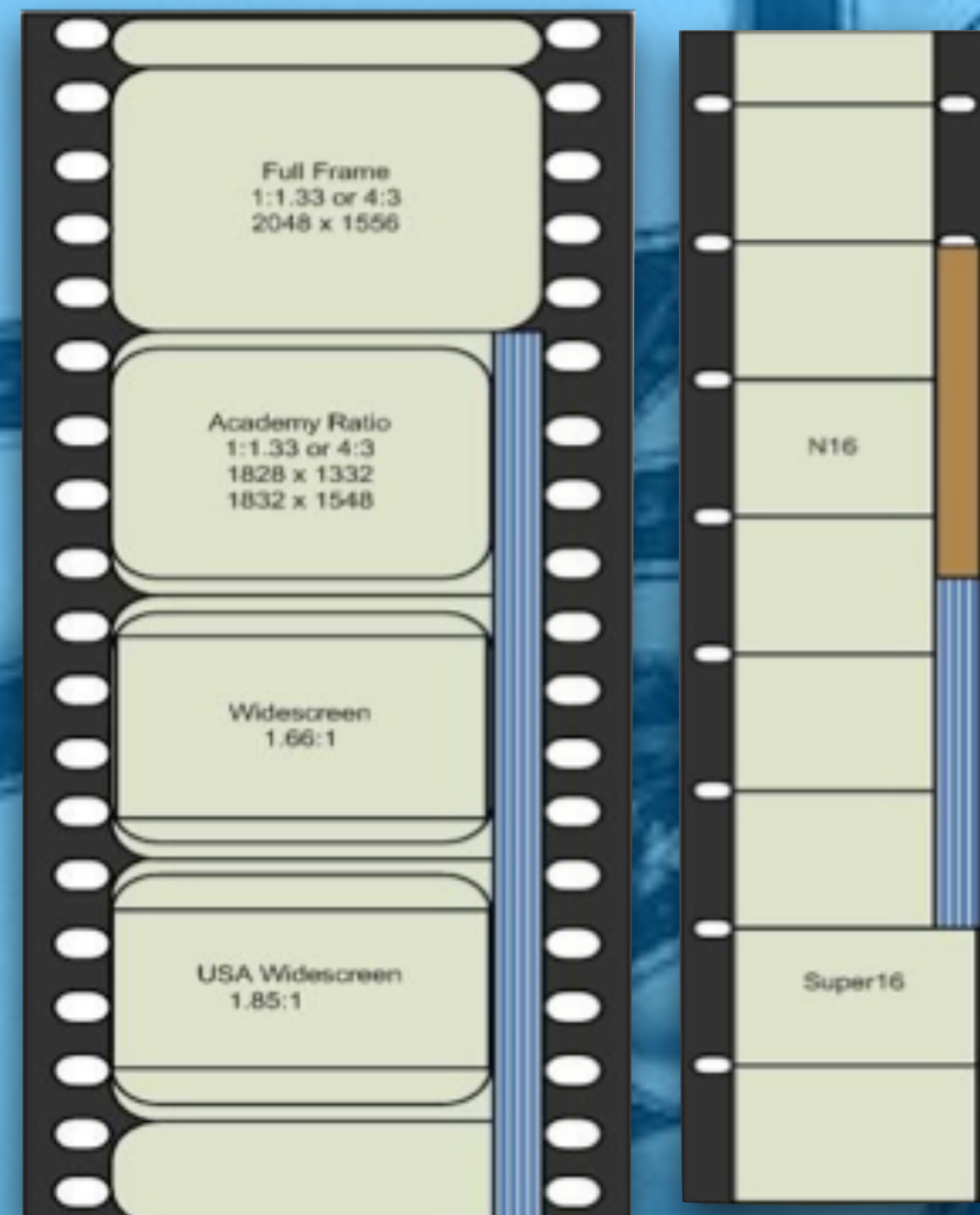
- Shrinkage
- Glue remains
- Splices
- Perforations
- A/B winds

Sound and sync

Dimensions (incl can)

Different items per carrier

Status metadata in catalogue



ARCHIVE SERVICES

Beeld en Geluid - Google Chrome
immix.beeldengeluid.nl/extranet/index.aspx?chapterid=1164&filterid=974&contentid=241&searchID=2449057&itemsOnPage=10

Keyframes
TERUGKEER ECHTPAAR VAN DE LEEUW *Integrale uitzending*
- NIET VAN TOEPASSING

Drager: (onbekend); 00:41:23 - 00:41:56 (programma)

Specifiek programma
 Alle (6310)

Home > Zoeken > iMMix-catalogi Erwin Verbruggen (NIBG) uitloggen 0 items

Opnieuw zoeken

Leeuw

meer zoekopties
Zoek in Alles
Uitzenddatum Alle

Resultaten 1 - 10 van 6310 uit 1462870 doorzochte documenten

-- Actie -- Er zijn geen items geselecteerd Pagina 1 van 631

Titel	Datum	Zendgemachtigde	Trefwoorden
<input type="checkbox"/> PAUL DE LEEUW SHOW - Afl. 7 - Integrale uitzending		NCRV	
<input type="checkbox"/> BEGIN- EN EINDTITEL LANDKAART POLYGON, RVD TITEL 1945 MET LEEUW TITEL - Integrale uitzending		NIET VAN TOEPASSING	
<input type="checkbox"/> SCHREEUW VAN DE LEEUW - Integrale uitzending		VARA	
<input type="checkbox"/> FAMILIE VAN DER LEEUW - Integrale uitzending	01-01-1925	NIET VAN TOEPASSING	vader, directies, families, kinderen, moeder
<input type="checkbox"/> TERUGKEER ECHTPAAR VAN DER LEEUW - Integrale uitzending	01-01-1933	NIET VAN TOEPASSING	directeuren, start en landing, sportvliegtuigen
<input type="checkbox"/> TERUGKEER ECHTPAAR VAN DE LEEUW - Integrale uitzending	25-01-1933	NIET VAN TOEPASSING	publiek, sportvliegtuigen, piloten, aankomst, luchtvaart, gezin
<input type="checkbox"/> RUDOLF, DE LEEUW VAN BUREN - Integrale uitzending	16-08-1940	KRO	



Slide with thanks to Harm-Jan Triemstra



Analogue materials

- Demand great effort, time, organisation, personnel
- Material prone to damage
- Watch & reuse ~ 15 films / month, declining



Digital files

- iMMix catalogue enables customers to watch, select and order immediately (hires video MXF D10)
- On average 10.000 downloads / month
- Majority is partial (average 6 minutes)
- Substantial number of 'Images for the Future'-related materials

GENERAL IT ARCHITECTURE OF THE ARCHIVE

AS-IS

iMMix Portal

iMMix Catalogue

Media Archive

DIVA

Online

SL8500

TO-BE

MAM Portal

MAM Core

DIVA

Online

SL8500

INITIAL RESEARCH QUESTIONS



Best way to scan several types of source material?



Best format to store the scanned material (and, possibly, what level of compression that can be applied?)



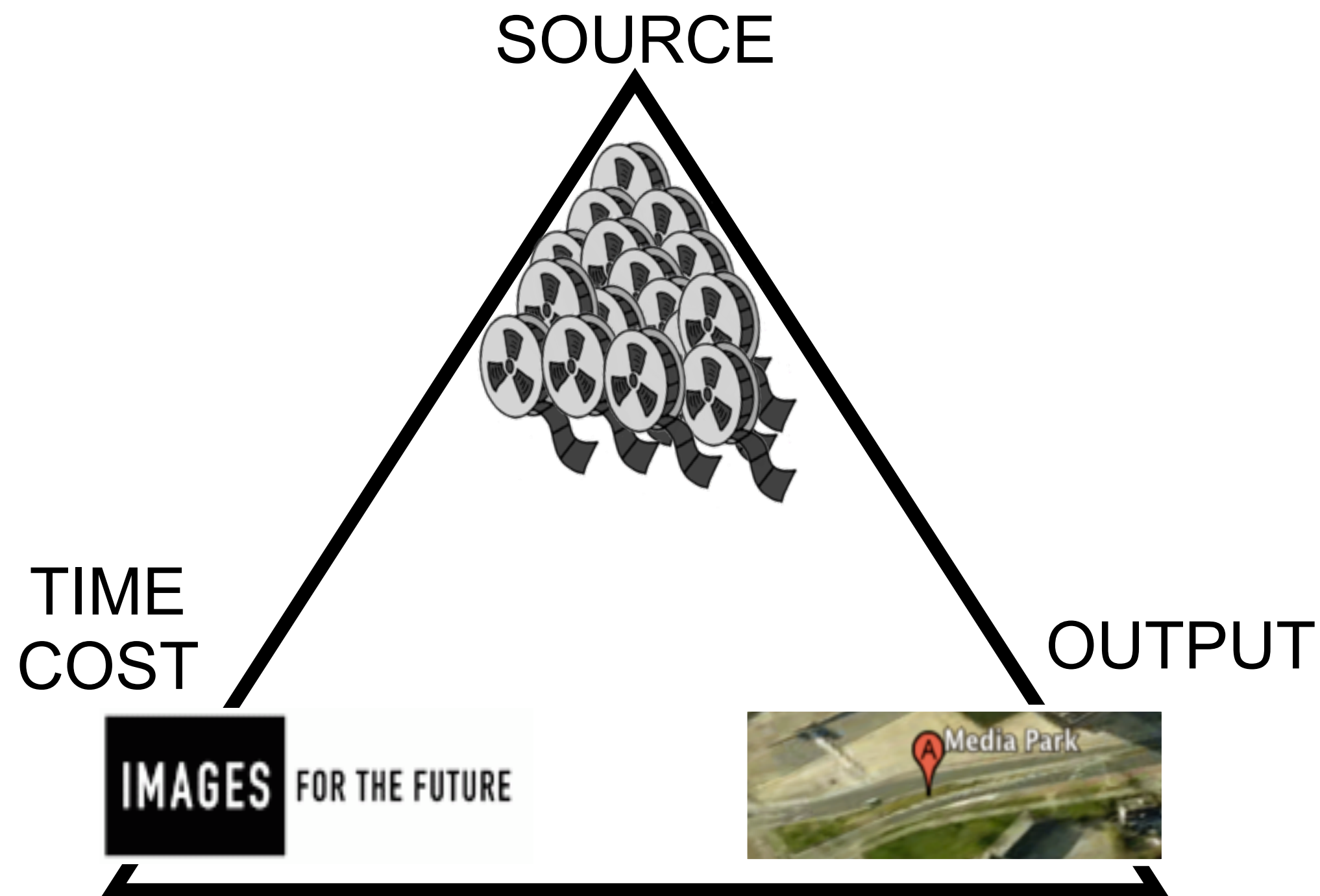
Best way to convert this material to a broadcast-compatible video format?



What are the practical capabilities of existing tools and formats?

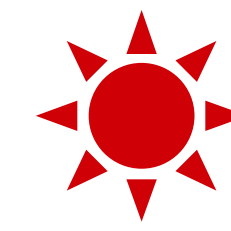


CHALLENGES & CONSTRAINTS



Permanence
Storage
Safeguarding

Labor Intensive
Data Storage
Costly



Sweet Spot ?

Accessibility
Search
Retrieval
Re-use

Coding
Resolution
Bit Depth
Fidelity

RESEARCH OUTCOMES



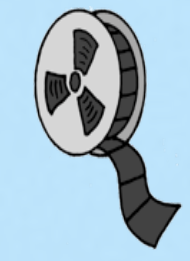
Native resolution



Resolution high enough to capture source detail



10-bit logarithmic transfer curve



Color correction needed in case of colour fading



Native scanning RGB Colour space



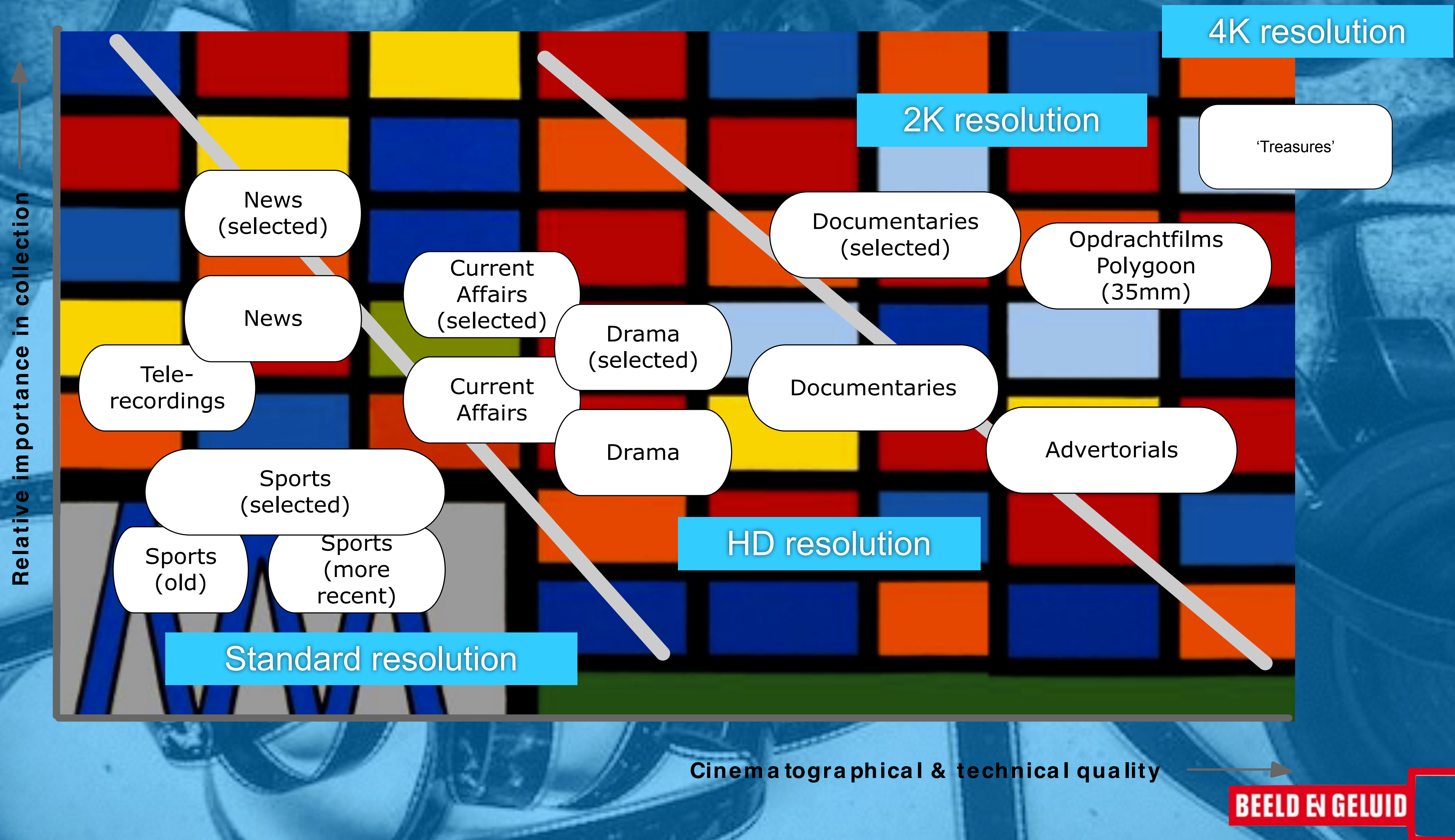
DPX better suited than JPG2000



Use Y-only for BW material



RESOLUTIONS DECIDED ON



RESOLUTIONS DECIDED ON

DPX

- SMPTE 268M-2003 v2
- 10 bit log
- RGB or single channel
BW
- Scanner colour space
(specified and with LUT
for Rec.709 - XDCAM
HD)



BWAV

- EBU tech 3285-2001 v1
- 24 bit linear PCM, 48 kHz
sample rate

XDCAM HD 422

- SMPTE 381, 382,
XDCAM_MXF_HD422_v080
- MXF OP1a: SMPTE 377,
378, 379
- Timecode Track in material
package MXF (EBU Rec
122)

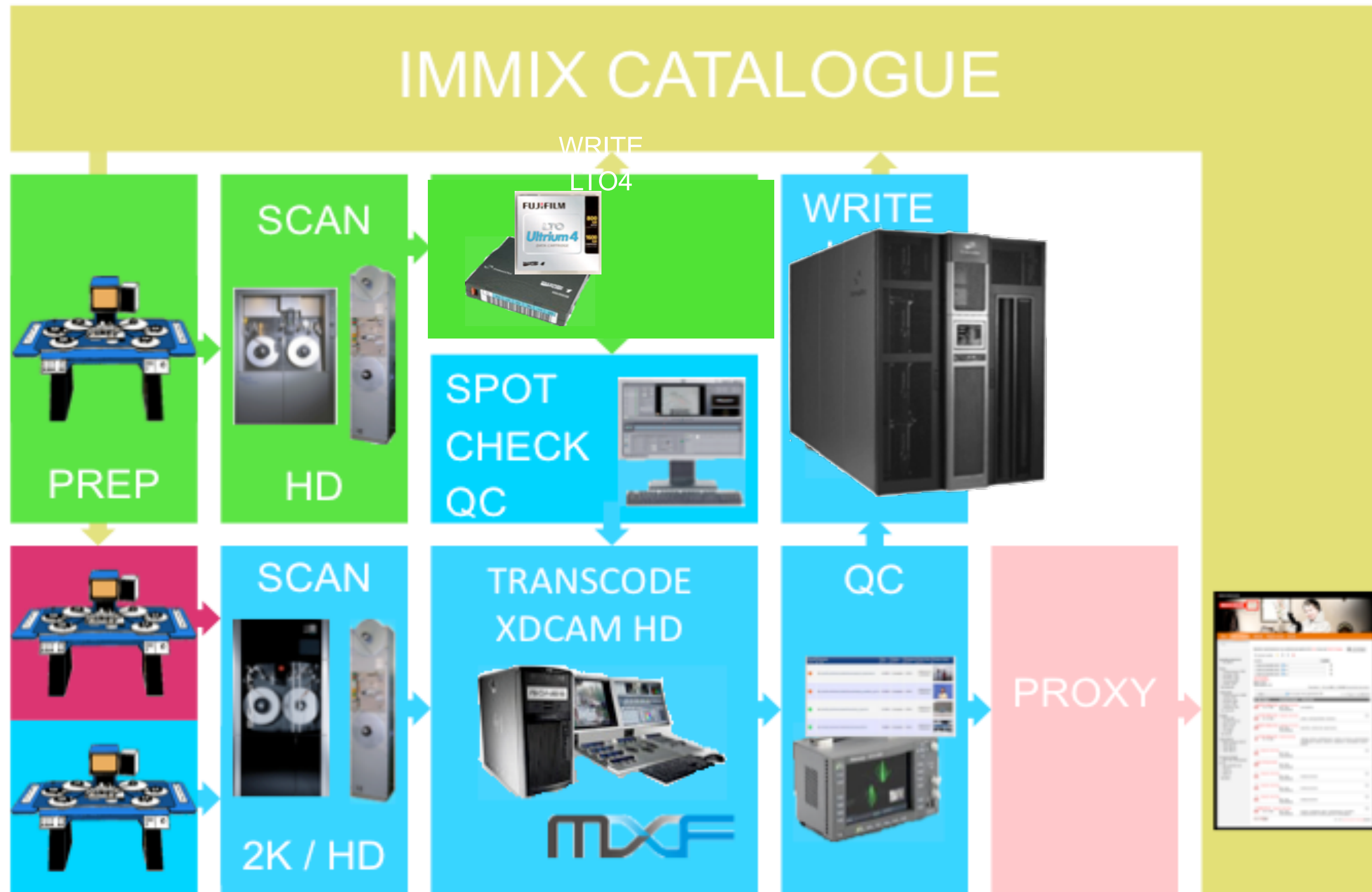
XDCAM HD

Professional Disc System

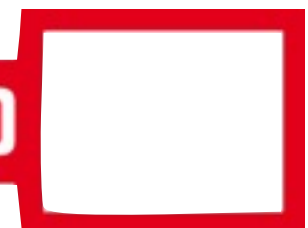


HD/2K Workflow

Combination of Outsourced & Internal



Slide with thanks to Harm-Jan Triemstra



LESSONS LEARNED (1)

Topic

Lesson

1 - Collection

How much is actually known/correct/complete about the source material (with regards to digitisation)? Don't overestimate this part.

2 - Technology

- Archival workflow has specific demands
- Archival material poses specific challenges that suppliers have limited access to / knowledge about.
- Take more time to fix start-up problems if you are an early adopter.

3 - Outsourcing

Even when material properties are specified this doesn't prevent wrong assumptions about the work load (e.g. film prep).

LESSONS LEARNED (2)

Topic

Lesson

4 - Formats

Due to the film grain, high detail level in the DPX and the coding properties of the XDCAM HD422, post-processing is needed to prevent visual artefacts (blocking) in the latter.

5 - Workflow & QC

Devising a digitisation workflow is not difficult, but it takes time to understand:

- How all the components (have to) work together
- What the properties of the formats are
- How to perform the verification of formats
- The extraction and mapping of metadata to internal systems.



TRUSTED STORAGE



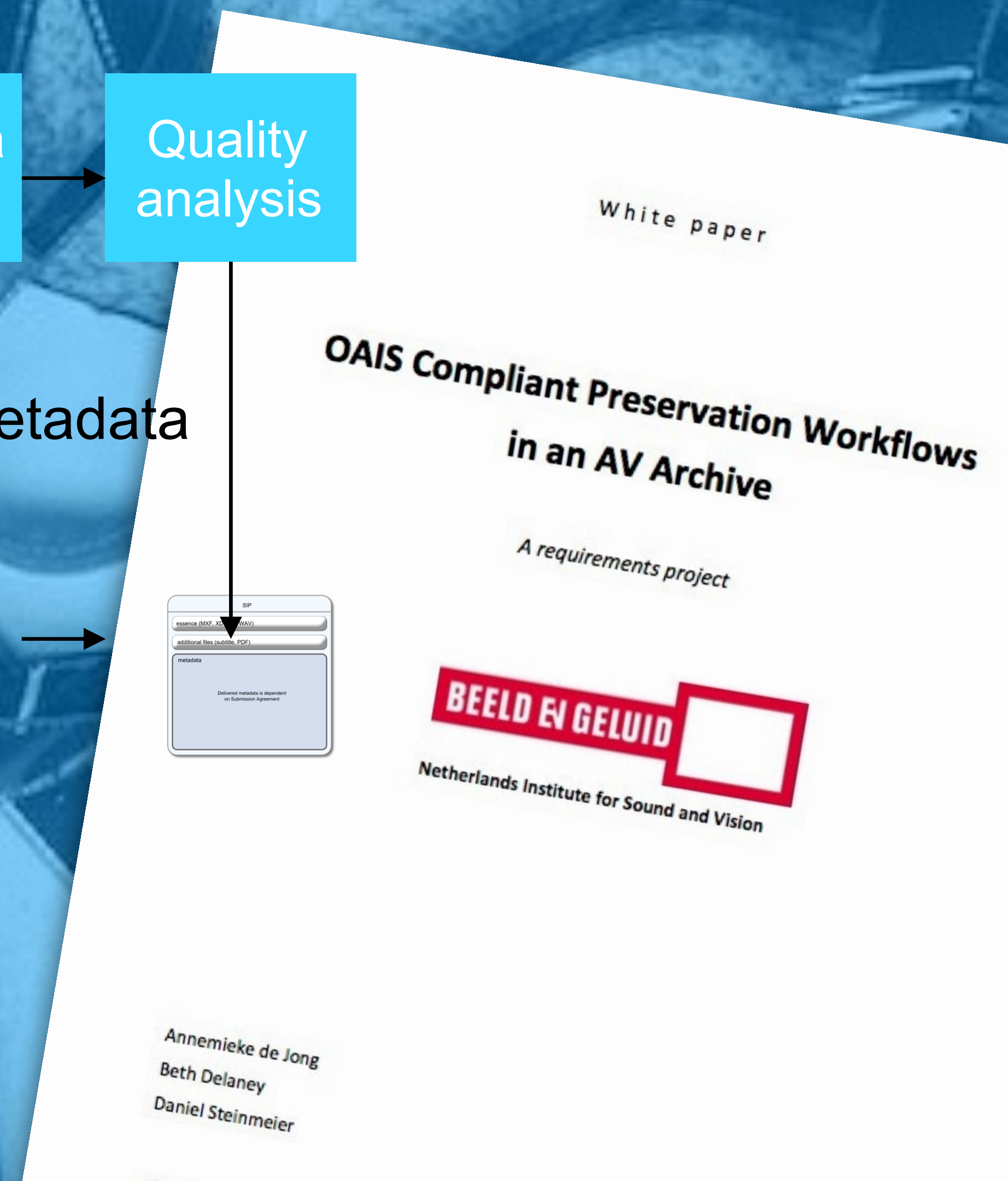
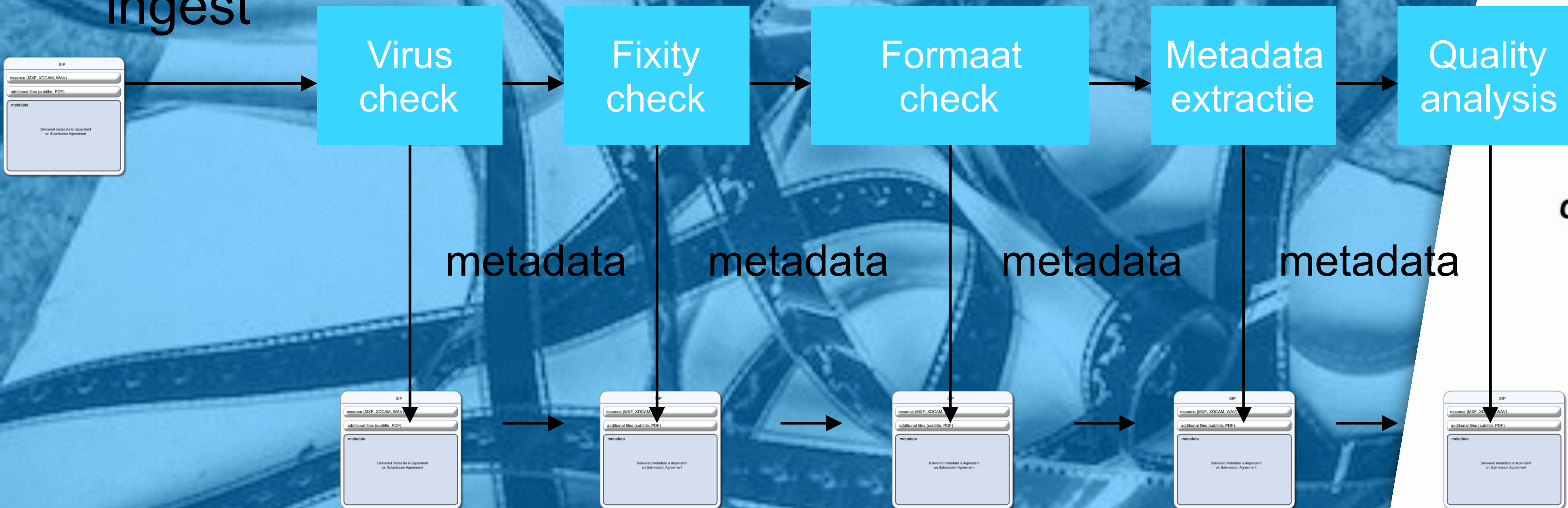
STORAGE PROVISION

Step	Concerns
1 - INTAKE	<ul style="list-style-type: none">• Intake form• Metadata template
2 - PLANNING	<ul style="list-style-type: none">• “Flat storage”• Available through iMMix
3 - CHECKING MD	<ul style="list-style-type: none">• 4 Required fields
4 - CHECKING FILES	<ul style="list-style-type: none">• DIVArchive: For MXF/WAV files• DIVAdirector: FTP for other files• Transcode
5 - IMPORT	<ul style="list-style-type: none">• Budget, Contract, SLA



TRUSTING OUR DIGITAL REPOSITORY

ingest





THE PERFECT STANDARD

PREservation FORMAts for culture information/e-archives

Friday, 14 March 2014

WEBSITE PROJECT PARTNERS TENDER ACTIVITIES OPEN SOURCE PORTAL COMMUNITY DOWNLOAD CONTACTS





BLOG HOME RESERVED AREA

Logged in as: preforma
Logout

MEDIA PARTNER



CONTACTS

Project Coordinator: [Borje Justrell](#)
Technical Coordinator: [Antonella Fresca](#)
Communication Coordinator: [Claudio Prandoni](#)
Scientific Coordinator: [Nicola Ferro](#)
Project website: www.preforma-project.eu

LATEST NEWS

PRESENTATION OF THE PROJECT



A new Pre-Commercial-Procurement project started in January 2014

PREFORMA, FUTURE MEMORY STANDARDS

Memory institutions are facing increasing transfers of electronic documents and other media content for long term preservation. Preservation models are often inspired by ISO 14721:2003, known as "the OAIS model", where transfers and preservation are built on information packages containing both data and metadata. [Continue reading →](#)

IN FOCUS



Brussels, 4 April 2014

PREFORMA Call for Tender, Information Day

On April 4th 2014 PREFORMA project will organise an Information Day to present the call for tender that will be launched as part of the Pre-Commercial Procurement.

PARTNERS











This project has received funding from the European Union's Seventh Framework Programme under grant agreement no 619503

PROJECT PARTNERS TENDER ACTIVITIES OPEN SOURCE PORTAL COMMUNITY DOWNLOAD CONTACTS

UPCOMING EVENTS [VIEW ALL →](#)

BRUSSELS, 4 APRIL 2014

PREFORMA CALL FOR TENDER, INFORMATION DAY



4 April 2014



MEMORY STANDARDS

Open Formats for culture information/e-Commercial Procurement (PCP) project, 2014, and co-funded by the European 7-ICT Programme.

To address the challenge of implementing open file formats for preserving data the main objective is to give memory institutions a chance to participate in the process of the conformity testing of data to be stored into archives.

On April 4th 2014 PREFORMA project will organise an information Day to present the call for tender that will be launched as part of the Pre-Commercial Procurement. Participation is open to everybody who is interested to participate to the call and to become a PREFORMA supplier but will be subject to registration.

[READ MORE](#)

PROJECT PARTNERS

Project Coordinator + Memory Institution	Riksarkivet	Sweden
Technical + Communication Coordinator	Promoter Srl	Italy
Technical Partner	Packed Expertisecentrum Digitaal Erfgoed Vzw	Belgium
Technical Partner	Fraunhofer Gesellschaft Zur Foerderung Der Angewandten Forschung E.V	Germany
Technical Partner	Hogskolan I Skovde University Of Skovde	Sweden
Technical Partner	Universita Degli Studi di Padova	Italy
Memory Institution	Stichting Nederlands Instituut voor Beeld En Geluid	Netherlands
Memory Institution	Koninklijk Instituut Voor Het Kunstpatrimonium	Belgium
Memory Institution	Greek Film Centre Ae	Greece
Memory Institution	Local Government Management Agency An Ghniomhaireacht Bainistiochta Rialtais Aitiuil	Ireland
Memory Institution	Stiftung Preussischer Kulturbesitz	Germany
Memory Institution	Ayuntamiento De Girona	Spain
Memory Institution	Eesti Vabariigi Kultuuriministeerium	Estonia
Memory Institution	Kungliga Biblioteket	Sweden

Pre-Commercial Procurement



- Competition-like procurement method
- Enables public sector bodies to engage with Innovative businesses in development projects
- Innovative solutions that address specific public sector challenges and needs.
- Created through a phased procurement of development contracts (to reduce risk)
- More and more common within the public sectors of the European Union



Challenge R&D



Empower memory institutions to
gain **full control** over
the **technical properties** of
digital content intended for
long-term preservation



Project Aim and Objectives



- ❑ **The aim:** to address the challenge of implementing various good quality standardised file formats for preserving data content in the long term.
- ❑ **The main objective:** to give memory institutions full control of the process of conformity tests of files to be ingested into archives.
- ❑ **The main objective of the PCP launched by PREFORMA:** to develop and deploy an open source software licensed reference implementation for various file format standards, aimed for any memory institution (or other organisation with a preservation task) that wish to check conformance with a specific standard.



Challenge Brief



- ❑ Develop an **open source conformance checker** that:
 - checks if a file complies with standard specifications
 - checks if a file complies with the acceptance criteria of the memory institution
 - reports back to human and software agents
 - perform simple fixes

- ❑ Establish an ecosystem around an **open source reference implementation** that:
 - generates useful feedback for those who control software
 - advances improvement of the standard specification
 - advances development of new business cases for managing preservation files



Strategy



- ❑ Develop an **open source conformance checker** that:
 - checks if a file complies with standard specifications
 - checks if a file complies with the acceptance criteria of the memory institution
 - reports back to human and software agents
 - perform simple fixes
- ❑ Establish an ecosystem around an **open source reference implementation** that:
 - generates useful feedback for those who control software
 - advances improvement of the standard specification
 - advances development of new business cases for managing preservation files



Content type

Standard specifications

TEXT

ISO 32000-1:2008 (PDF 1.7)
ISO 19005-1:2005 (PDF/A-1)
ISO 19005-2:2011 (PDF/A-2)
ISO 19005-3:2012 (PDF/A-3)

IMAGE

ISO 12234-2:2001 (TIFF/EP)
ISO 12369:2004 (TIFF/IT)

MOVING IMAGE

Open standard:

- maintained by a not-for-profit organization,
- available either freely or at a nominal charge.
- IPR made irrevocably available on a royalty-free basis.
- no constraints on re-use

Capture AV-files that comply with the set of minimum technical parameters

Sustainability Analysis



- Has the format been adopted by digital preservationists?
- Has the format been adopted by PREFORMA stakeholders?
- Has the format been adopted by service providers?
- Does the license of the format allow for developing open source software?
- Is the standard specification document available either freely or at a nominal charge?



Open standard?	AUDIOVISUAL			TEXT	IMAGE
	<i>broadcast</i>	<i>film</i>	<i>Consumer</i>		
PREFORMA stakeholders	<i>MPEG-IMX (MXF/MPEG2)</i> <i>XDCAM HD422 (MXF/MPEG4)</i>	<i>DPX</i> <i>DCP (MXF/JPEG2000)</i>	<i>MOV/MPEG2</i> <i>AVI/MPEG2</i> <i>MPEG/MPEG2</i> <i>MPEG/MPEG4-AVC</i>	<i>PDF 1.4</i> PDF/A1	TIFF 6.0 <i>JPEG</i> JPEG2000 <i>RAW</i>
Industry standards	<i>ASI07 (MXF/MPEG2)</i> <i>(MXF/JPEG2000)</i> <i>FIMS (MXF/MPEG2)</i>	DCDM (TIFF 6.0) <i>DCP (MXF/JPEG2000)</i> <i>IMF (MXF/MPEG4)</i>	<i>MPEG-AF</i>	<i>PDF</i>	JPEG2000 TIFF
Open standards	MKV/FFV1 OGG/Dirac	PNG	WebM/VP8 OGG/Theora	PDF/A1 PDF/A3 PDF/A3	PNG
PREFORMA	MKV (?) OGG JPEG2000 (?) FFV1 Dirac LPCM (?)			PDF/A	TIFF 6.0 (?)

Main public events



1. A **Training event for Open Source companies**

Stockholm, December 2015

Includes first Prototype Demonstration

2. An **Experience Workshop**

Berlin, December 2016

Includes second Prototype Demonstration

PREFORMA partners will share with memory institutions their experiences of working with suppliers under R&D service agreements.

3. A **final conference**

Stockholm, December 2017

Results of the project.



IN CONCLUSION

Film materials in a broadcast vs film context?

- Preservation formats: not too different?
- Digitisation technology: not too different
- Storage technology: not too different
- Archival practices & standards: not too different
- Workflows & *umwelt* demands are!



Thank you.

Erwin Verbruggen
Netherlands Institute for Sound and Vision



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@erwinverb



www.beeldengeluid.nl



@benglabs



PREFORMA



FOR THE FUTURE