Before the Restoration

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Hochschule der Künste Bern
**Analoge und digitale
Filmkonservierung und -restaurierung**
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Table of Contents

- principles
- preparation
- digitisation
- conservation

Principles

ฟิล์มนั้นยังคงมีอายุยืนยาวอยู่

๒. สิทธิของอนุชน

๒.๑ ด้วยตระหนักในความรับผิดชอบของตนในอันที่จะอนุรักษ์
ฟิล์มภาพยนตร์ให้ดำรงอยู่อย่างยั่งยืน หอภาพยนตร์จักยืน-
หยัดต่อต้านการบีบบังคับใด ๆ ที่จะกำจัดหรือทำลายสิ่งของ
ที่หอภาพยนตร์จะสงวนรักษาไว้ และจะเลือกที่จะปฏิเสธ
หรือรับส่งของใด ๆ ที่มีผู้เสนอให้หอเก็บสะสมด้วยเหตุผลกล
ใดซึ่งอาจอยู่นอกเหนือกฎเกณฑ์ว่าด้วยการอนุรักษ์หรือ
นโยบายการคัดเลือกที่ใช้อยู่ของหอภาพยนตร์นั้น

๓. สิทธิในการใช้ประโยชน์

๓.๑ หอภาพยนตร์ตระหนักว่า สิ่งของในความดูแล มีทั้งมูลค่าใน

Conservation

Conservation encompasses all activities for the care of an object, which **delay its further decay** and ensure that it remains in the most intact condition for the future.

Restoration

Restoration includes all interventions and treatments that serve to **retrieve a certain historical state** and contribute to the legibility, aesthetic integrity or **reuse** of an object.

Restorative actions may be irreversible and require great care in planning, justification, execution and **documentation**.

An Ounce of Ethics

- The probability that a work is available in its integrity in the future is increased.
- All the options that existed before taking an action remain open after the action.
- Every step is carefully documented.

Live in the real world!

There is only one efficient way:
- keep the analogue source elements as long as possible
- more prevention:
  → better insulation
  → more efficient air conditioning
- less handling of the source elements
- make digital masters and access copies

File Formats

- **The archive must be able to handle the file formats it holds.**

- open source
- simple to use and well documented
- widely used by the community

Different Purposes

archive master format:

→ for preservation

mezzanine format:

→ for professional use in post-production

dissemination formats:

→ for widely spreading and easy access

Preparation

Film

- film as document or work of art
- elements of the film
- actual reel

Sources

- splices repair
- perforation repair
- film cleaning
- chemical treatments
- … and beyond

Splices

- cement
- tape
- re-splicing

Perforation

- tape bridges
- film bridges
- acetone
- notches
- V-cuts

Cleaning

- PTR

  - manual cleaning
  - machine cleaning
  - dry
  - using a solvent

  - re-washing

Chemical Treatments

- drying
- humidifying
- mould fungus
- swelling the emulsion
- re-development
- hardening the gelatine

... and Beyond

- transfer the emulsion onto a new base
- keep only the emulsion

Digitisation

Scanner

- film transport
- light source
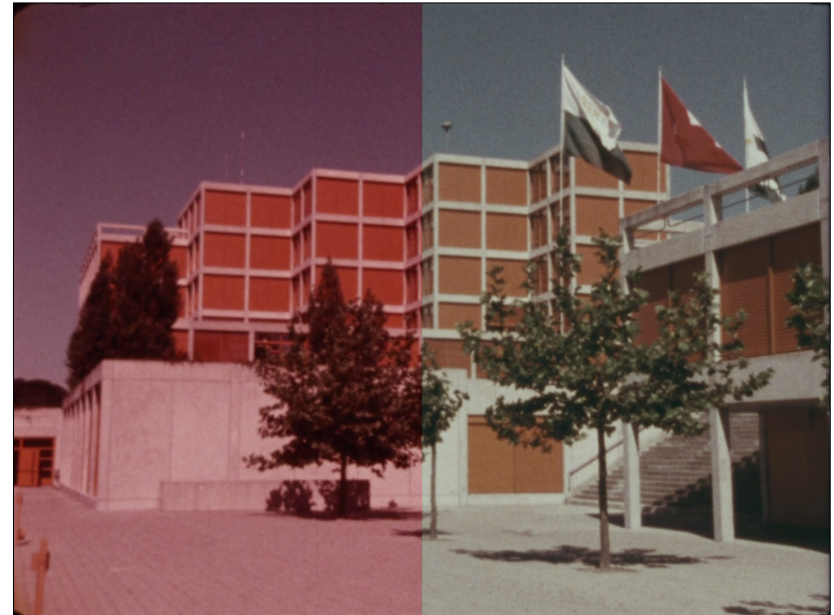- camera
- image section
- wet scanning
- file format

Film Transport

- sprocket
- PTR

- tension
- film path, guide and gate
- reels
- continuous vs. step-by-step

Light Source

- diffuse
- direct
- white
- coloured

- illuminant

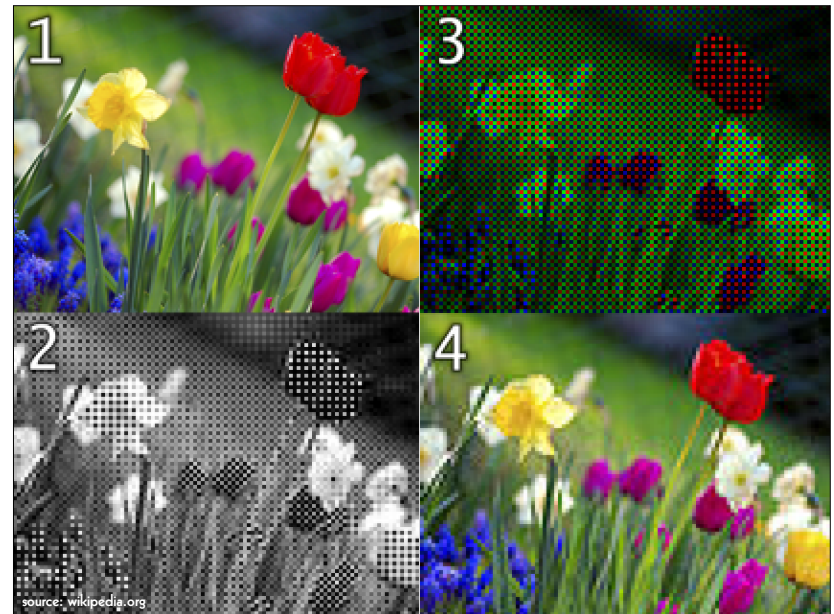## Camera

- image sensor
- resolution
- bit depth
- "raw" data
- lenses

source: wikipedia.org

Ways to use Bayer-type data

digital blow-up to RGB
- 3 times the amount of the generated data
- the file has the full sensor resolution
- only ⅓ of the data are real

digital reduction to RGB
- ¾ the amount of the generated data
- the file has ½ of the sensor resolution
- all data are real

Ways to store Bayer-type data

- pixel values generated by one de-mosaicking algorithm (digital blow-up)
- pixel values generated by mixing two green sensel values into one (digital reduction)
- raw sensel values

Image Section

- camera
- projector
- safe area

- over-scan
- edge to edge

Safe Area

SMPTE RP 8 (1961) / SMPTE RP 13 (1963)
- safe title area is 80 % width and height
- safe action area is 90 % width and height

SMPTE ST 2046-1 (2009)
- safe action area is 93 % width and height
- safe title area is 90 % width and height

Wet Scanning

- wet transfer
- full immersion
- pre-wet

- solvent

Audio Raw Data

- pcm_s16le
- pcm_s24le
- pcm_s32le

Video Raw Data

- rgb48le
- rgb24
- rgb72le

- yuv444p16le
- yuv422p10le
- uyvy422
- yuv420p

- bayer_bggr16le
- bayer_bggr24le

Image Formats

single image:
- DPX 12-bit
- TIFF
- JPEG 2000
- OpenEXR
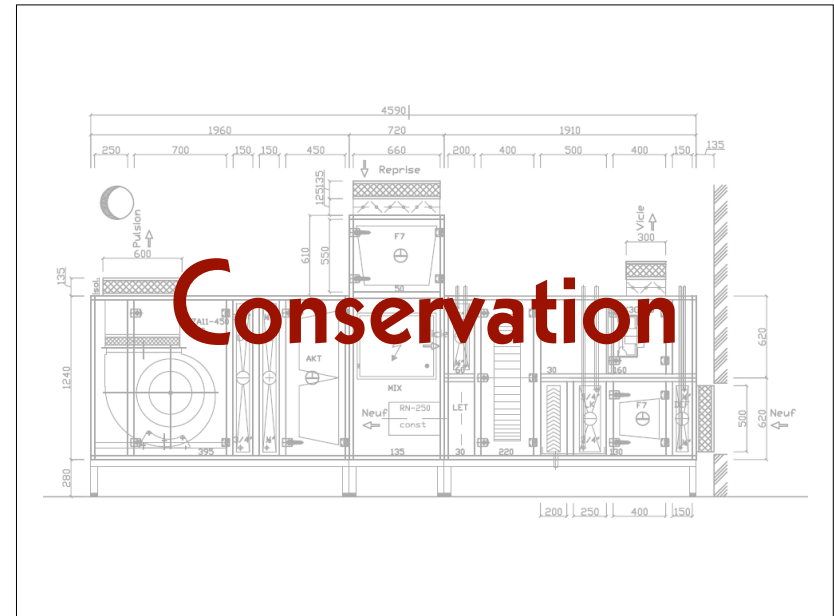- DNG

stream:
- $Y'C_BC_R$ 10-bit uncompressed
- FFV1

What is inside my DPX?

- log neg encoding
- log RGB encoding, quasi-log encoding
- gamma encoding, power function encoding
- scene-linear encoding

Conservation

Source Element(s)

- de-restoration
- cleaning
- preparation for storage

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