JOANNEUM RESEARCH DIGITAL

DIGITAL – Institute for Information and Communication Technologies

Essence Quality Control for AV Archive Digitisation, Migration and Exploitation

Peter Schallauer

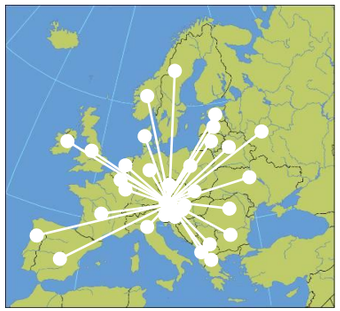
PrestoCentre Preservathon, Nov. 14th 2014

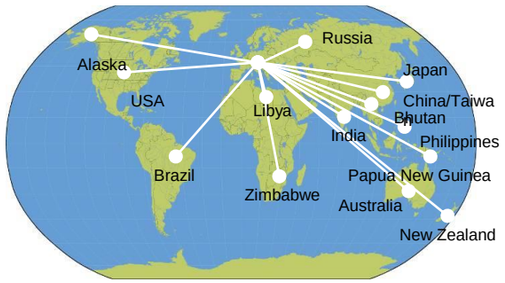
Overview

- Who is JRS
- File QC Layers
  - File/Wrapper/Bitstream/**Essence**
- Essence Quality Control in AV Archives
  - Preservation use cases
  - Automation - workflow
  - Automatic and Interactive Essence QC Tools
- How to use QC results
- DAVID

THE INNOVATION COMPANY

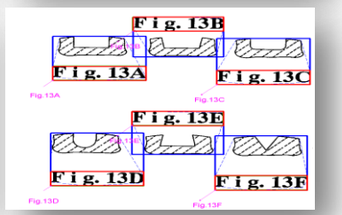
- Applied R&D for industry and public bodies
- Shareholders
  - Province of Styria (90 %)
  - TNO (10 %)
- ~450 staff
- Research Institutes
  - MATERIALS - Surface Technologies and Photonics
  - HEALTH - Biomedicine and Health Sciences
  - RESOURCES - Water, Energy and Sustainability
  - POLICIES - Economic and Innovation Research
  - ROBOTICS - Core Unit Robotics
  - DIGITAL - Information and Communication Technologies





Research Group **A**udio**V**isual **M**edia

- Image Processing, Computer Vision, Machine Learning
  - Media Archives: film/video restoration, quality assessment/control
  - Media Production: content structuring, media similarity, logo detection
  - Security & Traffic: wrong-way driver detection, person flows, traffic intensity
- Metadata
  - Modelling, Validation, Mapping
  - Standardisation, e.g. EBU-QC, FIMS-QA&AME, MPEG-7 AVDP & MP-AF
- Research Projects
  - DIAMANT, PrestoSpace, PrestoPRIME, Presto4U, DAVID FascinatE, TOSCA-MP, ICoSOLE…



AVM
Selected Products

-

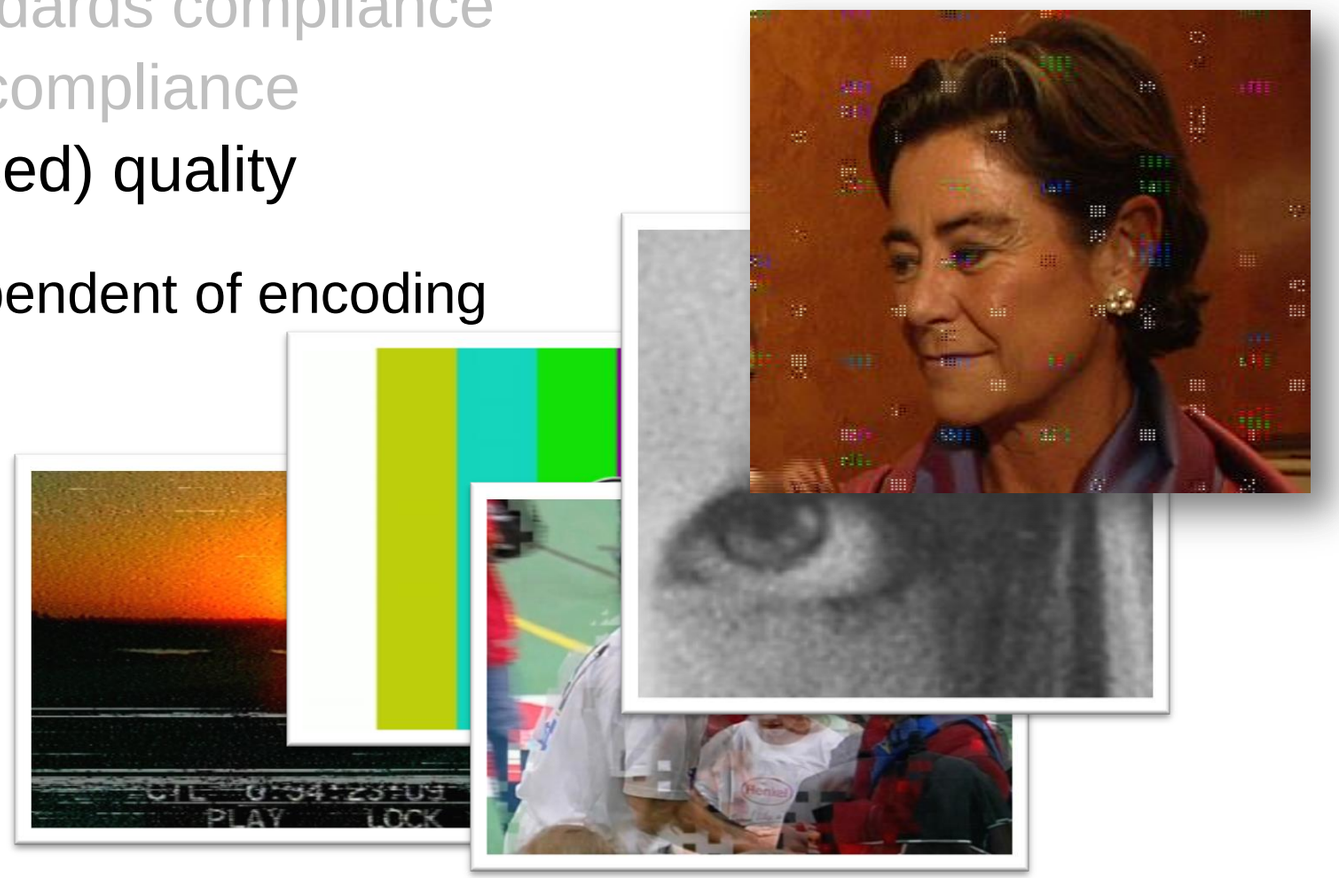
  - DIAMANT Film Restoration
- BRAND DETECTOR
  - Logo Recognition
- viasense
  - Wrong way driver detection

State Prize for Transport 2009

- VidiCert
  - Efficient Video and Film Essence Quality Control

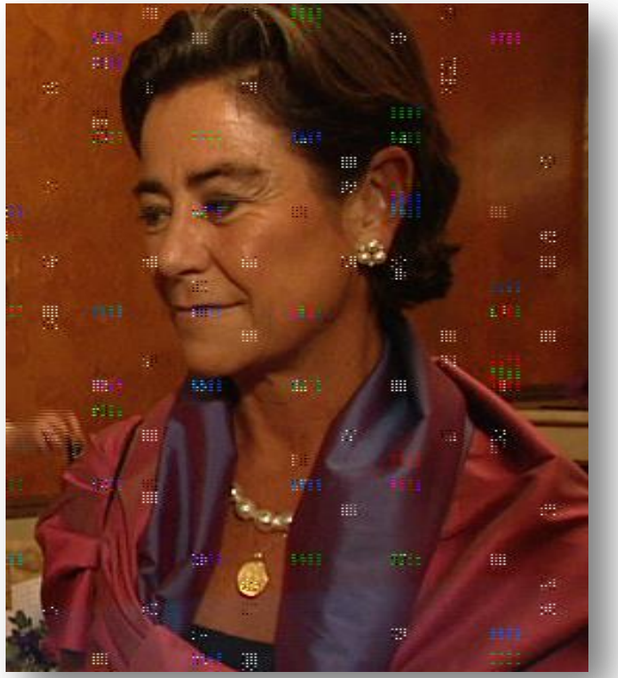
Our focus on Essence QC

- File integrity
- Wrapper (MXF, MOV, AVI…) standards compliance
- Bitstream (MPEG,....) standards compliance
- Essence (base band, content based) quality assessment
  - Analysis of raw image data – independent of encoding
  - Video and movie degradations
  - Detects multi-generation defects
  - Analogue and digitally born
  - Resolution independent
  - No reference video required



Archive Use Cases for Essence Quality Checking (I)

- AV Digitisation and Digital Migration
  - monitor if the video player shows problems (due to head clogging, dusty tape)
    - Analogue Video (off-lock, line dropouts, video breakup, TBC hit)
    - Digital Video Tapes (different types of block drop-outs)
  - monitor the film scanning process
    - instability, out of focus, white/black point, ...



Archive Use Cases for Essence Quality Checking (II)

- Archive/MAM File Ingest
  - ensure consistency between file content and its legacy MAM description
    - do the digitised file has the correct content at all?
    - are file and MAM start/end timecodes consistent?
    - is the file audio channel allocation/encoding/content consistent with MAM?
  - ingest only essence fulfilling certain quality criteria
    - no up-scaled essence (e.g. upscaled SD in an HD archive)

Archive Use Cases for Essence Quality Checking (III)

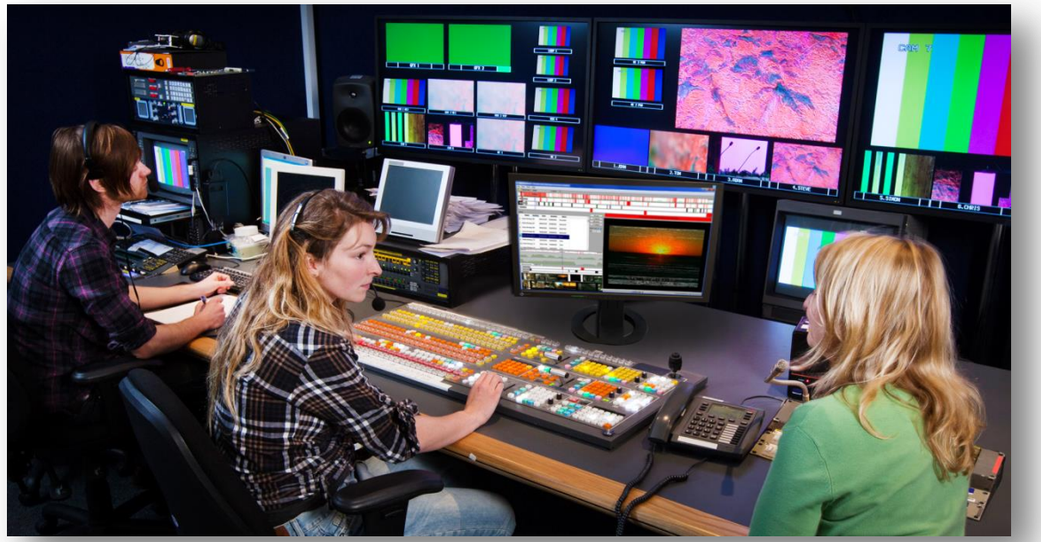
- Archive Content Selection/Access/Search
  - select my ‘best quality copy’
  - search for a video with minimum quality for a certain usage
    - Sharpness high enough for HD program or Blu-ray disc?
    - Noise reduction necessary?
- Restoration Planning
  - estimate costs
  - select tools/systems

The Essence QC Challenge

- **The challenge**

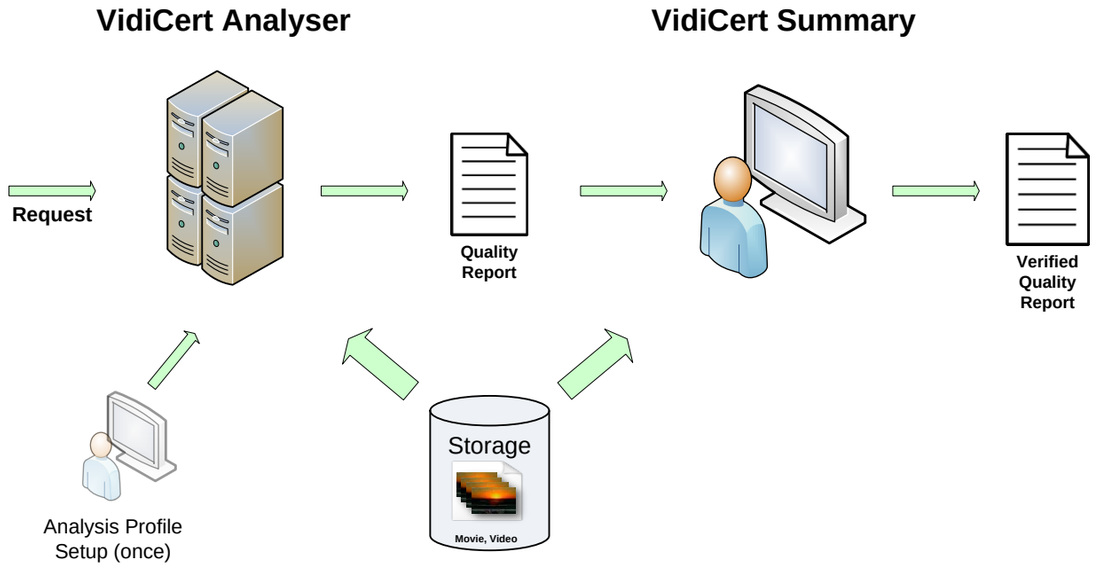
  for essence QC (image & audio)

  is operator job time



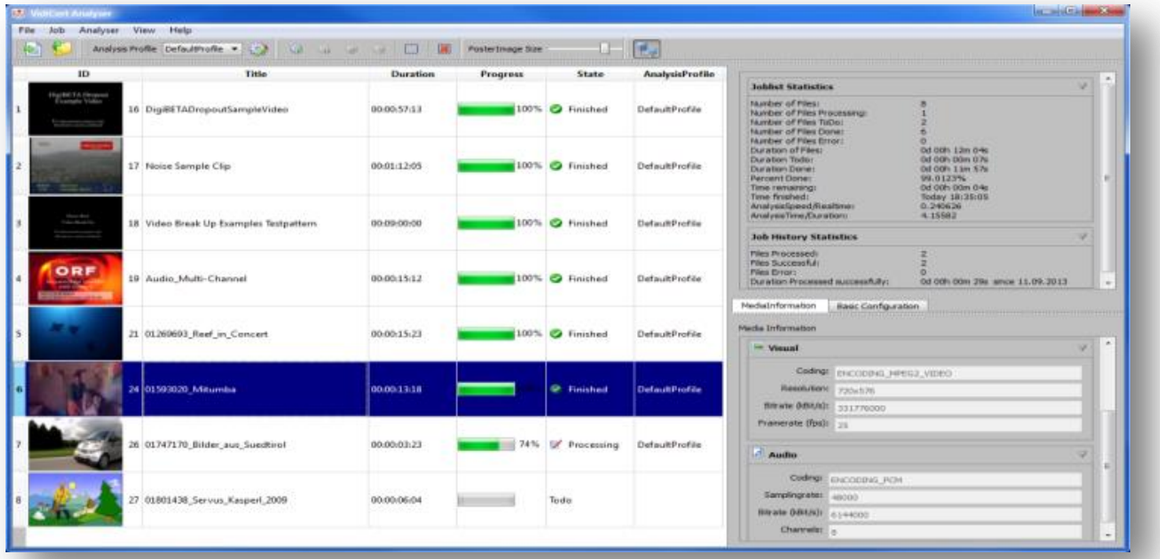
Automation of Essence Checking

- Fully manual
  - High quality, extremely expensive
- Fully automatic
  - Limited functionality, very cheap
- Automatic analysis + Human verified
  - Cost efficient and high quality



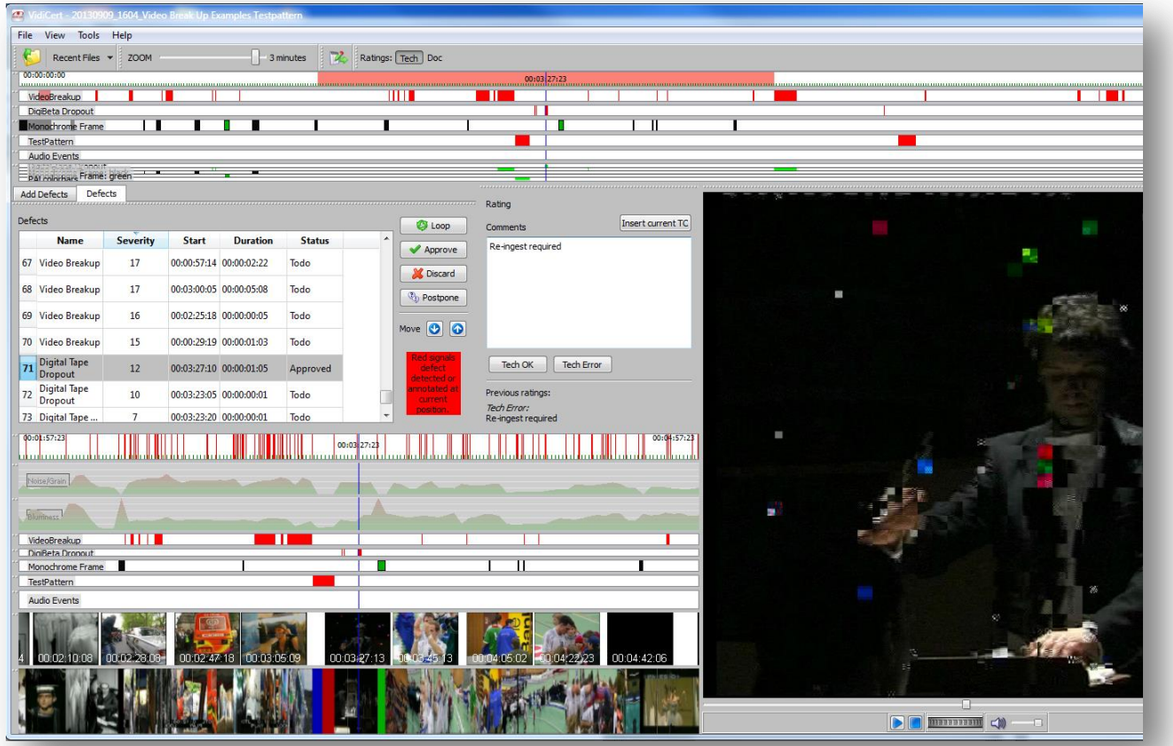
Automatic Quality Analysis

- VidiCert Analyser
  - Detectors
    - Video Breakup (major analogue video disruptions)
    - Noise/Grain (electronic & film grain)
    - Digital Tape Dropouts (e.g. Digital BETACAM™)
    - Blurriness
    - Monochrome Frames
    - Test Pattern
    - Silence
    - Dolby®E™
    - Field Order Errors
    - Scanning Type Errors (Progressive/Interlaced/3:2 Pull Down)
    - Customised solutions, e.g. Line Dropout Detection
  - Metadata fully compliant to MPEG-7/AVDP (XML)
  - Customizable analysis profiles
  - Highly optimised GPU accelerated algorithms
  - Workflow integration via web service & drop folder



Efficient Interactive Essence Quality Verification

- VidiCert Summary
  - Advanced summarisation and navigation by various timeline based metadata views
  - Fully customizable user interface (including full screen video player support on second monitor)
  - Job-time optimistation capability – trade-off human effort against verification accuracy
  - Efficient time based annotation
  - Rating support, including multi-stage QC



How to use Essence QC Results (I)

Depends on Workflow/Task

- Digitisation/Migration
  - Re-play video tape
    - with cleaned tape
    - on cleaned VTR
    - on another VTR
    - with correct TP-In/Out
  - Re-scan with different parameters (e.g. light, focus)
- Re-ject at Archive/MAM File Ingest
  - If digitised file shows wrong content at all or has wrong start/end TC
  - If audio channel allocation/encoding/content is not correct
  - If content has been delivered upscaled instead of full resolution (contracted)

How to use Essence QC Results (II)

- Document defects
  - For lateron restoration
  - To know which video segments can/cannot be used
- Re-Store
  - Established systems on market, e.g. DIAMANT-Film
  - New restoration functionality, e.g. from DAVID DIGITAL AV MEDIA DAMAGE PREVENTION AND REPAIR

DIGITAL AV MEDIA DAMAGE PREVENTION AND REPAIR

Restoration
Digital BETACAM Dropout

Restoration
Digital BETACAM Dropout

Summary on Essence QC for AV Archive Digitisation and Exploitation

- Digitisation, digital migration and archive ingest and access can benefit from essence QC tools
- Automation of QC is essential to reduce costs
- Reliable detection algorithms are required
  - Video Breakup, Noise/Grain Level, Blurriness, DigiBETA Dropouts, Scanning Type ….
- Efficient human verification tools and approaches are essential
  - Timeline based summarisation and navigation
  - Job time optimisation by severity based verification

The DAVID Project (david-preservation.eu)

- Goals
  - What types of damage are common in digital video archive content and workflows and what are its consequences on the re-usability of that content?
  - Which solutions are there to detect and repair MXF errors?
  - Which solutions are there to detect and repair video essence damage and to improving the picture quality beyond its original state?
  - How to apply risk management to prevent from digital damage in the future?

DIGITAL AV MEDIA DAMAGE PREVENTION AND REPAIR

The DAVID Results

- Outcomes
  - MXF D10 File Repair (operational ORF workflow)
  - Detection of DigiBETA Dropout, Field Order and Interlaced/Progressive/Pull-Down Errors integrated in the VidiCert Essence QC System
  - Noise and DigiBETA Dropout Repair integrated into DIAMANT-Film Restoration System
  - Advanced Field Processor
  - De-blurring and Super-Resolution of Archive Content
  - Risk Modelling & Management tools for digital damage prevention within archives
- **DAVID Test-Workshop, 28.-29. April 2015, Vienna**
  - Evaluate the tools and discuss your needs about
  - Registration info at david-preservation.eu/news

Contact

www.vidicert.com

Peter Schallauer

peter.schallauer@joanneum.at