

# DIGITAL – Institute for Information and Communication Technologies



## **Are Your Digitised Files Really OK? Levels of QC for Video and Film Digitisation**

Peter Schallauer

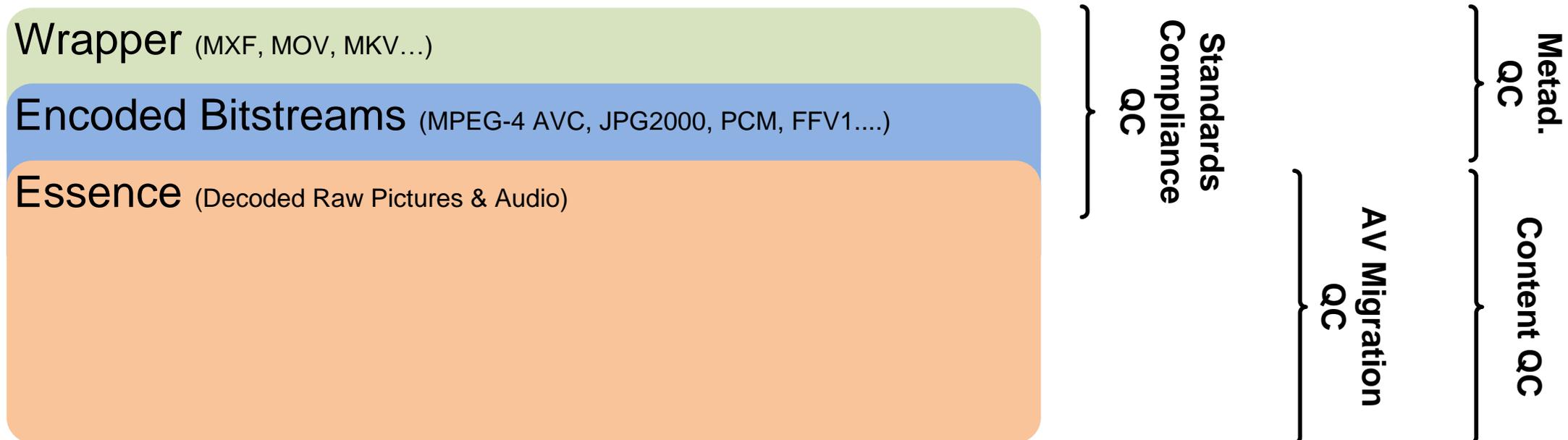
FIAT/IFTA Conference, Oct 20<sup>th</sup>, 2017

# Overview

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- AV-File Layers and related QC Types
- Types of Digitization QC: Goals, Features, Experiences
  - Standards Compliance QC
  - AudioVisual Media Migration QC
    - ORF video migration use case
    - Indiana University film digitization use case
  - Content and Metadata QC
- Conclusions per QC Type

# AV-File Layers and QC Types



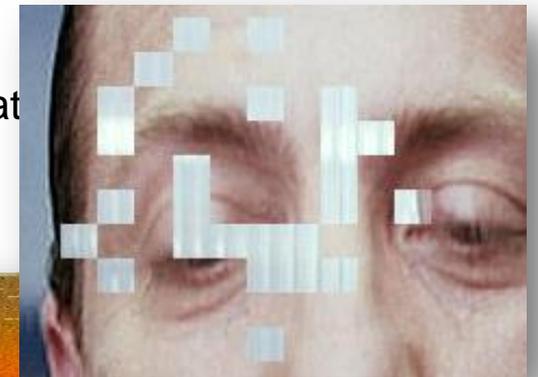
# Standards Compliance QC

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- To ensure that the file is compliant with a specific file wrapper, encoding standard and application profile for today and future compatibility
- Wrapper Metadata and Structure
  - Descriptive MD, technical MD (visual & audio enc.), MXF index table, ....
- Bitstream Metadata and Structure (for each visual and audio stream)
  - E.g. resolution, bitrate, field order, GOP structure....
- Application Profiles how a standard is used for a specific application
  - DPP, UK, Nordic C., US
    - AS11: Requirements for the production and delivery of programs (SD, HD, UHD) to broadcasters
  - ARD-ZDF, DE
    - HDF01, HDF02 and HDF03: MXF profiles for the exchange of programs between broadcasters
  - AS-07, US
    - MXF profile for Archive & Preservation of AV content
    - Including timecodes, captions, subtitles, core descriptive metadata set, segmentation metadata, embedded content integrity data....

# AudioVisual Media Migration QC Video

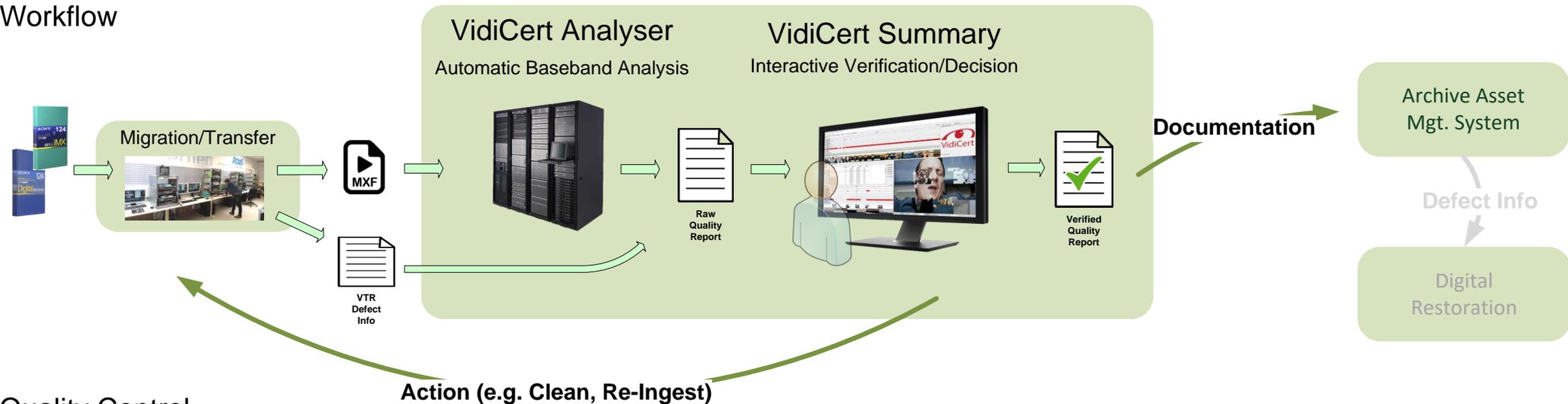
- To ensure that migration from the source media to the target media/file do not introduce unwanted audiovisual defects to the target media/file
- To detect earlier generation migration issues in order to re-migrate if earlier generation is still available
- To detect and document AV issues for future restoration
- Essence defect **detection and verification functions** relevant for digital and analogue video tape migration
  - Block Dropout for all DCT based encoding formats
  - DigiBeta Dropout
  - Macroblocking
  - Analogue Sync Errors for severe line & field synchronization errors, e.g. on Beta SP, 1"...
  - Vertical Interlaced Time Code (VITC): Present/Non-Present, Static, Discontinuity)
  - Black & Single Coloured Frames, Test Pattern to detect specific image content which should not be in programme
  - Field Order, Freeze Frame
  - Black Bar / Aspect Ratio
  - Gamut/Clipping Error
  - Audio Silence, Peaks/Clipping, Phase, Hum
- Integration of VTR info
  - Video and Audio Channel Condition (ISR)
  - TC Discontinuities
  - RF Level of video head



# AudioVisual Media Migration QC Use Case ORF | Video

- ORF Digital Migration project
  - 600.000 tapes, 300.000 hrs in total
  - DigiBETA and IMX
  - 10 years (2016-2026)
  - Target format: D10 (MPEG-2 and PCM in MXF)

■ Workflow



■ Quality Control

- Throughput: ~130 hrs per day (migration and content QC)
- ~12 min. of QC operator time per content h (migration and content QC)

# AudioVisual Media Migration QC QC Statistics | Use Case ORF | Video

- Evaluation period: June 16 – Sept. 17
- 52.822 files, 42.002 hrs, avg. file duration: ~48 min.

## Human Verified Defect Detections by Source, and its Temporal Correlation

Detection Source		VTR Defect Info			Sum: 57.608
		Channel Condition	TC Discontinuity		
VidiCert Analyser	Verified Defects	21.810	35.798		
	Analog Syncr. Error	38.967	1.197	4.651	
	DigiBETA Dropout	7.259	372	725	
	Block Dropout	12.092	1.890	4.651	
	Macroblocking	4.684	414	1.195	
	Black Frames	12.434	49	257	
	Grey Frames	1.787	83	74	
	Test Pattern	1.667	1	0	
	Silence	253.519	5.310	11.378	
	Sum: 332.454				

Detections temporally overlapping

- ~400.000 defects in total, ~10 defects per h
- VidiCert baseband analysis detects significantly more than VTR
- Temporal overlap between VC and VTR is low (=detections are complementary)
- VTR: TC-Disc. is more relevant than C.C.

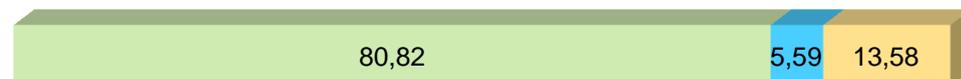
# AudioVisual Media Migration QC

## QC Statistics | Use Case ORF | Video

- Evaluation period: June 16 – Sept. 17
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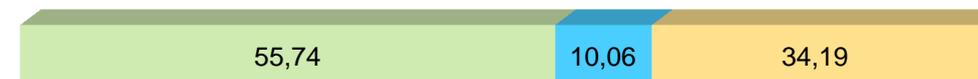
### Detection Source for Audio Defects [%]

■ VidiCert Analyser Audio Detector ■ Both ■ VTR Ch. Cond. & TC-Discont.



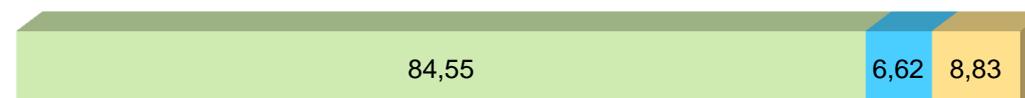
### Detection Source for Visual Defects [%]

■ VidiCert Analyser Visual Detectors ■ Both ■ VTR Ch. Cond. & TC-Discont.



### Detection Source for Audio+Visual Defects [%]

■ VidiCert Analyser Visual&Audio ■ Both ■ VTR Ch. Cond. & TC-Discont.



# AudioVisual Media Migration QC Film

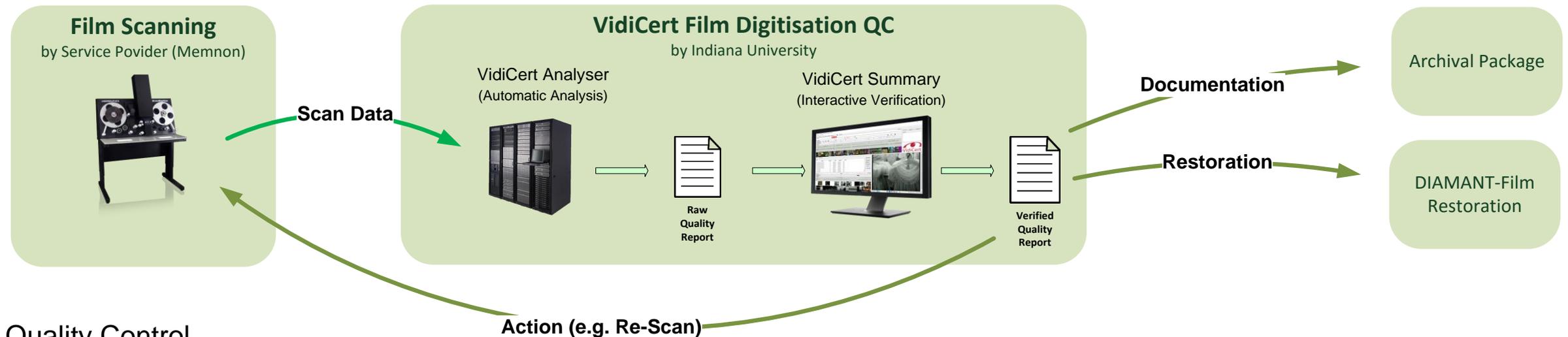
- To ensure that migration from film to file do not introduce unwanted audiovisual defects
- To detect and document AV issues for analogue and digital restoration
- Defect **detection and verification functions** relevant for film migration
  - Out of Focus/Blurriness
  - Dust/Dirt/Hair
  - Film Grain Noise
  - Freeze Frame
  - Framing Error
  - Under&Over Exposure
  - Contrast/Luminance Range
  - Cadence
  - Black & Single Coloured Frames
  - Black Bar / Aspect Ratio
  - Macroblocking
  - Audio Silence, Level, Peaks/Clipping, Phase, Hum
  - Integration of scanner sensor data
    - Perforation/Shrinkage
    - Light
    - Splices



# AudioVisual Media Migration QC Use Case Indiana University | Film

- IU MPDI Film Digitisation Project
  - 25.000 movies, 12.500 hrs in total
  - Three years (2017-2020)
  - Target resolution: 2k for 8 and 16 mm, 4k for 35mm
  - Target formats: DPX 10 bit log, ProRES HQ4444

## Workflow



- Quality Control
  - Throughput: ~32 hrs/day
  - Overscan and crop versions are QC'd

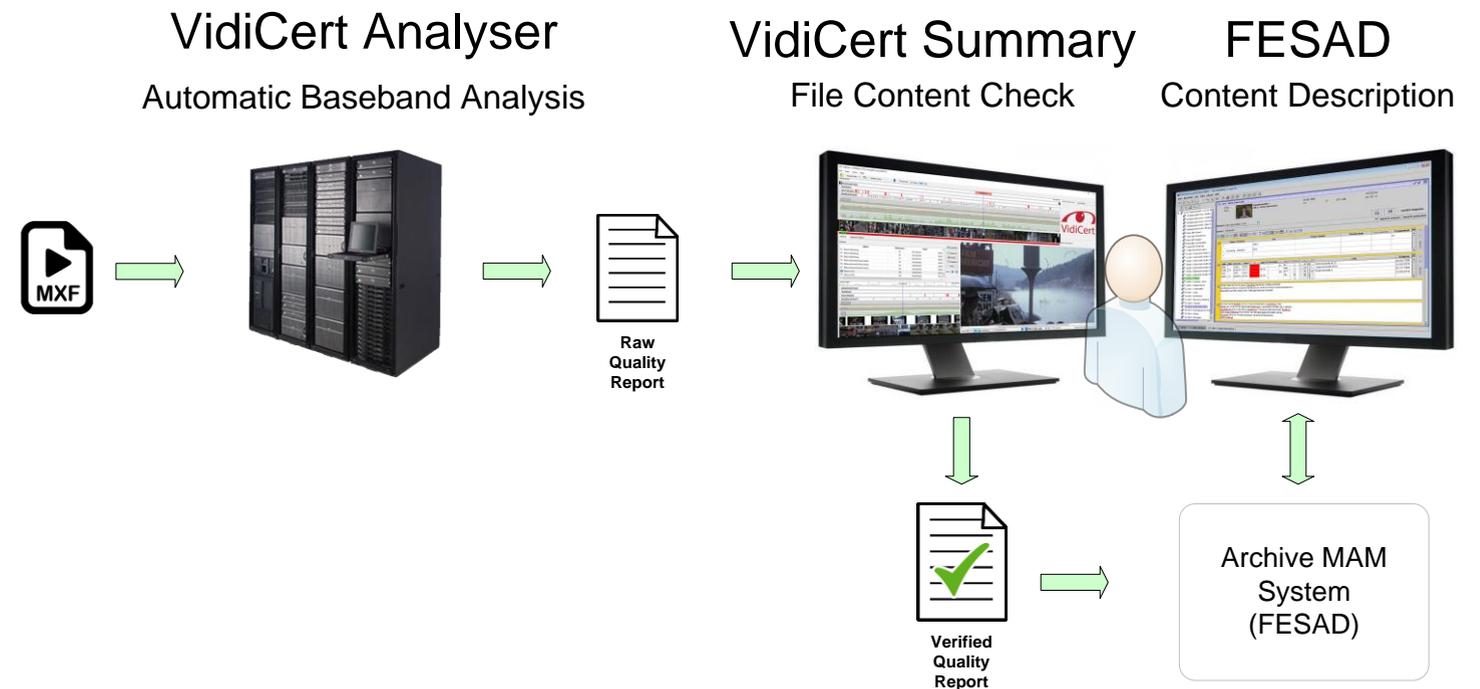
# Content and Metadata QC

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- To ensure that
  - content in created files is complete
  - content and respective metadata stored in content/asset management system are consistent
- Why
  - Essential for any automated archive content usage scenario
  - Essential if destruction of media (tapes, film) desired after migration

# Content & Metadata QC Use Case ORF

- VC supported **content QC** functions
  - is file content correct and complete
    - Title, trailer
  - audio channel allocation/encoding/content consistent
  - start/end timecodes exact and consistent
  - scanning type (interlaced, progressive, pull-down) and field order consistent
- QC may results in
  - Re-Ingest (of same or alternative copy)
  - MAM metadata updates/corrections



# Conclusions

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- Standards Compliance QC
  - Use the profiles defined today to ensure future compatibility
- AudioVisual Migration QC
  - Efficient, human verified, large scale migration QC is commercially and technically feasible, for video and for film
  - VC baseband analysis detects significantly more issues than VTR based detection
  - VC baseband detections and VTR detections are complementary
- Content and Metadata QC
  - Essential for any automated archive content usage scenario

# Contact

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The Archive QC  
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