

DIGITAL – Institute for Information and Communication Technologies



Darrel Myers



Peter Schallauer

Quality Control Experiences from a Large-Scale Film Digitisation Project

The Reel Thing Workshop @ AMIA 2018 Conference
Portland, 28th of November 2018



Media Digitization & Preservation Initiative

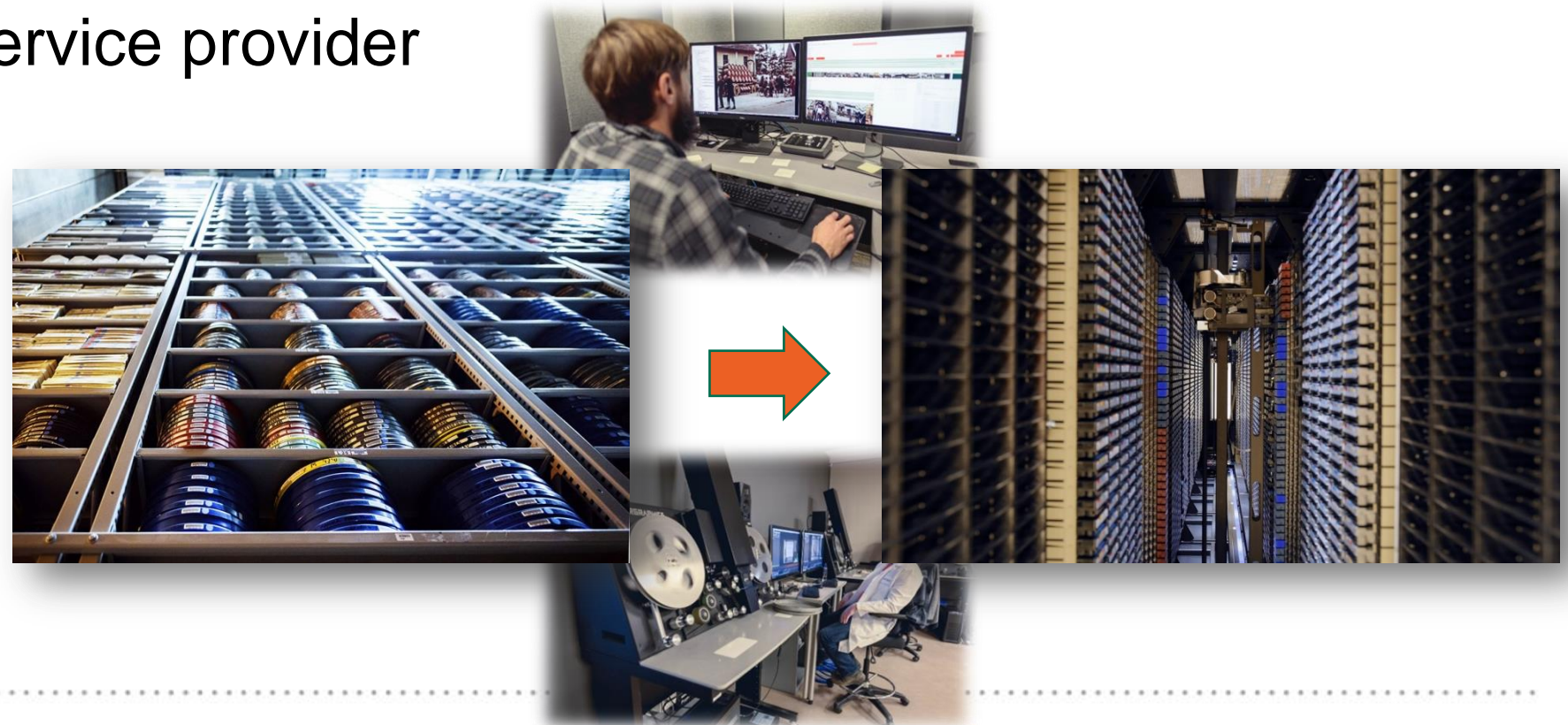
- Digitally preserve all significant audio, video, and film (~24 Petabytes)
- Complete by IU Bicentennial in 2020
- Create and adapt existing technology to model process for industry
- Use of film scanning service provider

Audio/Video

325,000 Recordings
within 5 years

Film

30,000+ of 100,000 Reels
within 3.5 years

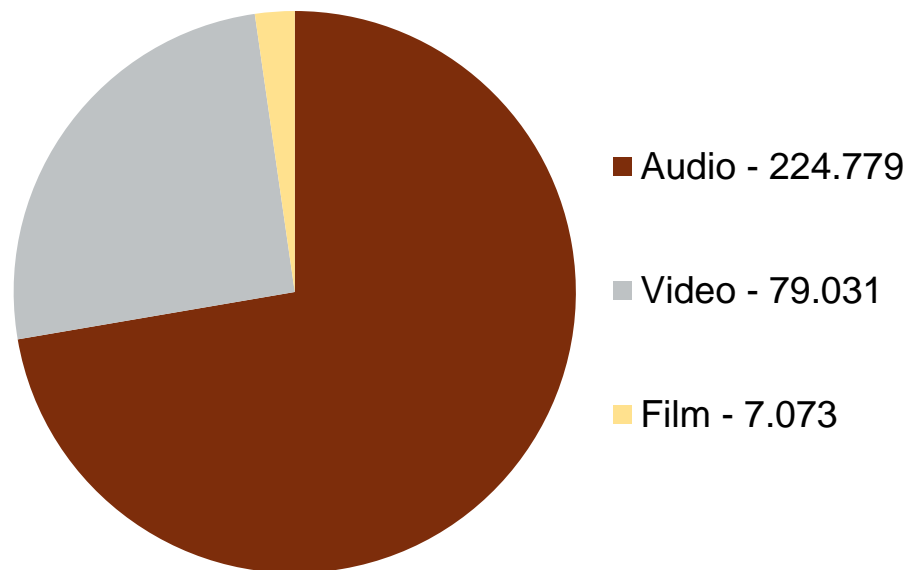




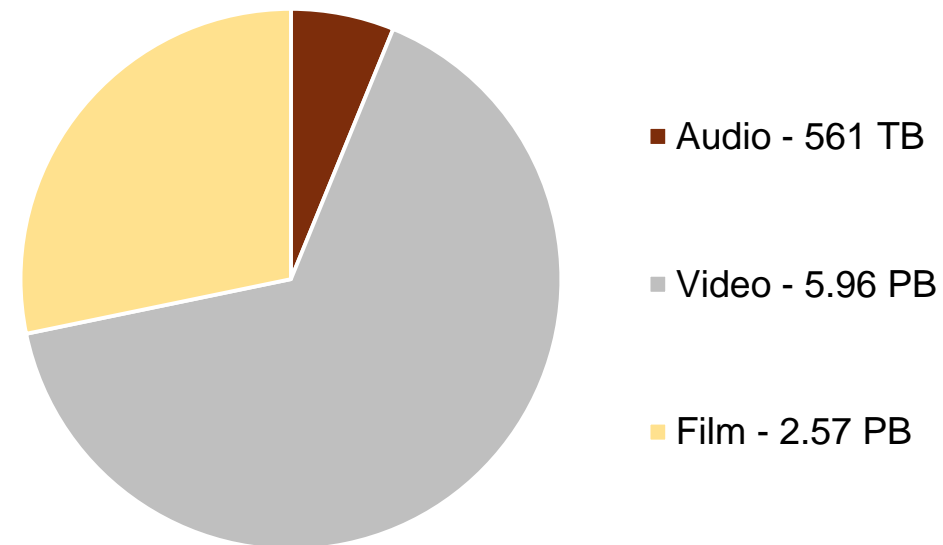
Preserved Titles

21 September 2018

Number of Items Digitized



Storage Usage (9.8 PB)



Hours

Audio – 171,383

Video – 94,578

Film – 1,912



Preserved Titles Detail

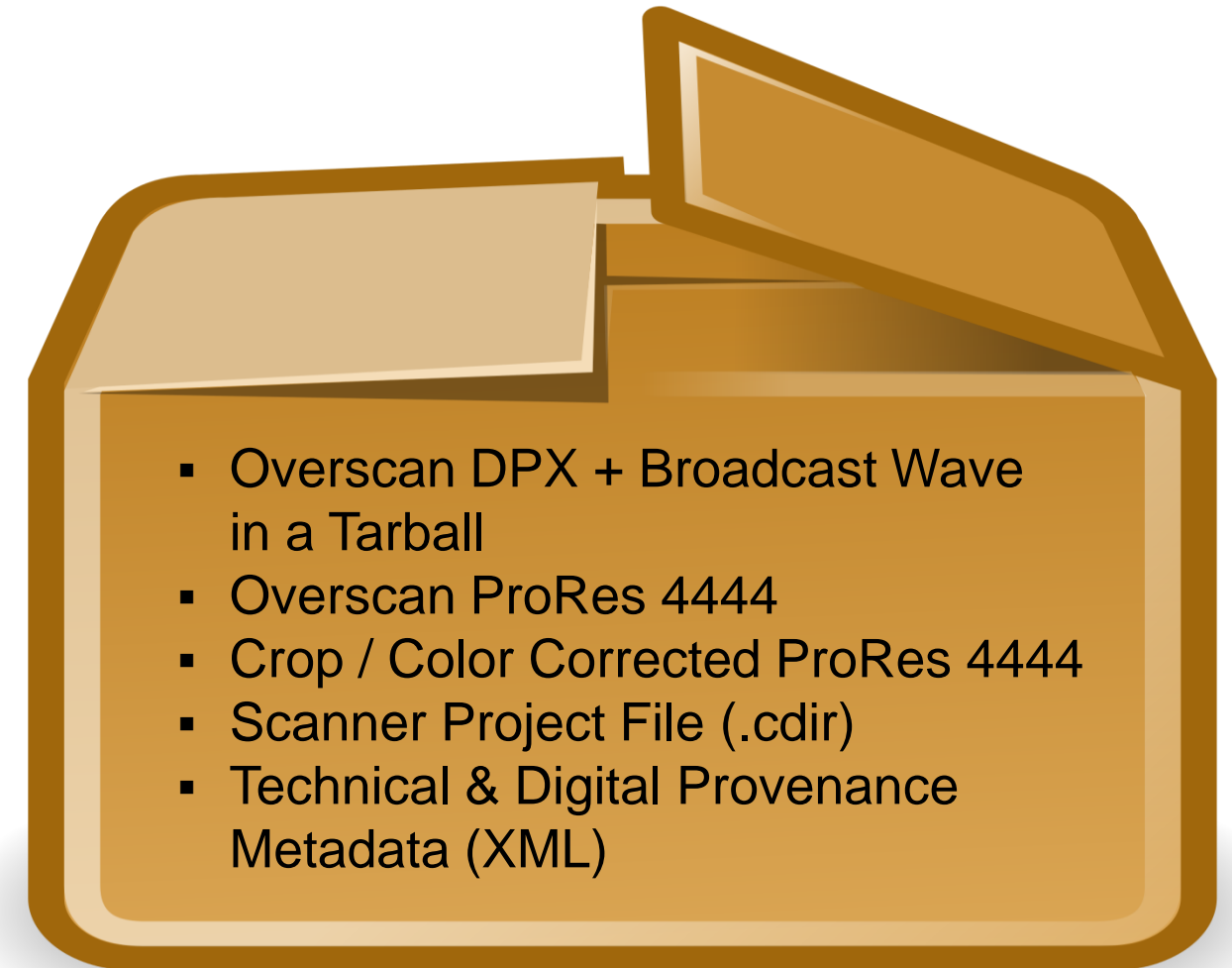
October 10th 2018

Type	Count	SDA Usage(G)	Avg Size(G)	Duration(h)	Avg Duration(m)
1-Inch Open Reel Video Tape	3758	134428.52	35.77	2314.45	36.95
45	4032	2084.07	0.52	513.77	7.65
78	34449	16553.92	0.48	3684.83	6.42
8mm Video	929	75030.51	80.76	1283.46	82.89
Aluminum Disc	552	358.39	0.65	80.08	8.70
Audiocassette	50484	241928.08	4.79	59551.10	70.78
Betacam	18803	820653.53	43.64	13476.86	43.00
Betamax	1212	104716.01	86.40	1939.71	96.03
CD-R	11850	14021.12	1.18	10213.16	51.71
Cylinder	4479	1236.68	0.28	194.68	2.61
DAT	8996	24929.38	2.77	17671.37	117.86
Film	7508	2817848.10	375.31	2095.25	16.74
Lacquer Disc	4361	5271.57	1.21	1269.32	17.46
LP	38644	114699.51	2.97	28120.42	43.66
Open Reel Audio Tape	67289	140388.94	2.09	50165.63	44.73
Other Analog Sound Disc	18	16.71	0.93	4.12	13.74
U-matic	14932	527298.42	35.31	9082.80	36.50
VHS	40049	4327942.94	108.07	67020.91	100.41
All Types	312345	9369406.40	30.00	268681.92	51.61



Quality Control Needs - Film

- Submission Package QC
 - Handle Up to 27TB per Day
- Image and Sound QC
 - 100% Mezzanines
 - 10% Preservation Masters
 - < 16 hrs content / day
- Fast Identification, Communication & Reporting for Potential Failures





■ Fully automated QC confirming

- ✓ Compare Deliverables to XML:
 - Durations
 - Bit Rate
 - Color Space
 - # Audio and Video Channels
 - Codec
 - Frame Rate
 - Height x Width
 - Pixel Format





Image and Sound QC – VidiCert

Confirm – Preservation Overscan

- ✓ Completeness
- ✓ No Image / Audio Loss
- ✓ No Image / Audio Corruption
- ✓ Playback Speed
- ✓ Film Prepared well for Scanning
- ✓ Faithful Representation of Original

Confirm – Access Copy (Cropped)

- ✓ Minimal Frame Lines
- ✓ Acceptable Color Correction

Create QC Report

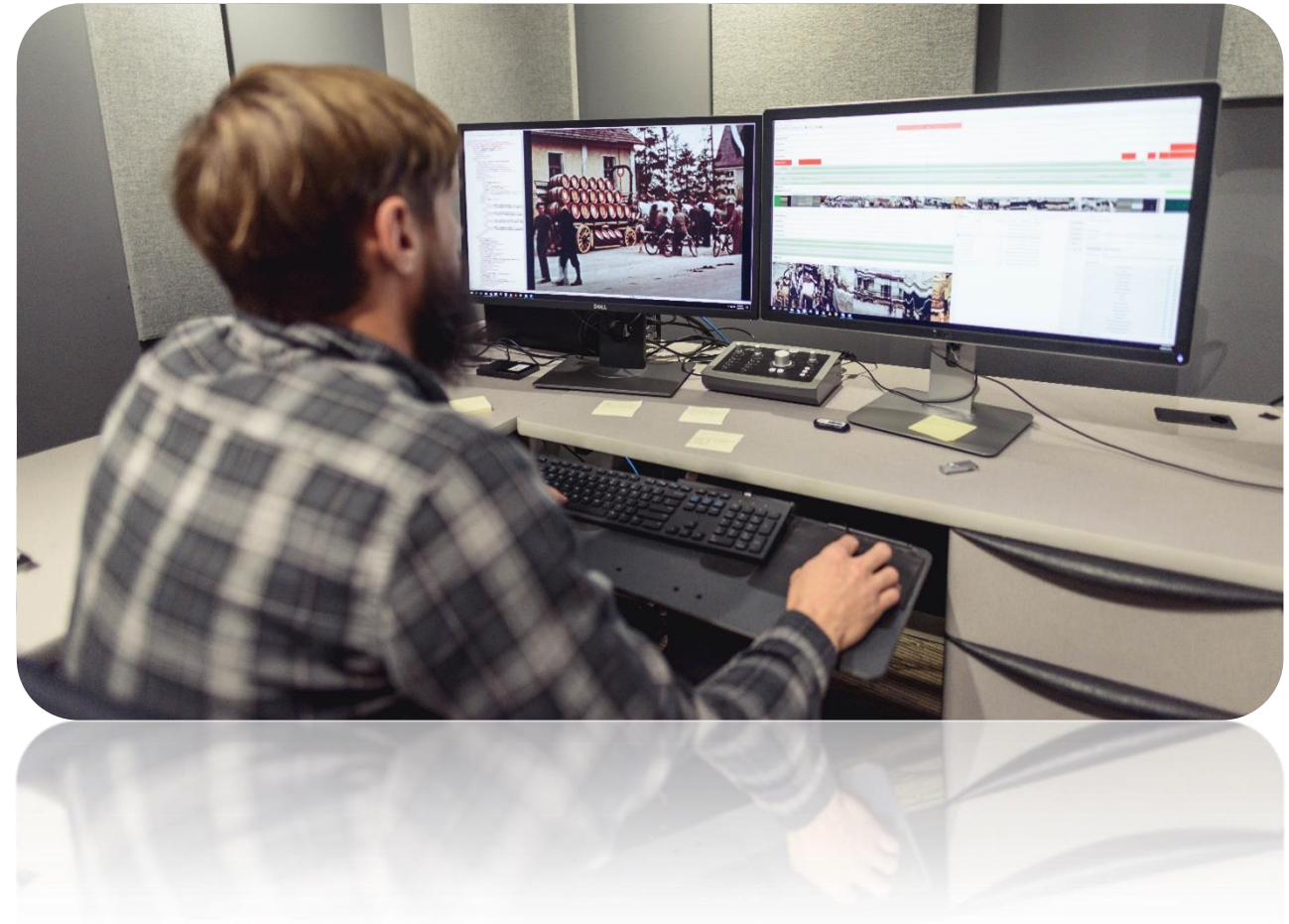
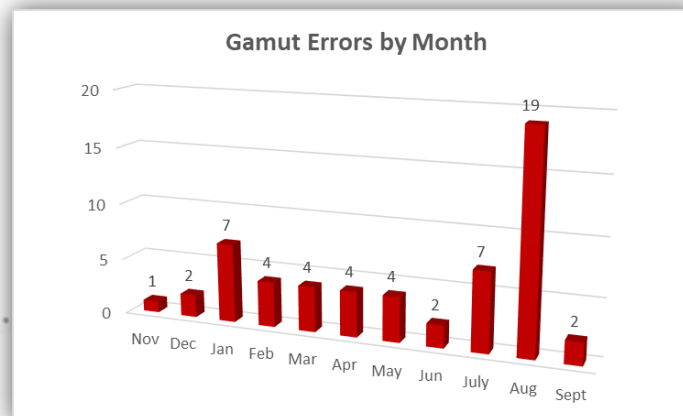




Image and Sound QC Identified Defects



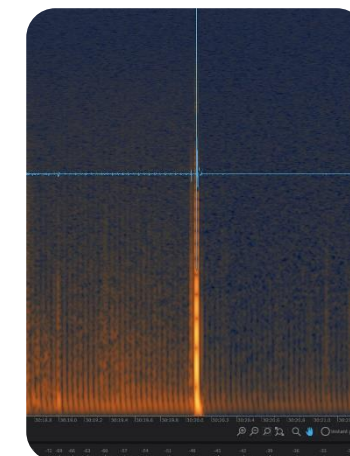
Dirt / Dust



Crushing /
Clipping



Foreign Object
in Frame



Interstitial
Errors

Added Tones

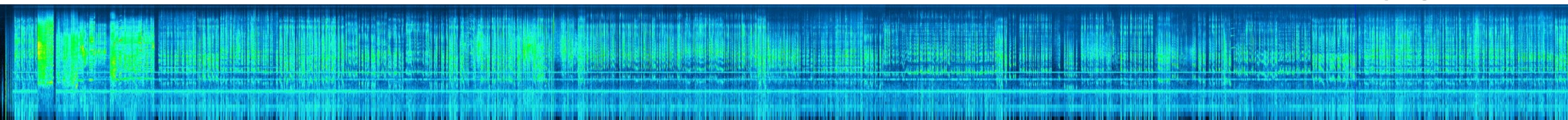




Image and Sound QC Stripe Image & Reporting

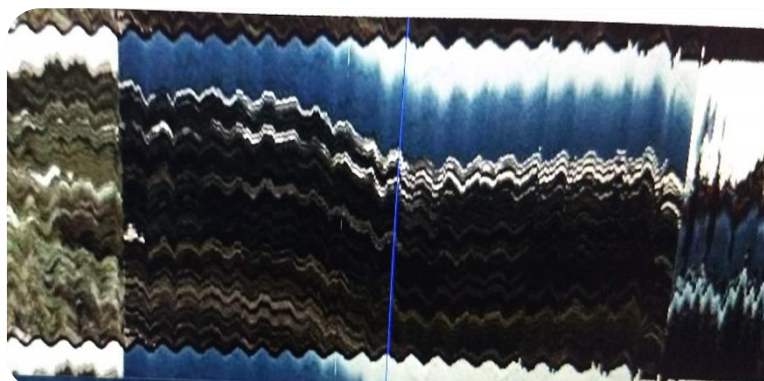


Image Loss & Framing Issues

PDF
Reports



Issues						Min. Durability	Avg. Reference	Min. Reference
No.	Name	Thumbnail	Start Timestamp	End Timestamp	Reference	Sec 2	Sec 100	Sec 100
1	Color Grading Problems		00:00:00	00:00:00	00:00:00	0.04	100	100
2	Color Grading Problems		00:00:14	00:00:14	00:00:14	0.04	100	100
3	Framing Issues		00:00:19	00:00:19	00:00:19	0.04	100	100
4	Framing Issues		00:00:19	00:00:19	00:00:19	0.04	100	100
5	Framing Issues		00:00:19	00:00:19	00:00:19	0.04	100	100
6	Framing Issues		00:00:19	00:00:19	00:00:19	0.04	100	100



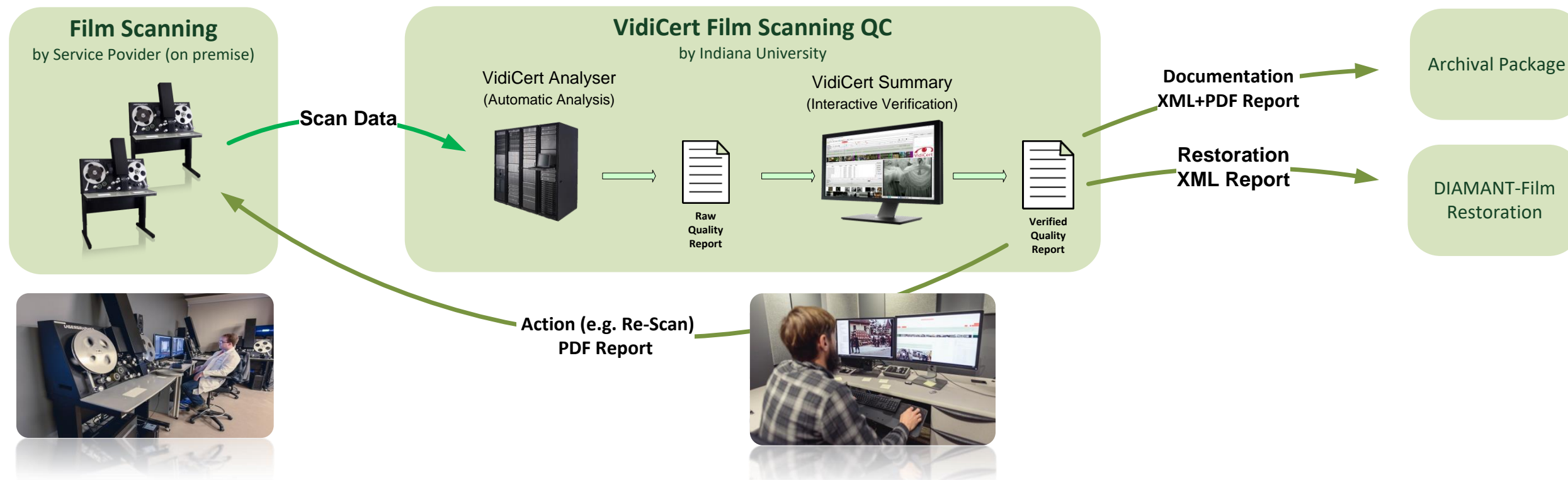
Stock Change –
Color Correction
Needed

Image and Sound Quality Control

- How does it work?
- How effective is it in operations?

Image and Sound QC

How does it work?



Scanning Operations

- 2 scanners, two 6 hrs shifts per scanner per day
- Creating up to 4 hrs of content per shift = up to 16hrs of content per day

QC Operations

- QC of overscan and crop version = **up to 32hrs of QC content per day**
- 3 VidiCert Analyser's, 2 VidiCert Summary stations
- Current **QC throughput: ~50 files = 15 hrs per person** in a 8 hours shift

Image and Sound QC Automated Defect Detection Functions

- Gamut/Clipping (Under&Over Exposure)
- Freeze Frame
- Framing Error
- Dust/Dirt/Hair Level
- Unsteadiness Level
- Film Grain Noise Level
- Out of Focus / Blurriness Level
- Contrast/Luminance Range
- Black & Single Coloured Frames
- Black Bar / Aspect Ratio
- Macroblocking
- Audio Silence, Loudness, Superimposed Sound
- Integration of scanner sensor data
 - Perforation/Shrinkage
 - Splices

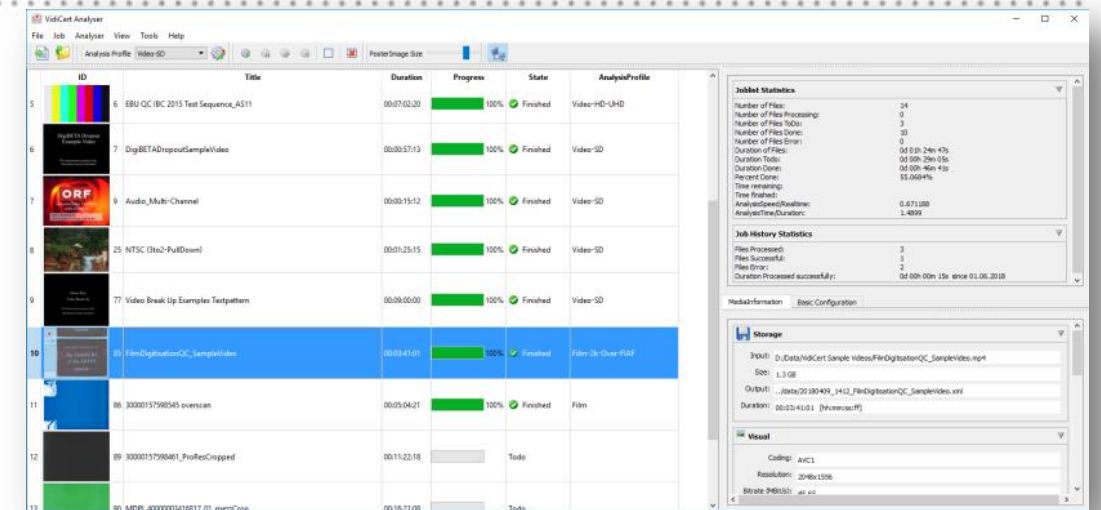


Image and Sound QC Interactive Defect Verification

- Time-efficient human verification of automated detections
 - Advanced summarization and navigation by timeline based views for each defect and quality measure
 - Full featured desktop player: zoom, time accurate playback, second monitor full screen, selectable audio channels, SDI out
 - Integration of external time based metadata, e.g. film scanner sensor metadata
 - Fully customizable user interface (presets for different QC tasks)
- Efficient time-based human annotation
- Job-time optimisation capability – trade-off human effort against verification accuracy
- QC reports
 - Machine readable XML
 - Human readable pdf
- DIAMANT Restoration report

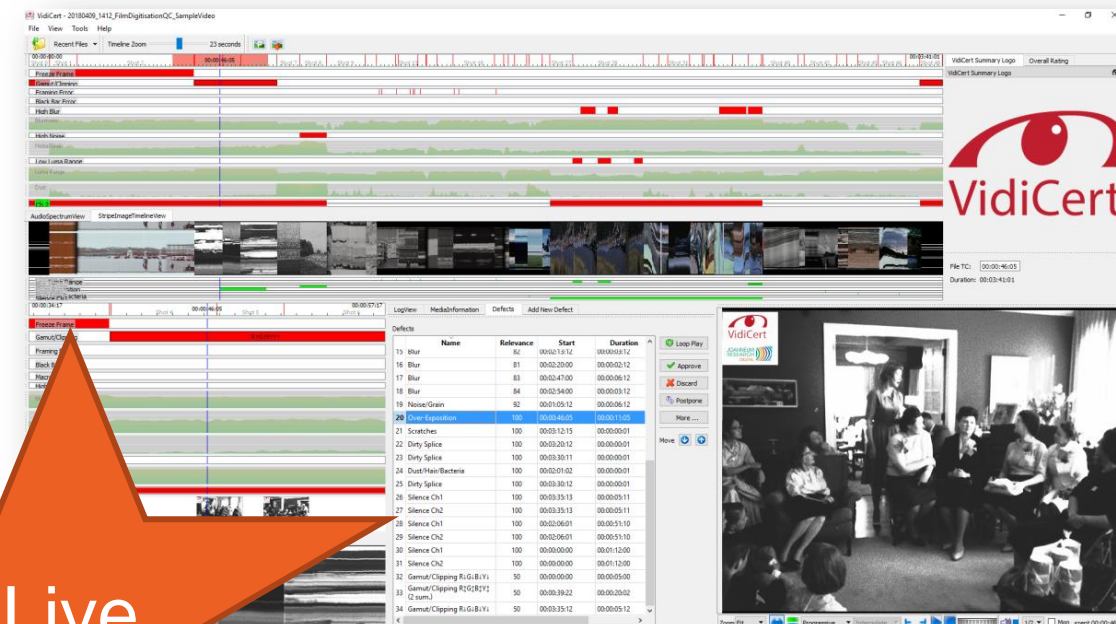


Image and Sound QC

How effective is it in operations?

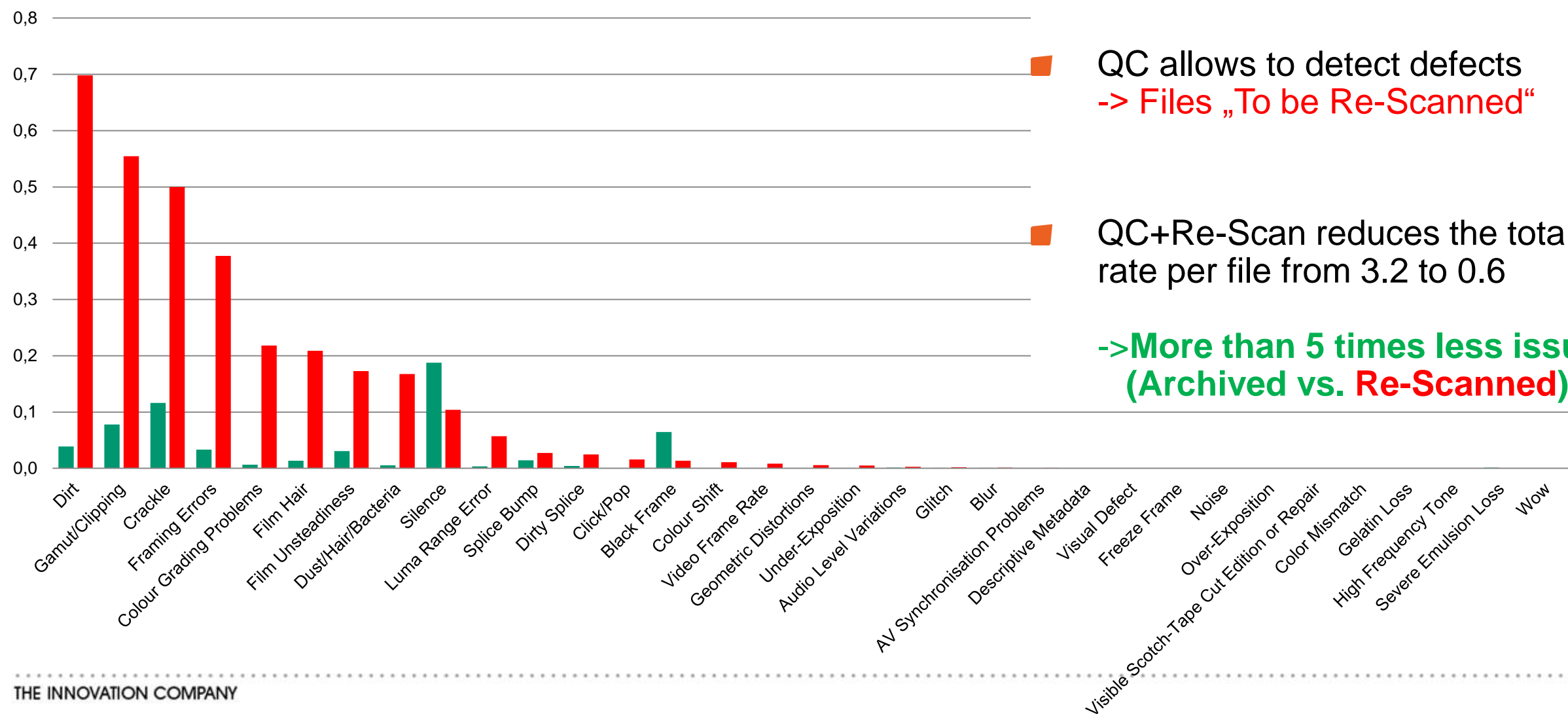
■ Statistics

- Dec. 2017 – Aug. 2018
- 6276 titles/reels = 12552 files to be QC'd (overscanned and cropped)
- Avg. File Duration: 16 Min. 06 Sec.

Image and Sound QC

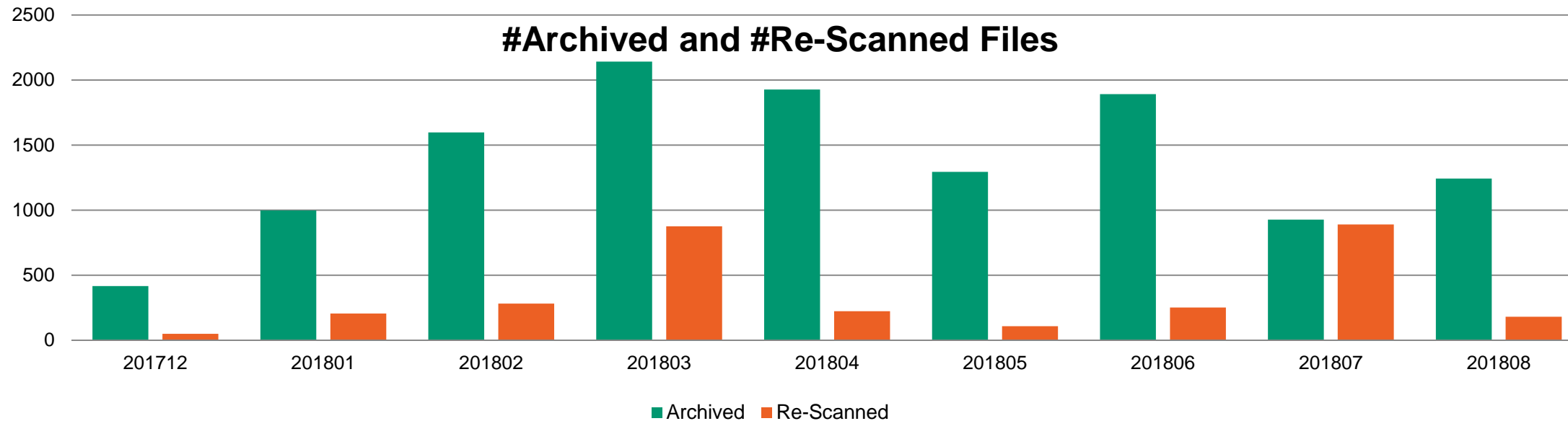
Most Critical Issues & Effectiveness

Verified defects per File in **Files to be Re-Scanned** and **Files to be Archived**



MDPI Operations Overview

Re-Scans per Month



- Goal of QC is to drive down rescans - September rescans down to 6%
- IU requests some rescans for reasons other than scanning defects
- Requirements and complexity change for some collections and film stocks
- Scanner and Film Cleaner equipment issues led to spikes in March and July
 - Were detected and solved

Image and Sound QC

What have we learned?

- QC program
 - Identified audio and image issues
 - Fed data into R&D process (scanner development)
 - Grew better with experience (learning curve)
 - Helped digitization vendor become more accurate

Conclusions

- Approach to QC is a project strength
 - Allows IU to better understand its diverse collections and adapt workflows
 - Enables high quality archive package
- Submission Package QC
 - Ensures packages meets archiving standards
- VidiCert Image and Sound QC
 - Integrates very well with IU workflow and Submission Package QC
 - Systematic issues can be detected quickly
 - Detailed automatic and interactive detection functions helps greatly in finding the origin of an issue
 - QC+Re-Scan reduces the total defects rate by more than a factor of 5
- Strengthens our relationship with the service provider

Thank you!

Peter Schallauer

peter.schallauer@joanneum.at



Darrell Myers

dsmyers@iu.edu

