



# **QUALITY MANAGEMENT**

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**What is Quality Management with  
reference to the imaging process?**

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**What is Quality Management with reference to the imaging process?**

**What is it?**

**Why do we need it?**

**How do we apply it?**

# QUALITY MANAGEMENT

**What is it?**

**Why do we need it?**

**How do we apply it?**

**Digitising cultural heritage collections consists mostly of creating image files from artefacts (excluding video and sound).**

**SO WHAT IS QM WITH REFERENCE TO THE IMAGING PROCESS?**

# QUALITY MANAGEMENT

## SO WHAT IS QM WITH REFERENCE TO THE IMAGING PROCESS?

*"Quality management of image files created by means of a digitisation process, is a systematic process of consistent measuring, evaluating and re-adjusting of variables to meet the required aims of the applicable ISO standards".*

# **QUALITY MANAGEMENT**

## **WHY DO WE NEED QUALITY MANAGEMENT?**

- 1. To verify the quality, condition and performance of the digitising equipment**
- 2. To ensure that the digitised artefact is authentic in terms of size, colour, form and shape**
  - The purpose of the above points is to ensure that the researcher can trust our digital content.**
  - For future research of the artefacts**

# QUALITY MANAGEMENT

**HOW DO WE IMPLEMENT A QM PROGRAM TO ENSURE ALL REQUIRED PARAMETERS ARE MET?**

- i Visual (subjective) inspection of digital files**
- ii Measured (objective) inspection**
- iii percentage (%) inspection of collection or..**
- iv frequency of inspection**

# QUALITY MANAGEMENT

## i - Visual (subjective) inspection problems

- # depends on personal experience of inspector
- # depends on technical knowledge
- # depends on physical constraints of inspector (*ie colour deficiency*)
- # can be influenced by illusions such as colour and geometry (*distortion*)
- # depends on the technical quality of the inspection platform such as the computer and screen calibration
- # depends on the consistency of the inspector



# QUALITY MANAGEMENT

## ii - Advantages of measured (objective) inspection

- # results are inspector independent
- # accuracy in terms of colour interpretation ie: no colour bias possible
- # parameters such as true/actual DPI and geometric distortion can be measured
- # measured results can be accurately compared to established ISO standards

# QUALITY MANAGEMENT

WHAT DO WE NEED TO IMPLEMENT A QM PROGRAM ?

Two types of targets and applicable software for analysis

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graph TD; A[Two types of targets and applicable software for analysis] --> B[Device level]; A --> C[Object level]; B --> D[To verify the quality and performance of equipment]; C --> E[To deliver a measurable target with the artefact, providing evidence of authenticity of digital content];
```

**Device level**

To verify the quality and performance of equipment

**Object level**

To deliver a measurable target with the artefact, providing evidence of authenticity of digital content

# QUALITY MANAGEMENT

**What are the targets?**

**Two precisely manufactured and measured targets are being digitised with the actual scanners (equipment) used for the project, and analysed by means of specific software.**

# QUALITY MANAGEMENT

## What do we measure with the targets? (1)

- # Slanted Frequency Response (SFR)
- # Sampling efficiency
- # Sampling frequency (pixel quantity)
- # Tonescale (bright/dark of image) (OECF)
- # White balance (indicating a colour cast)
- # Delta E2000
- # Noise (which produce poor quality of image)
- # Colour misregistration (horizontal/vertical)

# QUALITY MANAGEMENT

What do we measure with the targets? (1)

# Colour misregistration (horizontal/vertical)

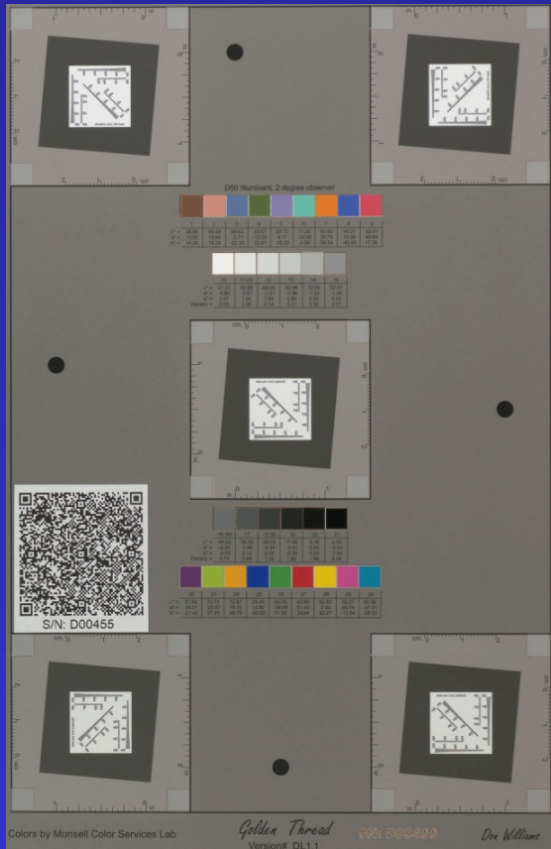
# Uniformity

# Geometric distortion (curved or skewed image)

# QUALITY MANAGEMENT

What do they look like?

Device level

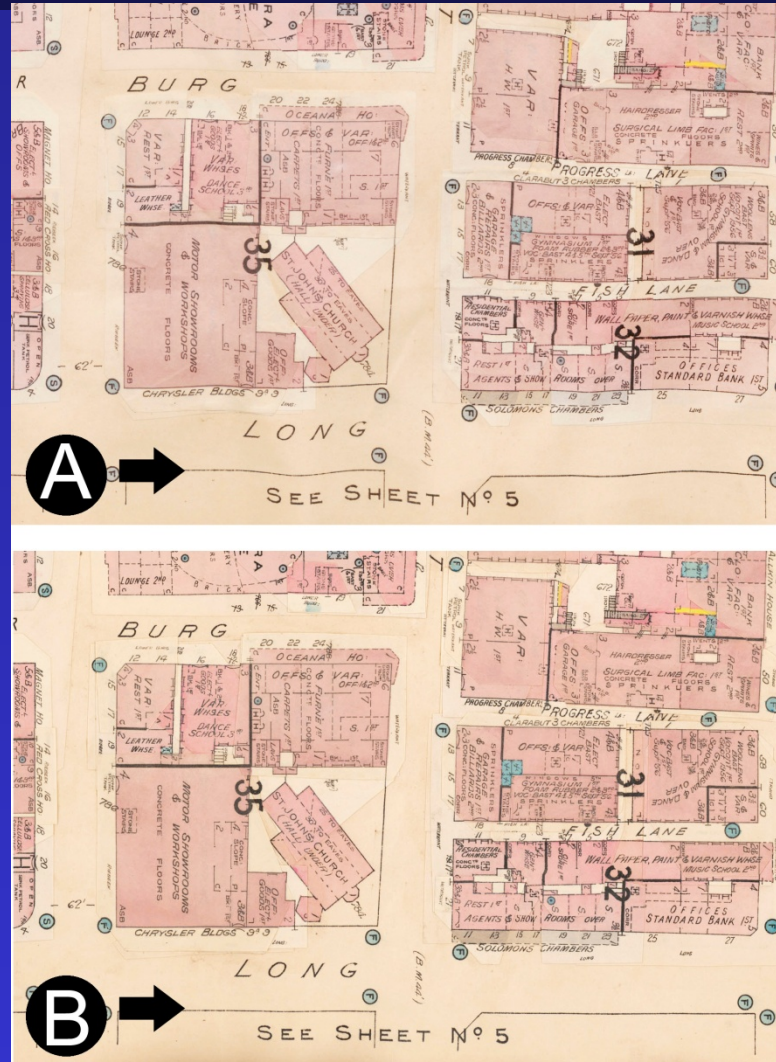


Object level



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## Example of geometric distortion



# TARGET ANALYSIS (REFLECTIVE)

ISO SFR Performance Analysis: 28-Dec-2013

File: Z\_14000.tif

Sampling: 601.0 pix/inch, (23.7 pix/mm)

SFR10 Sampling efficiency r,g,b,lum %

Horiz.	30.5	33.0	28.5	32.0
Vert.	41.0	42.5	38.0	42.0

Spatial frequency for SFR values, (cy/mm)

10% h:	4.83	5.16	4.73	5.07
10% v:	6.97	7.14	6.62	7.11
50% h:	2.01	2.08	2.05	2.06
50% v:	2.81	2.89	2.72	2.86

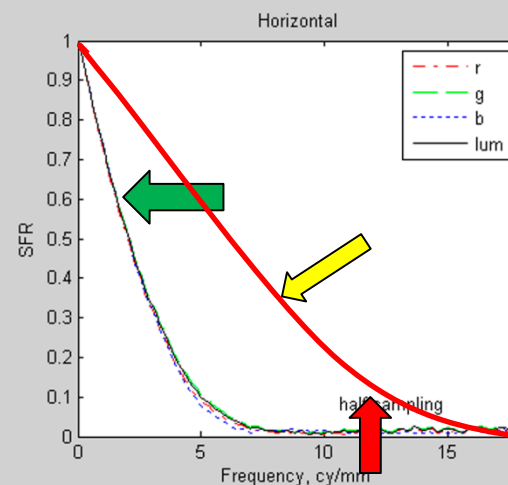
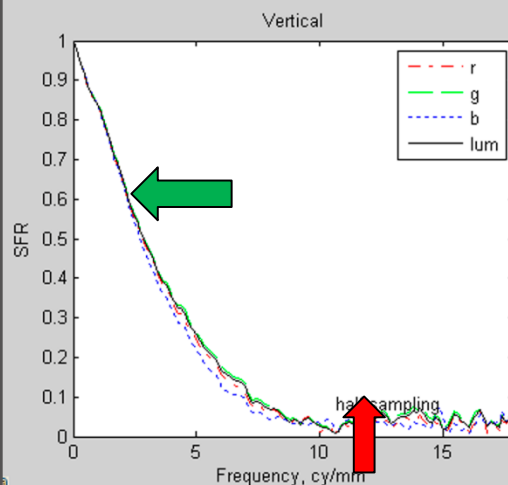
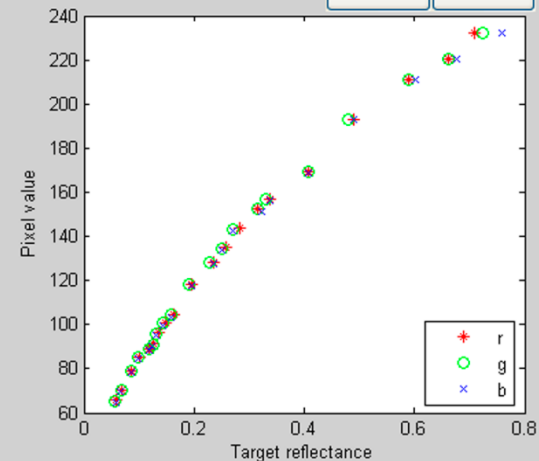
Misregistration r,g,b (pixels)

h:	0.00	0.00	-0.01	-0.00
v:	0.06	0.00	-0.14	0.00

Plot vs.

Density

Reflectance





# DIGITAL PRESERVATION STANDARDS

**FADGI**  
**(USA)**

**4 levels**

**\* Star**  
**\*\* Star**  
**\*\*\* Star**  
**\*\*\*\* Star**

**METAMORFOZE**  
**(NETHERLAND)**

**3 levels**

**Metamorfoze**  
**Metamorfoze Light**  
**Metamorfoze Extra Light**

# DIGITAL PRESERVATION STANDARDS

Tone Response - (OECF)		
Performance Level	AIM	TOLERANCE ( 8 bit equivalent) ( applies to all density levels and color channels)
★★★★	consistent with chosen color space ( e.g. Gamma = 1.8 or 2.2 ) or user defined	+/- 3 count levels
★★★		+/- 6 count levels
★★		+/- 9 count levels
★		> 9 count levels, < -9 count levels

Table 1 – TRC aim guidelines

Spatial Frequency Response (SFR) - mid-frequency resolution ( native response, no sharpening, Luminance channel only)			
Performance Level	AIM	TOLERANCE ( specified at half of selected dpi level or 50% the half-sampling frequency)	
		lower limit	upper limit
★★★★	0.50 SFR response at 55% of half sampling frequency	> 40% of half sampling	< 60% of half sampling
★★★		> 35% of half sampling	< 65% of half sampling
★★		> 30% of half sampling	< 70% of half sampling
★		< 25% of half sampling	> 70% of half sampling

Table 5 - Suggested mid frequency SFR tolerances for specified performance levels

**QUESTIONS ?**



