

Quality Controlled Digitizing



Museovirasto
Finnish Heritage Agency

Kommenttipuheenvuoro:
Digitoinnin laatukriteerit
Kuva-arkistopäivät
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The Picture Collections

Quality Controlled Digitizing



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- Need to create and implement national level practical guidelines for digitizing cultural heritage materials based on international guidelines, standards, image quality analysis and workflows
- What is Quality !? Why !? Who !?



Quality Controlled Digitizing

Norm / Guideline		ISO 19264-1			FADGI			METAMORFOZE		
Quality Level		A	B	C	****	***	**	Strict	Light	Extra light
Resolution (claimed sampling rate)	ppi				400	300	300	300	300	300
Bit Depth (minimum)		8	8	8	16 or 8 (1)	8	8	16 or 8 (2)	8	8
Tone Reproduction (of gray scale @ image center)	ΔL^*	± 2	± 3	± 4		± 5	± 8	± 2	± 2	± 2
Gain Modulation (Patches 95 and 85)	Gain	0,8-1,1	0,7-1,2	0,6-1,3				0,8-1,08	0,8-1,08	0,8-1,08
Gain Modulation (All other patches)	Gain	0,7-1,3	0,6-1,4	0,3-1,6				0,6-1,4	0,6-1,4	0,1-2,0
Noise (visual noise)	visual	< 5	< 6	< 7						
Noise	RMS				< 1	< 2	< 3	$\leq 1,6$	$\leq 1,6$	$\leq 1,6$
Dynamic Range (of gray scale @ image center)	D	$\geq 2,3$	$\geq 2,1$	$\geq 1,9$						
Banding (visual inspection)		none	none	slight				none	none	none
Defect Pixels (visual inspection)	ppm	none	0,1	1						
White Balance (over field)	ΔC^*	≤ 2	≤ 3	≤ 5	≤ 2	≤ 4	≤ 6	≤ 2	≤ 2	≤ 2

Color Reproduction (Max)	ΔE^*	≤ 10 CIE	≤ 15 CIE	≤ 15 CIE				≤ 10 CIE	≤ 18 CIE	≤ 18 CIE
Color Reproduction (Mean)	ΔE^*	≤ 4 CIE	≤ 5 CIE	≤ 5 CIE	≤ 3 CIE	≤ 5 CIE	≤ 8 CIE	≤ 4 CIE	≤ 5 CIE	≤ 5 CIE
Sampling Rate (claimed/obtained)	%	≤ 2	≤ 3	≤ 4				≤ 2	≤ 2	≤ 2
Resolution @ MTF 10 (claimed/obtained)	%	≥ 85	≥ 80	≥ 70	> 90	> 80	> 70	≥ 85	≥ 85	≥ 85
MTF @ Nyquist (50% sampling frequency)	%				< 20	< 30	< 40			
MTF 50 (frequency @ MTF 10)	f	$\geq 0,5$	$\geq 0,45$	$\geq 0,45$				$\geq 0,5$	$\geq 0,45$	$\geq 0,45$
MTF 50 (MTF @ 25% sampling)					≥ 45 ≤ 65	≥ 35 ≤ 75	≥ 25 ≤ 85			
Sharpening (max. SFR contrast value)		$\leq 1,05$	$\leq 1,1$	$\leq 1,2$	$\leq 1,0$	$< 1,1$	$< 1,2$	$\leq 1,05$	$\leq 1,05$	$\leq 1,05$
Illumination non-uniformity (\leq DINA3)	ΔL^*	≤ 3	≤ 3	≤ 3	$\leq 1\%$	$\leq 3\%$	$\leq 5\%$	≤ 3	≤ 3	≤ 3
Illumination non-uniformity ($>$ DINA3 and \leq DINA2)	ΔL^*	≤ 4	≤ 5	≤ 5	$\leq 1\%$	$\leq 3\%$	$\leq 5\%$	≤ 4	≤ 4	≤ 4
Illumination non-uniformity ($>$ DINA2 and \leq DINA1)	ΔL^*	≤ 5	≤ 6	≤ 6	$\leq 1\%$	$\leq 3\%$	$\leq 5\%$	≤ 5	≤ 5	≤ 5
Illumination non-uniformity ($>$ DINA1 and \leq DINA0)	ΔL^*	≤ 5	≤ 6	≤ 6	$\leq 1\%$	$\leq 3\%$	$\leq 5\%$	≤ 6	≤ 6	≤ 6
Color misregistration	pixels	$\leq 0,40$	$\leq 0,70$	$\leq 1,0$	$< 0,33$	$< 0,50$	$< 0,80$	$< 0,33$	$< 0,50$	$< 0,80$
Distortion	%	$\leq \pm 1,5$	$\leq \pm 2$	$\leq \pm 5$	$\leq \pm 1$	$\leq \pm 2$	$\leq \pm 3$	$\leq \pm 2$	$\leq \pm 2$	$\leq \pm 2$

[Image Access, Quality Controlled Scanning, Guideline Overview](#)

- International guidelines, standards, image quality analysis
 - Federal Agencies Digital Guidelines Initiative (FADGI), [Guidelines: Technical Guidelines for Digitizing Cultural Heritage Materials](#)
 - National Library of the Netherlands (KB), [Metamorfoze Preservation Imaging Guidelines](#)
 - ISO Technical Specification (19264-1:2017), [Image quality analysis — Part 1: Reflective originals](#)



Quality Controlled Digitizing



Phase One, [iXG Camera Solutions](#), screen capture

- More examples:
 - DT Cultural Heritage, [Digitization Guides](#), Digitization Workflows: Reflective and Transmissive (2017, 2018, commercial)
 - Nationaal Archief, [Digitisation of photographic materials, Guidelines](#) (2010)
 - Rijksmuseum, [Manual for the photography of 3D objects](#) (2017)
 - Kulturrådet, [Digitalisering av fotosamlinger](#) (2009)



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Deltae, deltae.picturae.com, screen capture

- Quality control from subjective to scientific quality analysis ([OpenDICE](#), [AutoSFR](#), [Delt.ae](#) and commercial softwares like [ISA Golden Thread](#), see [example](#))
- Everything starts with qualified employees (photographers & image processing specialists), standardization of the digitization environment, methods (type of camera or scanner) and workflows



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