GENERAL RECOMMENDATIONS FOR DIGITIZATION

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Within the framework of EuropeanaPhotography, the Centre for Image Research and Diffusion organized a 14 hour workshop about digitization (May 2012). The workshop aimed to provide an overview of the available systems for digitization of original photographic materials as well as the procedures to obtain the best results in terms of image quality and fidelity to the original. The instructors of this workshop were Carles Mitjà and Bea Martínez, both teachers at Polytechnics and renowned professionals. This factsheet provides some **general recommendations on digitization**, that resulted from the lectures and feedback during the workshop. They are not to be considered a theoretical corpus, but a best practice guide.

RECOMMENDATIONS

1   In order to obtain the best results, a camera should be used for digitization as the quality is superior to scanners.

2   Both for reflective and transmissive work, the lighting applied for digitization using a camera should be by electronic flash strobes. Strobes allow very short exposure times that avoid camera shake at large magnifications and also provide better sensor response.

3   You must determine the best lighting system when digitizing different types of materials. The main types of material to test for different lighting are opaque and translucent materials.

4   Before testing equipment, you must collect information about the camera and lens in order to determine the quality of your equipment.

5   The camera lens must be near free of distortion (best options below 1%); this is not possible with zoom lenses. TCA must not be present. The lens must be tested and both residual distortion and TCA should be fixed at the RAW file processing stage.

6   The camera lens resolution must be tested in order to find the optimal aperture range to avoid aberrations when fully open and to eliminate diffraction effects when closing the diaphragm.

7   Depending on the resolution needed for a given application, the more photodetectors on the sensor the higher the risk of image degradation because of diffraction at small apertures. A possible solution is to increase the physical sensor size and so avoiding the excessive reduction of the sensor photodetector size.

8 Sensors without an anti-aliasing filter (known as the optical low pass filter or OLPF) can produce image artefacts when taking pictures containing textures that have small details periodically structured. With a higher camera resolution, there is less chance of aliasing and moiré patterns. In some cases changes in magnification can reduce or completely remove the aliasing effects.

9 A system false response or aliasing must be measured by analyzing the image of a suitable sinusoidal test target taken at different configuration modes.

10 The OECF measurement should be calculated to determine the optimal dynamic range available for different working conditions.

11 For any given equipment set up, the system MTF measurement and interpretation provides objective information about: **a.** Best lens, aperture and sensor combination performance. **b.** Risk level concerning aliasing. **c.** Best camera settings and values to be used in each case.

12 Any lens-sensor system provides RAW files that lack in contrast and sharpness; this can and should be fixed as a raw processing adjustment or as a post processing operation.

13 Any processing affecting image tone, color, contrast and sharpness must be monitored by analyzing groups of originals and taking objective measurements from the images.

14 Although cameras capture in 12 or 14bit and can provide 8 or 16bit output, capture should be done at the highest bit setting available and output should always be set at 16bit as this helps to avoid processing artefacts. After image processing, any output intended for a use should be saved as B&W or Color of 8bit in depth.

15 When lighting textured objects, a single fixture is considered better than a uniform two light illumination. This helps keeping a natural texture appearance; unevenness in brightness can be fixed by digital image processing.

16 Edge enhancement needs to be applied with care to avoid any over-sharpening and must be monitored using objective measurements. In general, while unsharp mask (high pass filter) tends to exaggerate edge enhancement over the high contrast regions, band pass filters such as DOG (Mexican Hat) act preferentially over the mid frequency regions, providing a more natural result.

17 Screens must be calibrated in order to view image colors accurately and to allow correct image processing. It is important to know the color space of the screen and avoid viewing of images with wider color spaces; working with ProPhotoRGB is not recommended.

18 Archive images must have a known ICC profile (specific or standard). AdobeRGB is recommended for archive images, because it allows for the optimization of images for different outputs.

19 There are different ways to calibrate camera colors, depending on the RAW processor. Adobe Camera RAW (ACR) works with profiles that can be created for each camera and situation, while Capture-One works with pre-defined ICC Profiles, created for each camera model. In all cases, it is recommended to take a photo of the ColorChecker Chart in the same conditions as the digitized images. This process proves useful when calibrating and evaluating camera color reproduction.

20 When applying a new ICC profile (or standard color space) it is important to know the difference between Assigning and Converting as the result is different.

21 Working with RGB color spaces is recommended to process and archive images, because they have a higher bit depth than grey scale images and wider color ranges than CMYK color spaces.