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**Graphic technology and  
photography — Colour  
characterization of digital still  
cameras (DSCs) —**

**Part 3:**

**User controls and readouts for scene-  
referred imaging applications**

*Technologie graphique et photographie — Caractérisation de la  
couleur des appareils photonumériques —*

*Partie 3: Contrôles utilisateur et lectures pour les applications  
d'imagerie par scène*

ISO/TR 17321-3:2017

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## Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

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This document was prepared by Technical committee ISO/TC 42, *Photography*.

A list of all the parts in the ISO 17321 series can be found on the ISO website.

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## Introduction

Pictorial photography by and large produces images that convey the specific artistic intent of the photographer. The intent might convey a complex artistic vision, or it might simply attempt to create images that are generally pleasing to viewers. Other types of photography, such as the reproduction of images of artworks and other objects for archival purposes and the reproduction of images for scientific measurement and analysis, reproduce images that require an accurate representation of the scene captured, where accuracy is measured in terms of relative colourimetry or adapted relative colourimetry (for cases where viewer adaptation differs when looking at the correctly reproduced image and when looking at the actual scene).

Images for pictorial photography are typically processed with an *output-referred representation* on some medium. In the case of film, the medium is often a photographic print or transparency. In the case of digital capture, the output characteristics are specified and communicated either by the identification of a standard reference medium, such as sRGB or ROMM RGB, or by the inclusion of an output-intent ICC profile.

*Output-referred images* are often not colourimetrically accurate photographic reproductions of the actual scene or object because

- scenes vary widely in their highlight-to-midtone and midtone-to-shadow luminance ratios, in their colour gamuts, and in other characteristics,
- output media vary widely in their colour gamuts and their luminance range capabilities, and
- pictorial photographers choose output media whose characteristics complement their artistic intent.

While *scene-referred (SR) images*, that is, colourimetrically accurate images of scenes and objects, are required, it is difficult to obtain colourimetrically accurate images of scenes and objects.

Digital archiving facilities sometimes use targets to create ICC profiles to invert the colour processing from output-referred images to scene-referred images. This approach is commonly used, but it has significant drawbacks:

- a) characterization charts do not always represent the actual spectra to be captured;
- b) the camera colour processing and chart used can limit the colour gamut and dynamic range of the resulting scene-referred images;
- c) precise exposure control is difficult because the camera and image readouts typically reflect the state of the image prior to application of the ICC profile;
- d) some cameras employ colour processing that is image dependent when producing output-referred images.

In this last case the ICC profile determined with the chart is only likely to be accurate when photographing the chart itself.

It is also possible to obtain scene-referred images by converting camera raw images using camera raw processing software. This approach is technically more sound than creating scene-referred images from output-referred images, but there are still issues:

- commercial camera raw processing tends to be focused on creating output-referred images;
- open-source software tends to be complex;
- additional software is often needed to convert the scene-referred image data to standard scene-referred colour encodings.

Users need simple and clear camera and camera raw processing controls and readouts that allow them to easily produce quality scene-referred images in appropriate encodings.

This document describes a scene-referred (SR) capture-processing mode that could be added to digital still cameras for use by those photographers interested in colourimetrically accurate images of scenes and objects.

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