

2016



Making A Future
with Color Management

THE INTERNATIONAL CONFERENCE

NPES-ICC COLOR MANAGEMENT | 2016

MARCH 17, 2016 • JAKARTA, INDONESIA • POLIMEDIA AUDITORIUM



Color Management For Digital Photography

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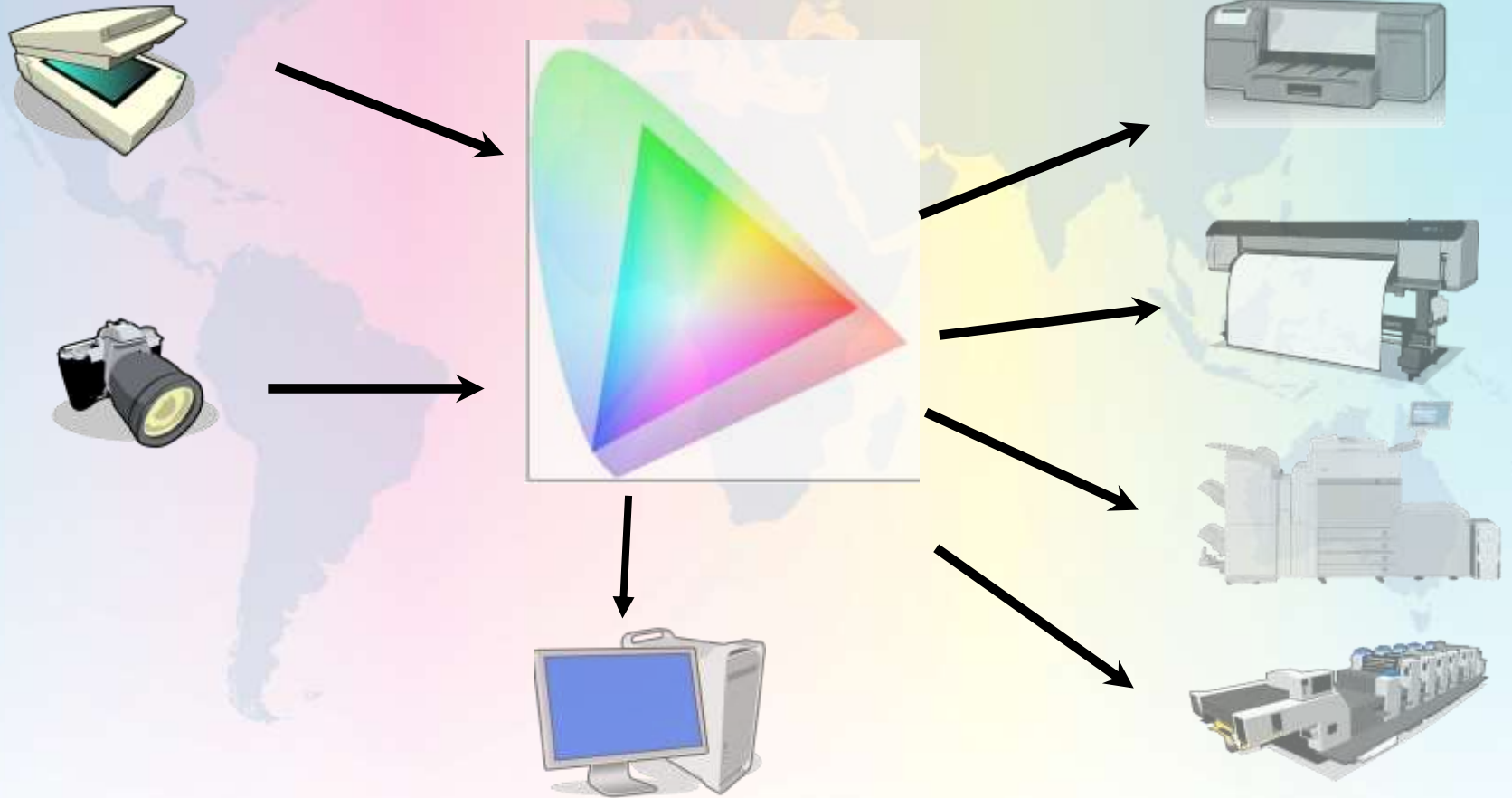
**ICC VICE CHAIR, CGATS CHAIR, USTAG ISO TC130 CHAIR
PRINTING AND IMAGING PORTFOLIO MANAGER – X-RITE INC**

What's out, what's in for today

- Out
 - Spectral Profiling
- In
 - ICC profiles for Digital cameras
 - Raw “Profiles” for Digital cameras
- In and Out
 - Scene-referred, Output-referred
 - Display Calibration
 - Printer Calibration



Input to output



Scene Referred – Output Referred

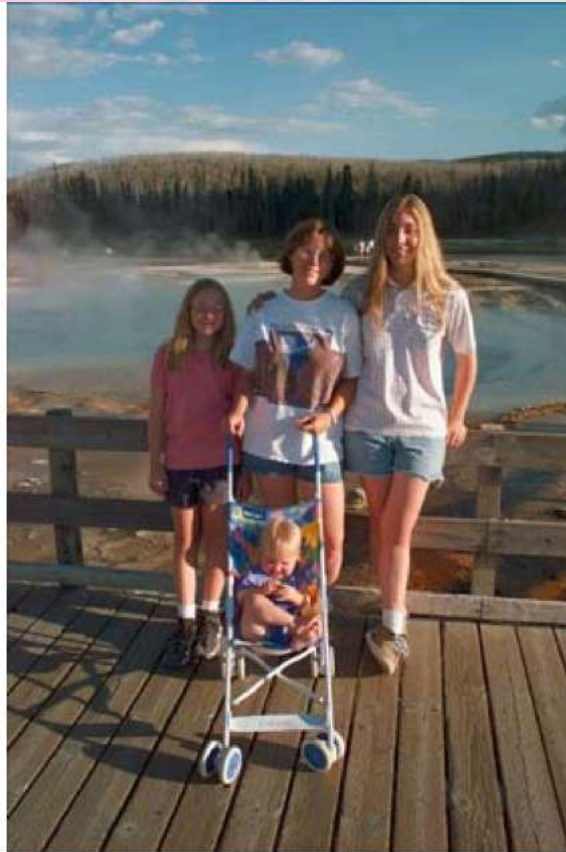


- Scene Referred:
 - The measured scene color the camera captures
- Output Referred
 - The transformation necessary to produce the desired interpretation for screen or print
 - Done in the camera for tiff and jpeg files if you set sRGB or Adobe RGB
 - If shooting RAW you become the renderer along with your RAW converter

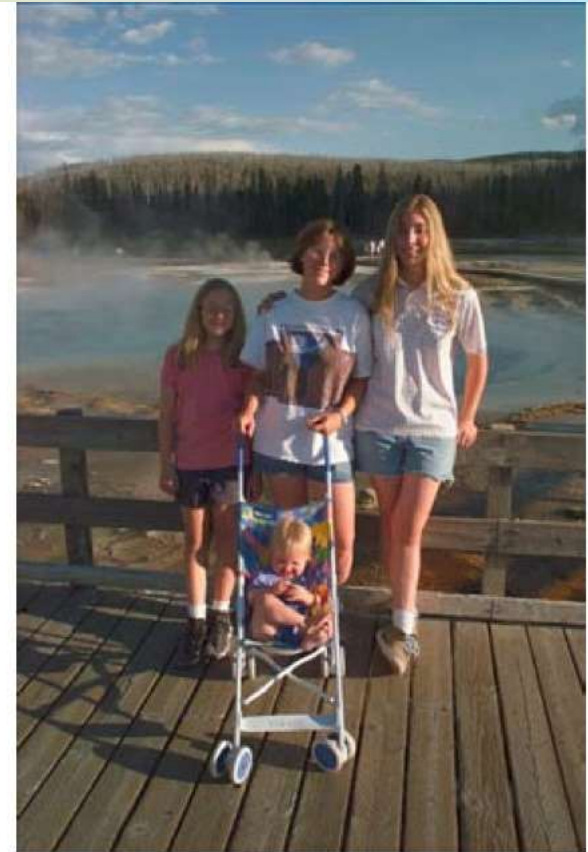
Scene Referred – Output Referred



Scene Referred



Camera A sRGB
rendering



Camera B sRGB
rendering

More Information

- ICC White papers
 - <http://color.org/whitepapers.xalter>
 - ICC_white_paper_17_ICC_profiles_with_camera_images.pdf
 - ICC_white_paper_20_Digital_photography_color_management_basics.pdf
- Creating Scene Referred images
 - <http://www.color.org/scene-referred.xalter>

International Color Consortium

MAKING COLOR SEAMLESS BETWEEN DEVICES AND DOCUMENTS

ABOUT ICC RESOURCES INFORMATION MEMBERS GETTING STARTED V4

ICC: EVENTS:

All ICC Events

2016

ICC Meetings - Munich

Creating scene-referred images using Photoshop CS3

Introduction

A scene is defined in ISO 22028-1 as follows:

scene

SEARCH ICC : GO

Got a question about ICC Profiles or colour management?

Ask Phil...

ICC: LIVE TOPICS:

Why profile a digital camera

Two common scenarios:

- Desire to have colorimetrically accurate reproduction
 - ICC workflow
- Desire to have pictorially consistent starting point
 - DNG or RAW calibration

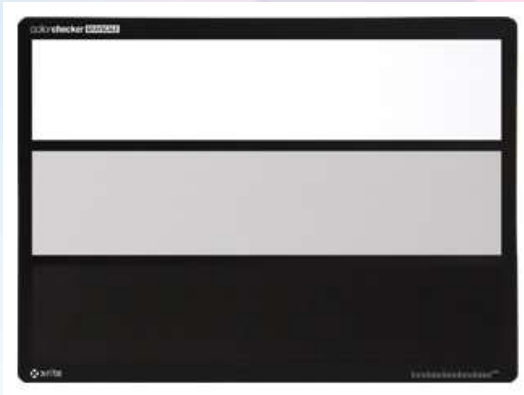
Camera Color Management

- ICC workflow - TIFs and JPEGs
 - Processed in the camera
 - sRGB or Adobe RGB
- DNG or RAW
 - Processed in software
 - All data is captured
 - Large file size
 - Greater editing capabilities

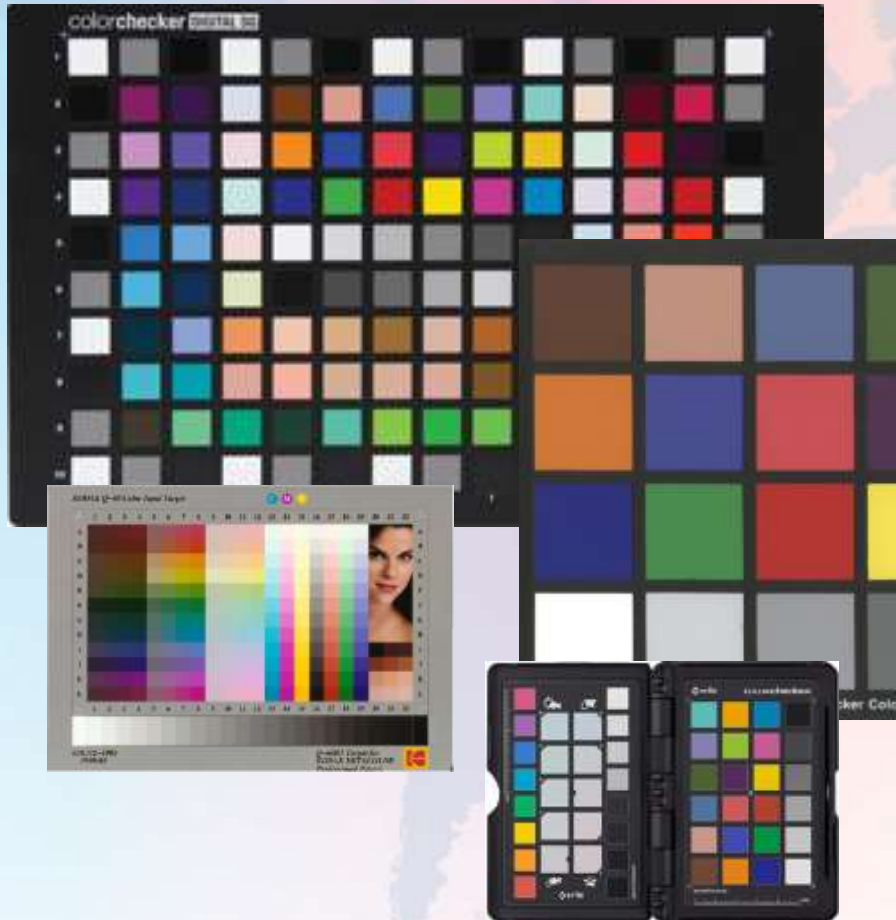


Common workflow elements

- White Balance the Camera
 - Survey reports 3 hours a week lost in just post capture white balance edits
- Software to create the profile
- Physical target compatible with software using to render the profile.



Common input profiling targets



Custom profiling targets

- Used primarily for tight colorimetric reproduction
 - Use the actual materials to be reproduced
 - Artist pigments
 - Fabric swatches
 - Other materials
 - Most common is to emulate the Classic ColorChecker
 - New work in ISO 12641-2 to allow easier creation of custom input targets



How often to profile

When something changes

- ICC
 - Colorimetric accuracy
 - primary concern is the lighting
- RAW
 - Lighting less of a concern with dual illuminant profile



Capturing target

- Even lighting
 - No glare
 - Proper exposure
 - Square on to the camera



Building the ICC profile

- Capture the target

- TIFF
- RAW
- JPG



- Process in the software of choice

- May need to have a reference file
- Various degrees of complexity

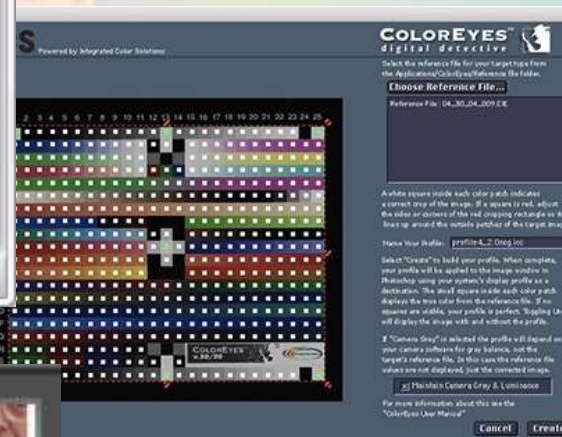
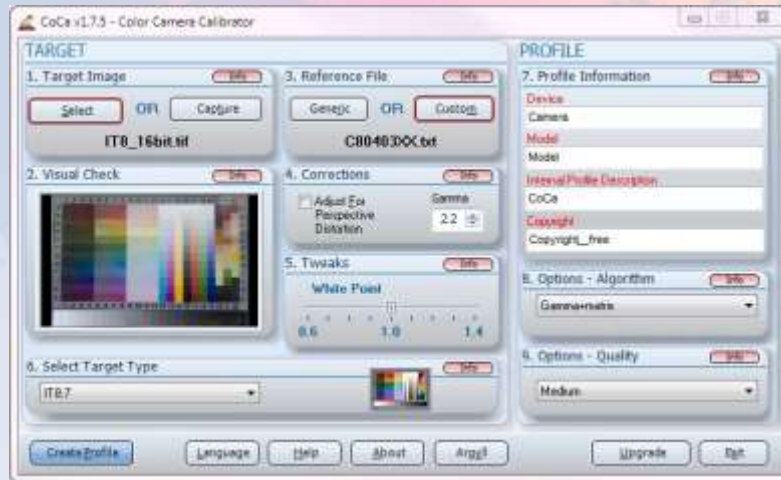


The data below is intended to be an average measurement of all ColorChecker Charts. ColorChecker Charts should be replaced every two years as fading of the colors will alter the values of the chart.

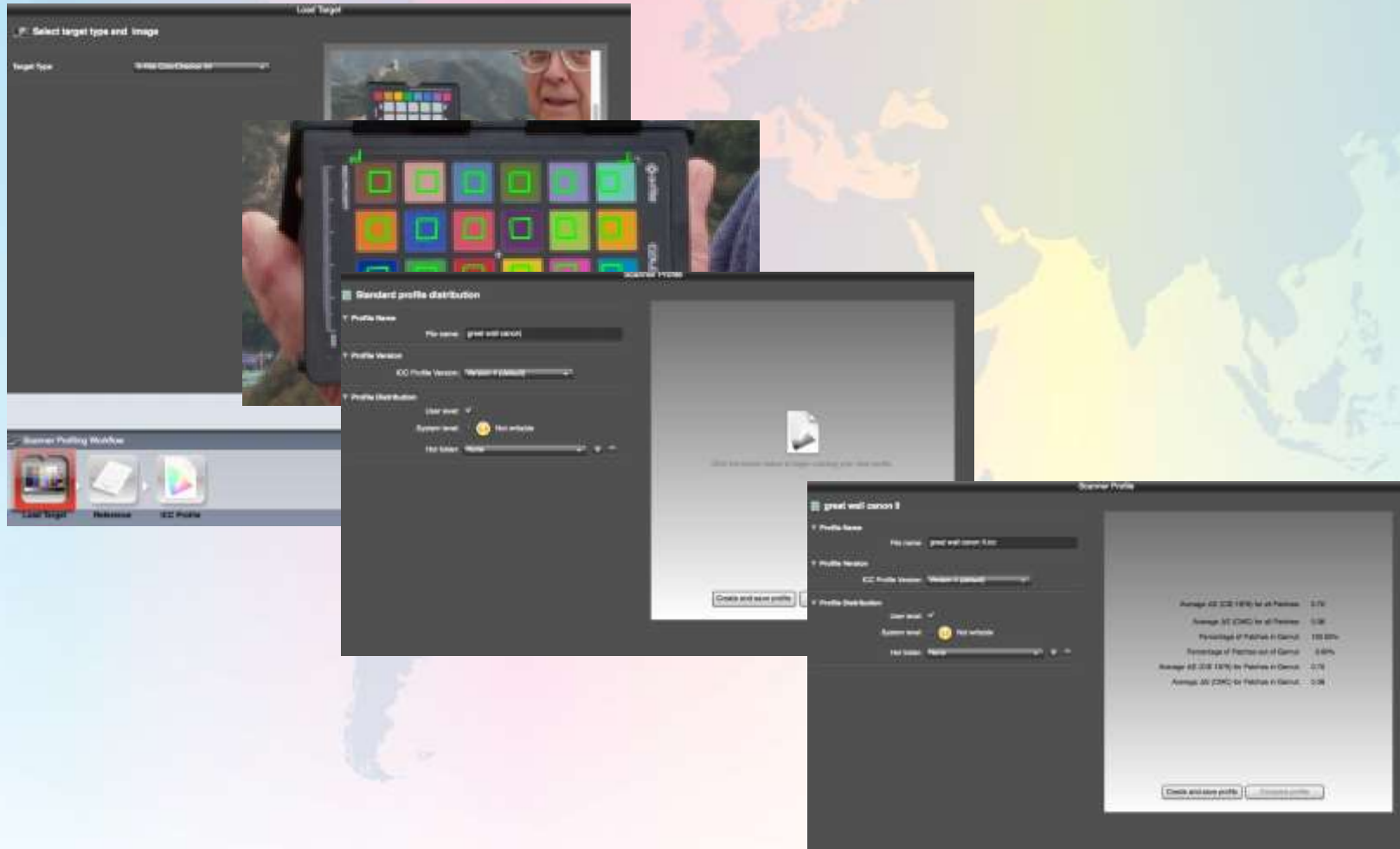
No.	Description	L*a*b*			D50 Illuminant, 2 degree observer			Munsell Notations	Density (D50)
		L*	a*	b*	L*	a*	b*		
1	dark blue	39.12	-18.11	18.72	39.12	-18.11	18.72	1.29/1.22	
2	light blue	68.80	-16.19	13.24	68.80	-16.19	13.24	0.47/1.41	
3	blue grey	49.24	-13.06	13.96	49.24	-13.06	13.96	0.29/1.55	
4	teal	65.43	-13.36	15.07	65.43	-13.36	15.07	0.21/1.45	
5	blue green	55.56	-12.72	15.11	55.56	-12.72	15.11	0.22/1.45	
6	green	49.24	-13.06	13.96	49.24	-13.06	13.96	0.29/1.55	
7	yellow green	72.46	13.24	15.07	72.46	13.24	15.07	0.21/1.45	
8	yellow	92.02	18.11	18.72	92.02	18.11	18.72	0.22/1.45	
9	orange yellow	82.72	13.36	15.07	82.72	13.36	15.07	0.21/1.45	
10	orange	55.56	12.72	15.11	55.56	12.72	15.11	0.22/1.45	
11	red orange	50.87	11.36	14.71	50.87	11.36	14.71	0.23/1.45	
12	red	38.12	13.24	15.07	38.12	13.24	15.07	0.24/1.45	
13	magenta	49.24	-13.06	13.96	49.24	-13.06	13.96	0.29/1.55	
14	violet	39.12	-18.11	18.72	39.12	-18.11	18.72	0.29/1.55	
15	purple	29.37	-24.49	15.07	29.37	-24.49	15.07	0.29/1.55	
16	dark purple	19.62	-24.49	15.07	19.62	-24.49	15.07	0.29/1.55	
17	black	39.12	-18.11	18.72	39.12	-18.11	18.72	0.29/1.55	
18	white	92.02	18.11	18.72	92.02	18.11	18.72	0.22/1.45	
19	neutral 8 (2.04)	39.12	-18.11	18.72	39.12	-18.11	18.72	0.29/1.55	
20	neutral 6.5 (1.44)	55.56	-12.72	15.11	55.56	-12.72	15.11	0.22/1.45	
21	neutral 5 (0.73)	72.46	13.24	15.07	72.46	13.24	15.07	0.21/1.45	
22	neutral 3.5 (0.35)	92.02	18.11	18.72	92.02	18.11	18.72	0.22/1.45	
23	neutral 2 (0.05)	99.62	0.56	0.61	99.62	0.56	0.61	0.04/0.05	
24	neutral 0.05 (0.02)	100.00	0.00	0.00	100.00	0.00	0.00	0.00/0.02	

See CIE 1931 colorimetric data for more information on the data above.

Typical software interfaces



Building an ICC Profile



Applying the ICC Profile in Photoshop

- Edit > Assign Profile



Raw Profiling in Lightroom

- Export with Preset > ColorChecker Passport



Applying the profile in Lightroom

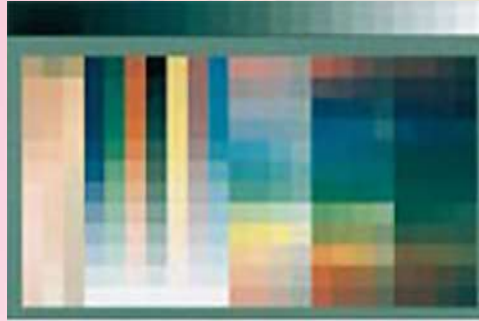
- Develop > Camera Calibration



Result of profiling



original



Capture



Profile applied



What could go wrong

- Biggest variables:
 - Camera settings
 - Variable internal image processing being applied
 - Auto white balance
 - Exposure
 - Lighting
 - Was the lighting on the target even
 - Was lighting on the target the same as corrected image

The new originals



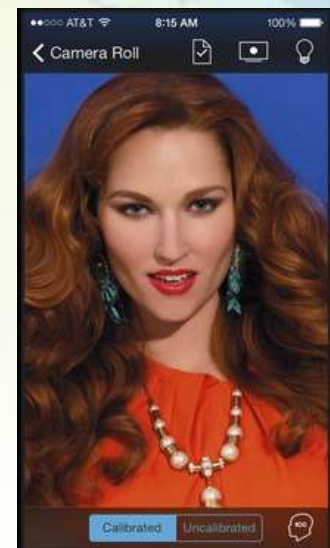
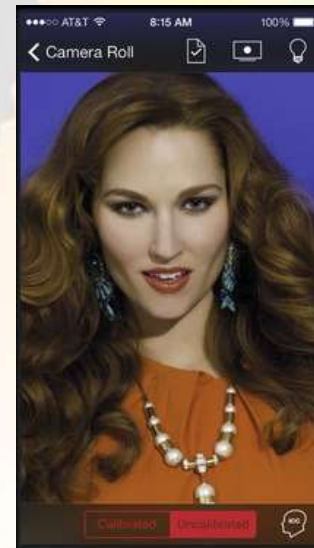
Display calibration

- The foundation for the digital darkroom
 - If editing on screen - display calibration is required
 - If sending to a lab or printing locally - display profiling reduces cost and rework
- In many cases the final destination is the display



Mobile Devices

- Mobile devices do not support system-wide color management
 - Assumption of sRGB
 - Application based color management is the only option



Survey results

- Lack of display calibration resulted in an average of 4.5 extra hours of work per week in color correction
- In a recent survey 66% of respondents answered that display calibration did affect their design process
 - Cut down time adjusting colors
 - Provided 'More Confidence'
- "More efficient in achieving the right color on a print out, based on what's on the screen"
- Majority used the word "accurate" when responding to how display calibration made a difference
- "More accurate photo reproduction"
- "Photos look better"

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Conclusions

- Camera Profiling or Calibration provide quantifiable benefits to digital photographers
- Monitor calibration is required for the new digital darkroom
- If printing closing the loop may require profiling your local printer, your lab or using their supplied profile

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