

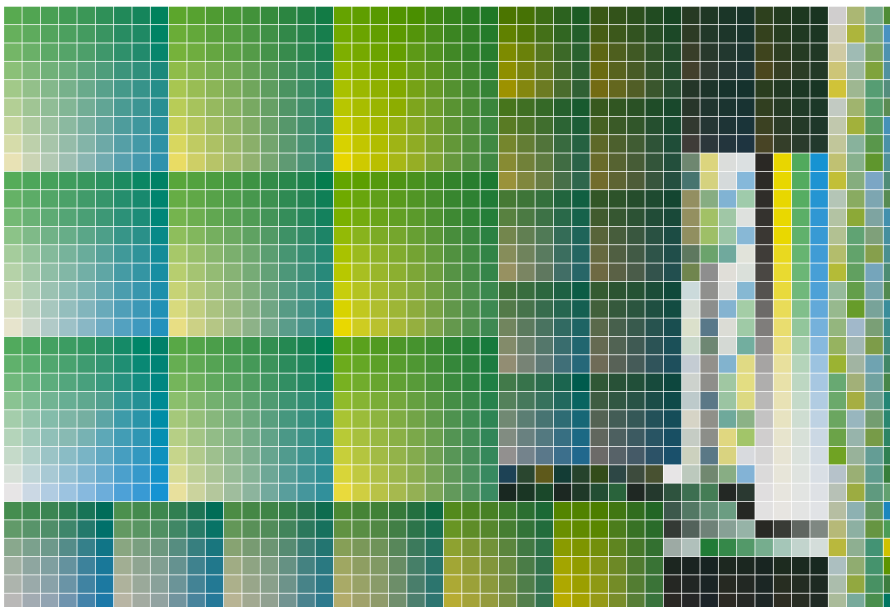
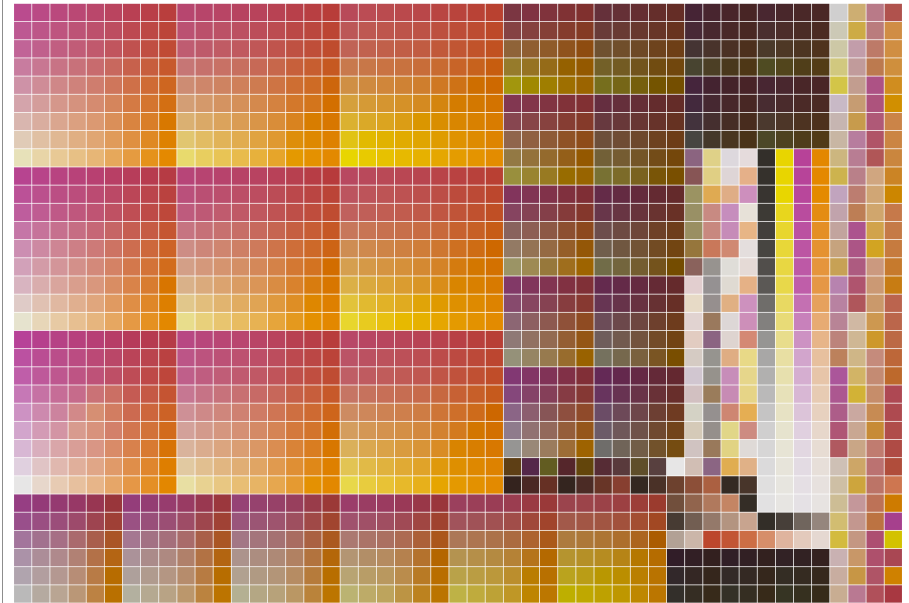
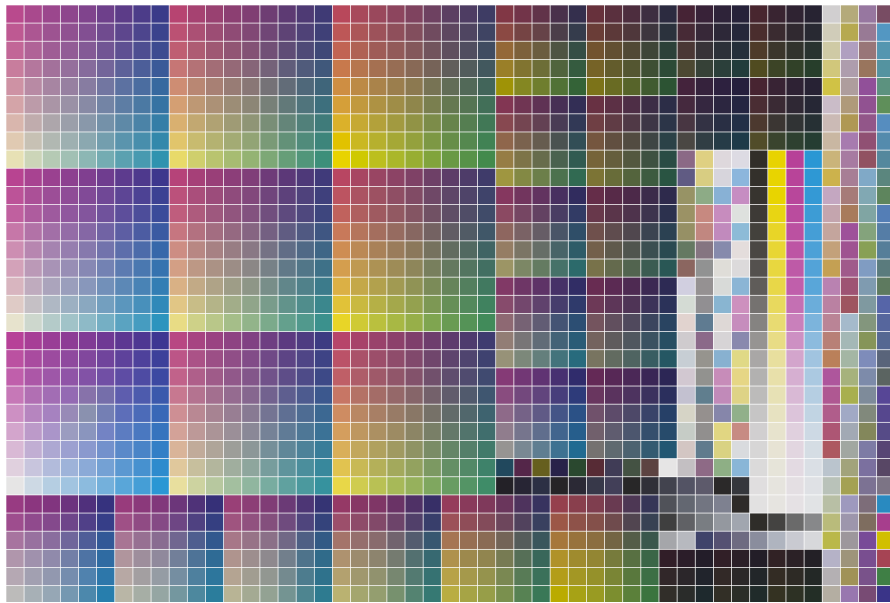


Fogra Multicolor Forum 2018

Characterization Target Conventional Print

- **Ink set**
 - Process colors with 5, 6 or 7 inks
 - CMYK ink set extended with O, G and/or B
 - Input colors mapped to a n-color process
- **Calibration**
 - Density or colorimetric based
- **Characterization**
 - Based on a number of 4-ink processes
 - CMYK + OMYK + CGYK + CMBK
- **Screening**
 - Conventional screening (AM, Hybrid, FM)

Characterization Target Conventional Print



Select CMYK characterization target

- Sampling optimal for printing process
- Use target for 4-ink subprocesses
- Print and measure different targets

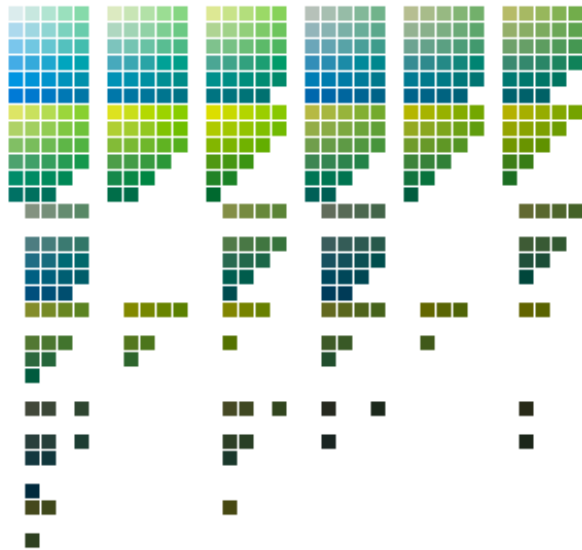
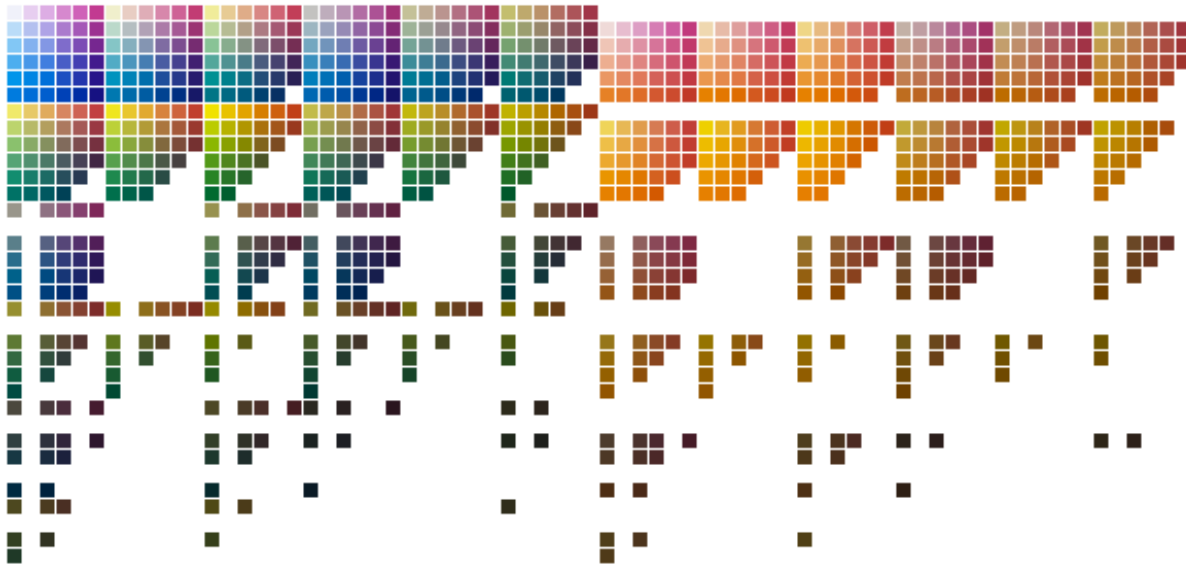
Number of color patches

- CMYK target: N
- CMYK-Plus-n : $(1+n) N$

Characterization Target Digital print

- **Ink set**
 - Multi-density inks
 - Multiple drop sizes
 - Basic ink set CMYK+OGB
- **Calibration**
 - Combine similar inks (multi-density, different drop sizes)
 - Colorimetric based
- **Characterization**
 - Based on a number of 4-ink processes
 - CMYK + OMYK + CGYK + CMBK
- **Screening**
 - Conventional screening (AM, Hybrid screening, FM)
 - Error diffusion

Characterization Targets Digital Print



Optimized n-colorant characterization target

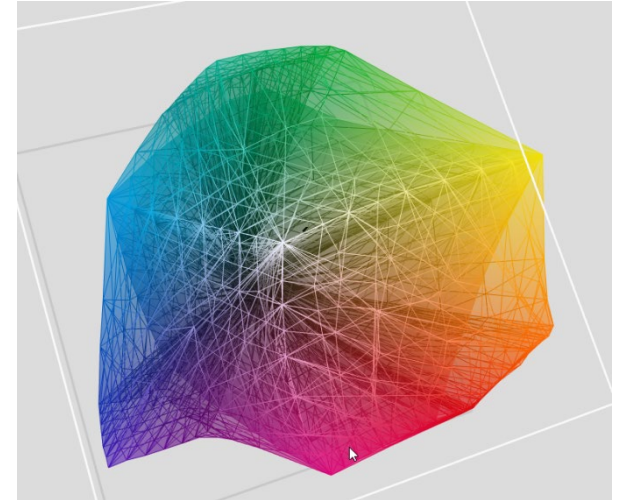
- Uniform sampling (typically per 20 %)
- Less sampling for increasing K
- TAC taken into account

Number of color patches

- Typically between 1000 and 1500

Multicolor profiling CMYKVOG

- Characterization
 - ICC based
 - A2B Multi-dimensional tables
 - Typically 5 or 6 sampling points
 - Model based
 - Accuracy
 - Max deltaE00: 7.01
 - Average deltaE00: 0.18
 - B2A separation tables
 - Typically 17 or 33 sampling points per axis
 - Based on limited set of 4-ink sub-processes
 - E.g. CMYKOGV => CMYK, OMYK, CGYK and CMVK



Multicolor profiling CMYKVOG

- Separation spots

	Purple	Green	Red	Skin
L*	51.6	75.3	46.6	64.4
a*	75.5	-50.0	72.0	36.4
b*	-40.3	27.7	52.0	6.5

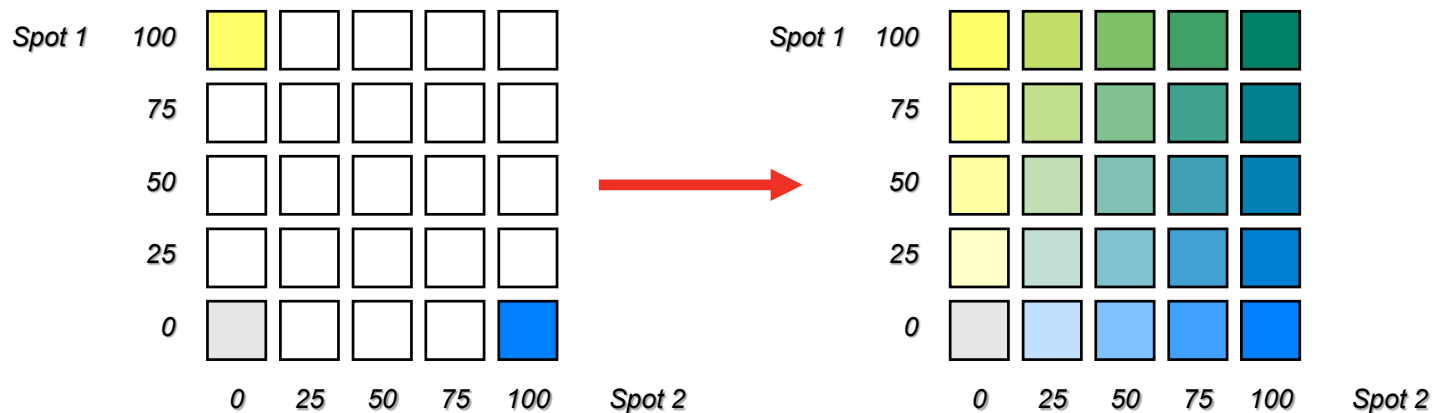
	Purple	Green	Red	Skin
deltaE	7.3 (9.6)	3.1	0.0	0.0

	Purple	Green	Red	Skin
C	0.0	0.0	0.0	5.7
M	83.5 (90.9)	0.0	98.3	49.0
Y	0.0	45.5	100.0	23.7
K	0.0	0.0	1.1	0.5
O	0.0	0.0	48.3	0.0
G	0.0	47.9	0.0	0.0
V	44.3 (32.4)	0.0	0.0	0.0

- - Epson P7000 7-color printer
 - Characterization with closed
 - Fogra multicolor MediaWedge 7C
 - Average deltaE00: 0.98
 - Maximum deltaE00: 3.01

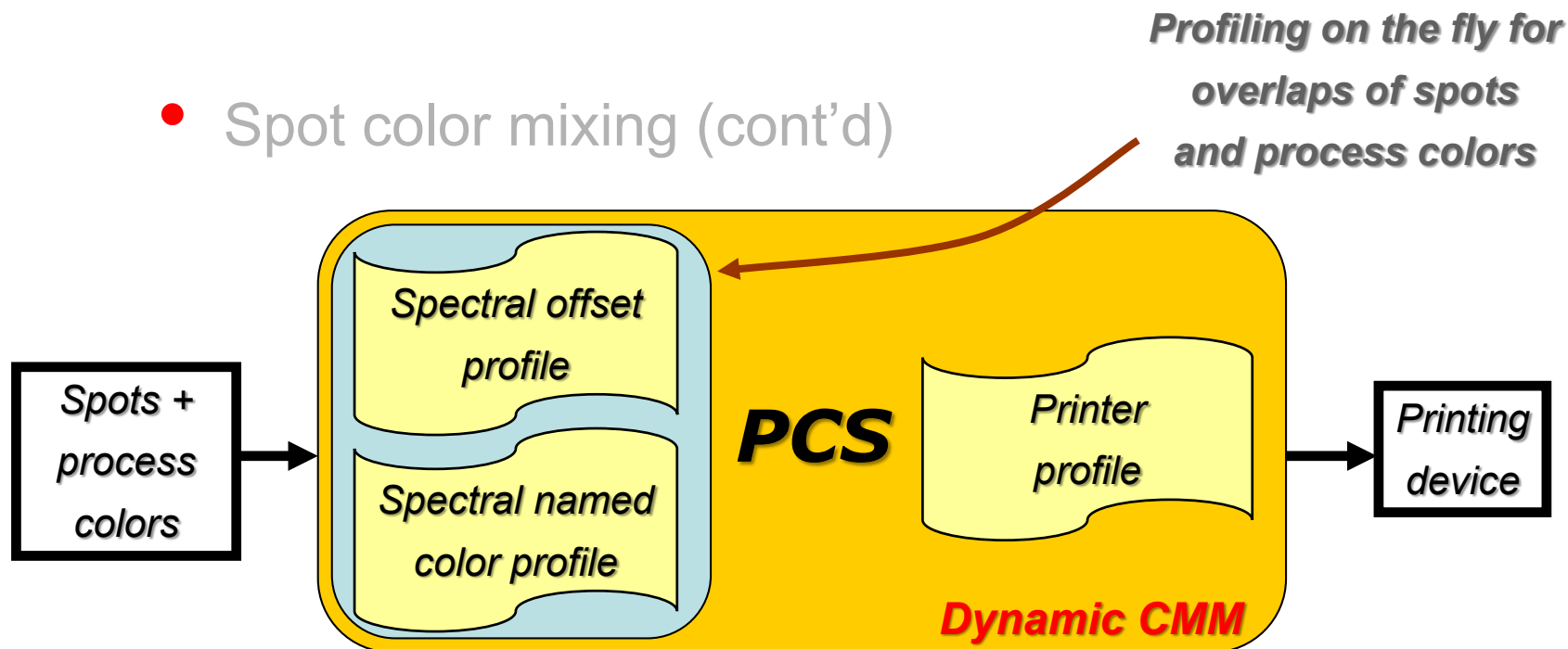
Spot color replacement

- Spot color mixing
 - Dynamic rendering of spot colors
 - Only spectra of solid spots needed
 - On the fly calculation of overprinted spot colors
 - Rendering based on dot gain, solid density, trapping, ...
 - Output profile defines media and viewing conditions



Spot color replacement

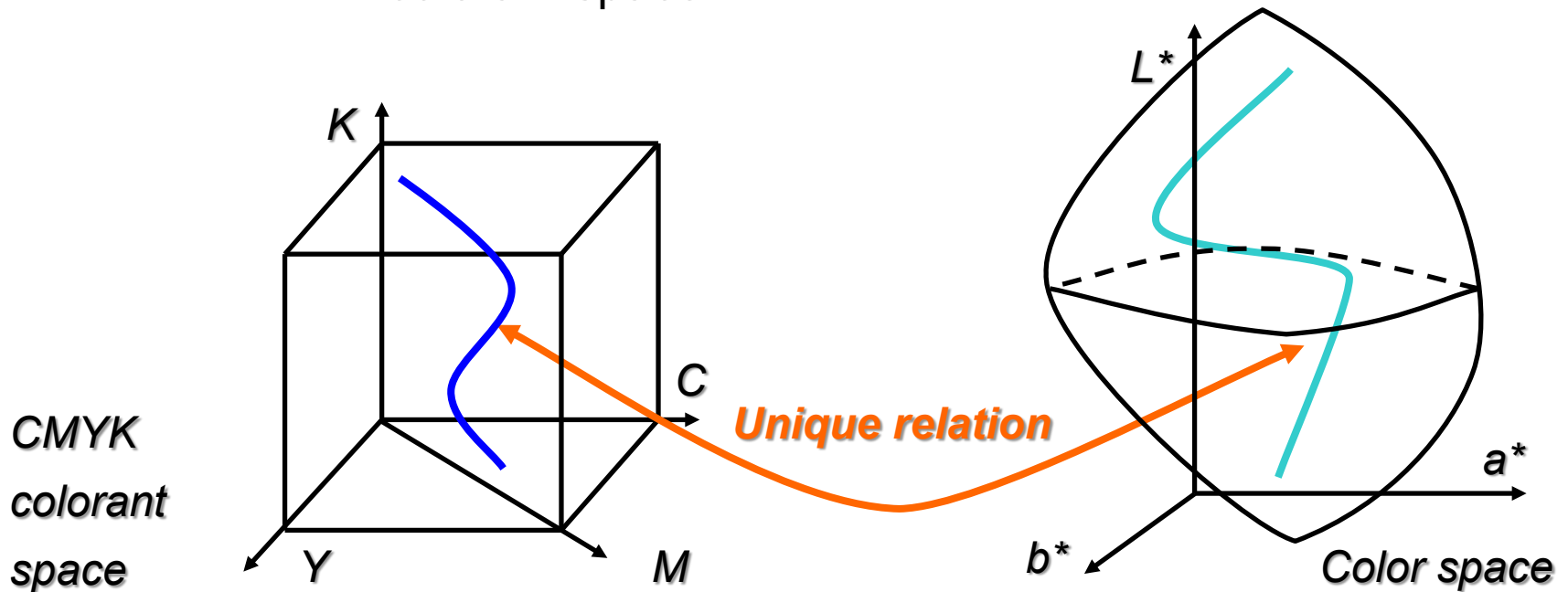
- Spot color mixing (cont'd)



- Rendering characteristics
 - Parametrized to get accurate and realistic rendering
 - Printing order taken into account
 - Continuity between different subsets of ink values
- DeviceN objects in PDF documents

Profile regularization

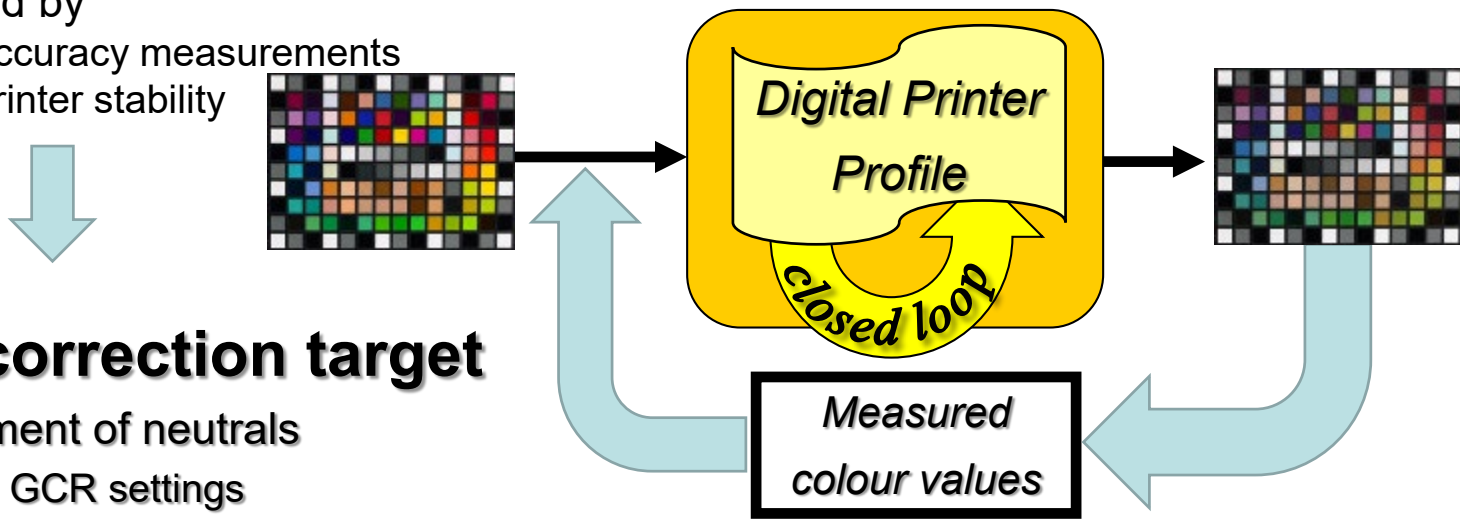
- **Build-in quality control**
 - **Connectivity and smoothness**
 - Connected path color space mapped to connected path in colorant space



Closed loop

- **Closed loop**

- Extends characterization target of digital printer
- Limited by
 - Accuracy measurements
 - Printer stability



Neutral correction target

- Improvement of neutrals
 - Used GCR settings
 - Applied ink limitations
 - Per rendering intent

