

2016



Making A Future
with Color Management

THE INTERNATIONAL CONFERENCE

NPES-ICC COLOR MANAGEMENT | 2016

MARCH 17, 2016 • JAKARTA, INDONESIA • POLIMEDIA AUDITORIUM



Building an ISO and ICC compliant workflow

By: Elie Khoury

Matching colors any product, any printing process

- ISO TC130: Standards
- Alwan Color Expertise: Software
- KEE Consultants: Services



What is the purpose of a printing business?

- To meet customer expectations:
« *I just want my color right...* »

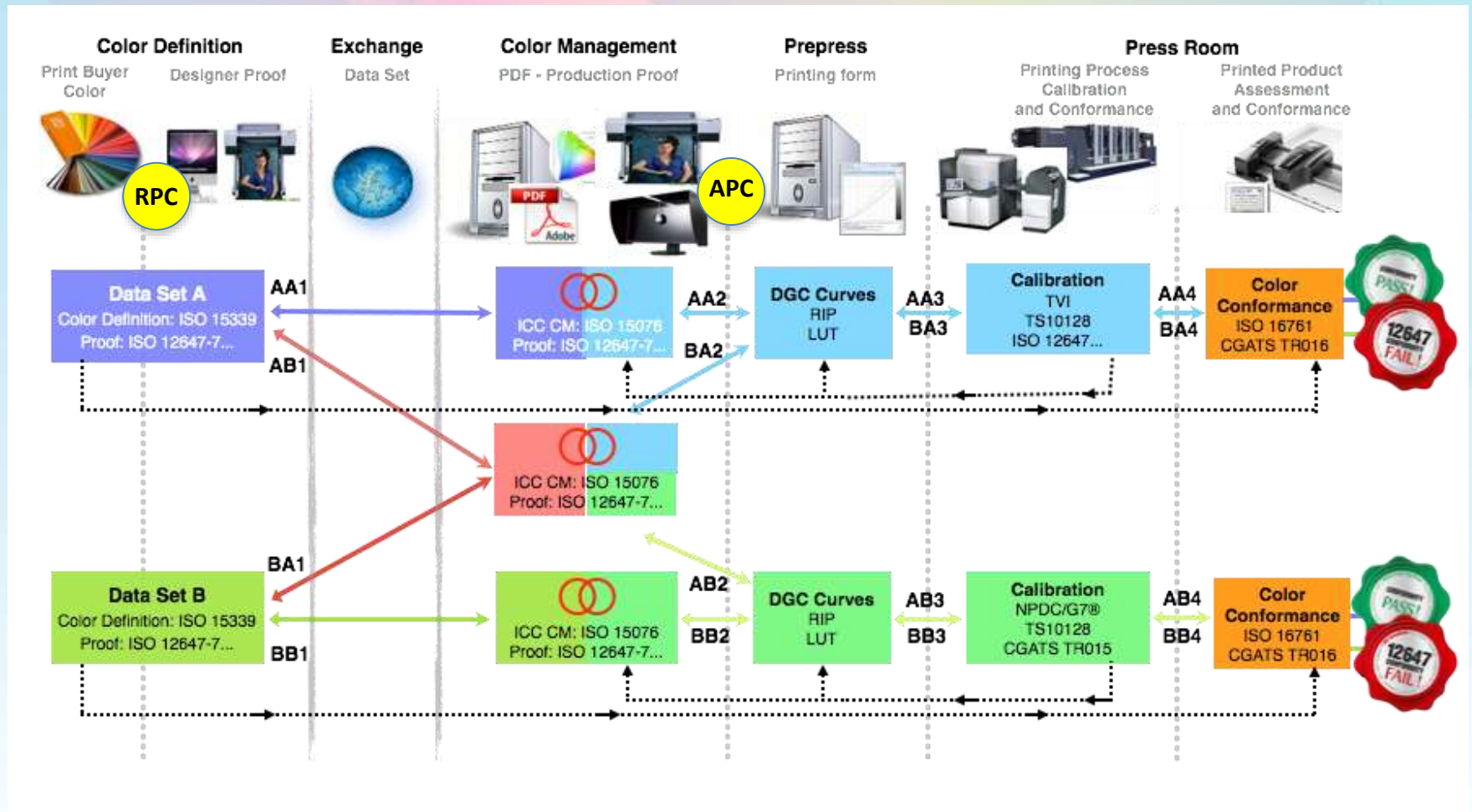


Ideal Printing Workflow

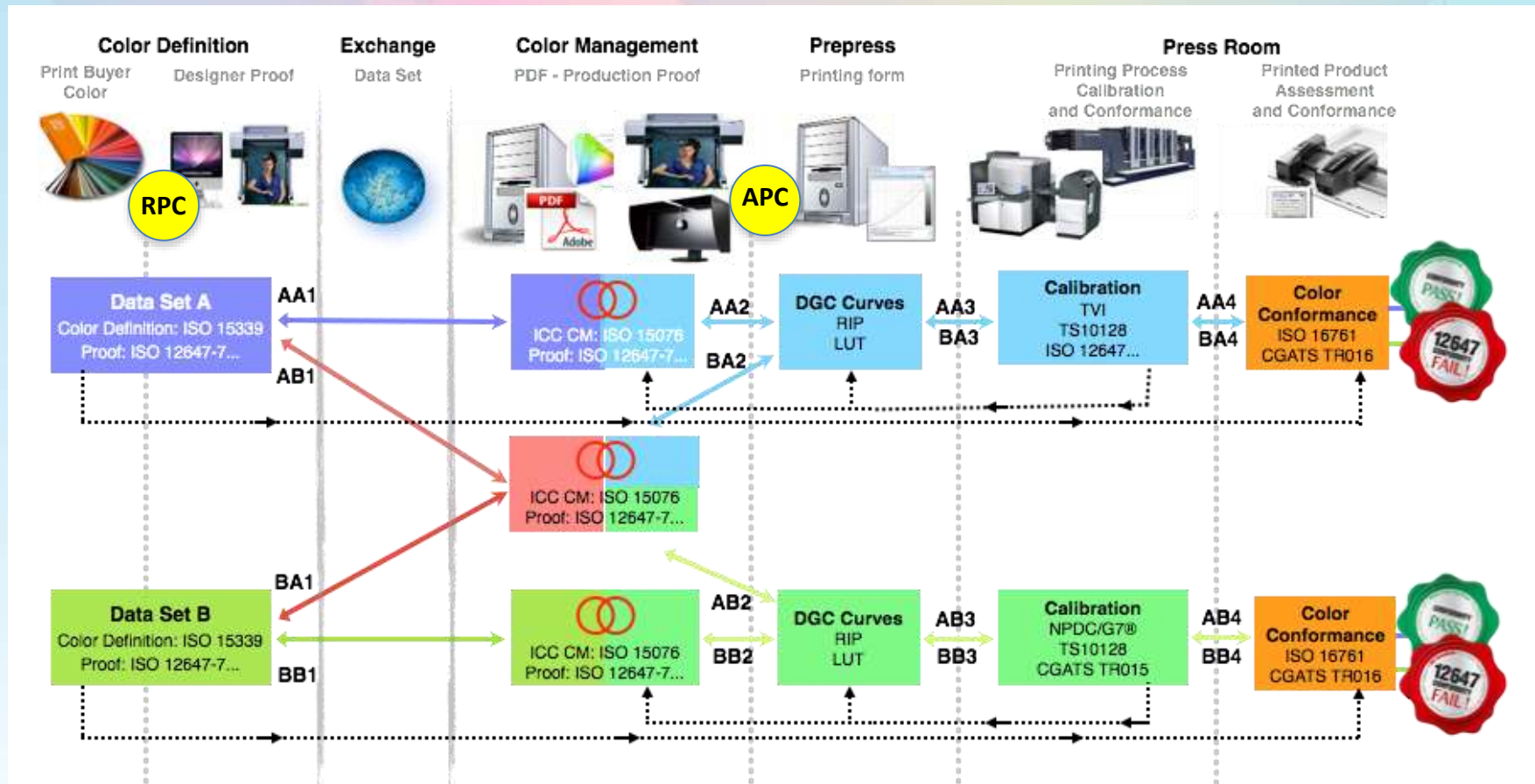


Reference Printing Conditions = Actual Printing Conditions = Product Color Match
CMYK, Spot Colors, n-color... match process capabilities

Actual Printing Workflows

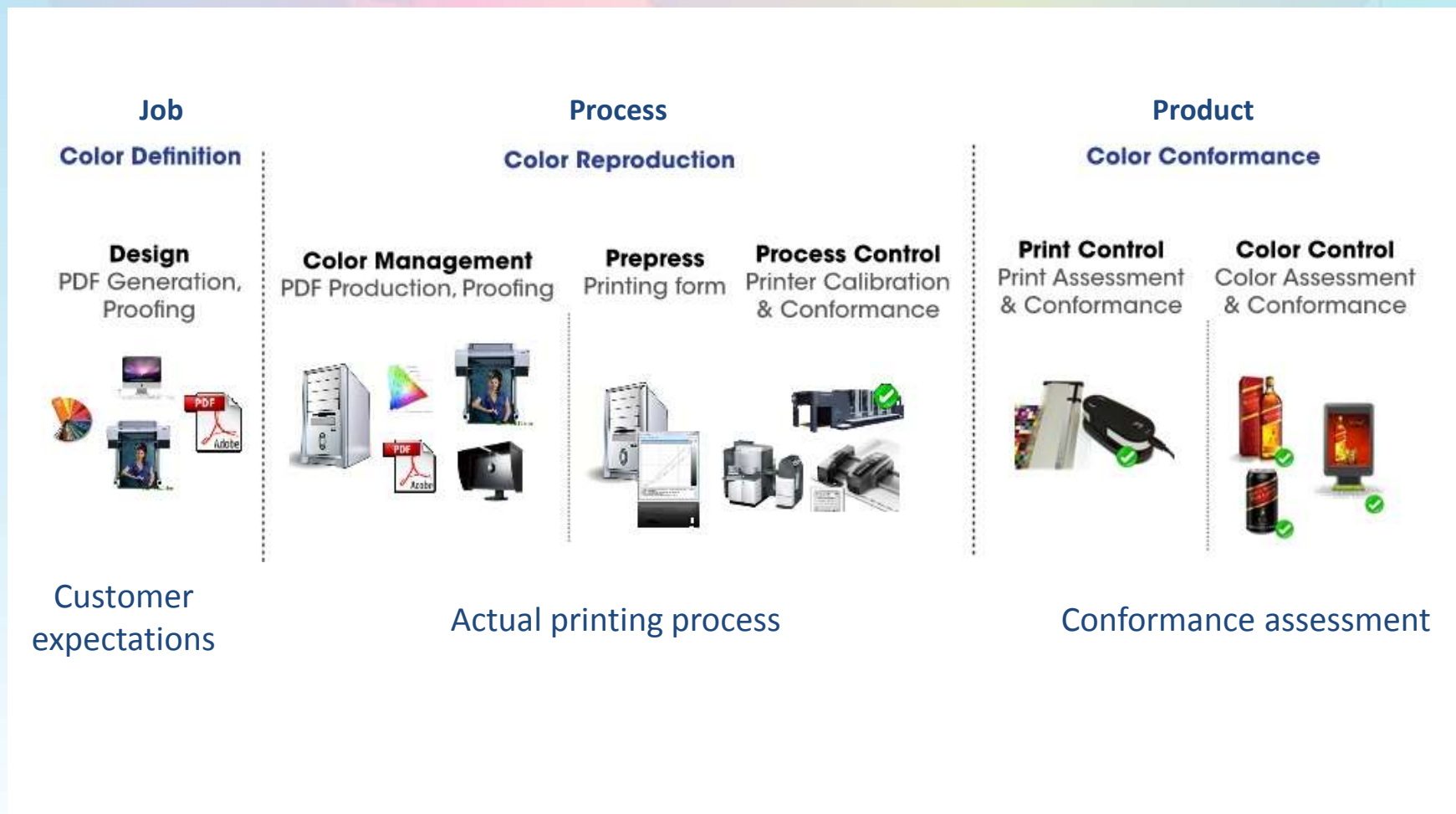


Actual Printing Workflows



Reference Printing Conditions $\neq$ Actual Printing Conditions = Product Mismatch

Universal Printing WORKflows Diagram



Color Definition Inaccurate

Design
PDF Generation,
Proofing



- Brand owner, designer... choose, proof and approve colors
- Brand Colors:
 - ?RGB
 - ?CMYK
 - ?Named color ink
- Process Colors:
 - ?RGB
 - ?CMYK

⇒ Printer can not identify customer colors

Color Definition Accurate

Design

PDF Generation,
Proofing



- Brand Colors:
 - CIELAB: commercial printing
 - Spectral, CxF/X-4 (ISO 17972-4): packaging, label, speciality printing
 - Solids and Tints
- Process Colors:
 - Defined RGB, CMYK and OutputIntent
 - ICC profiles and Color Data Sets: ISO 15339
 - PDF/X: ISO 15930

⇒ Printer can identify customer colors

Color Reproduction

No Color Management

Color Management
PDF Production, Proofing



- Printing process matches job color definition: $APC = RPC$
 - process and spot inks match
 - Process control
 - Solids
 - TVI
 - Gray balance (CMYK)
- Printing process does not match job color definition: $APC \neq RPC$

⇒ Process colors are not predictable

Color Reproduction

Accurate Color Management

Color Management
PDF Production, Proofing



- Printing process does not match job color definition: $APC \neq RPC$
 - Process inks / spot inks / substrate do not match
 - RPC and APC colors do not match
- Process control is not enough
- $\Rightarrow$ Color Management: ISO 19302
 - Composite colors (Device Color Builds)
 - Spot Colors (IFS, multicolor printing)
 - + Process Control

$\Rightarrow$ Process colors are predictable and accurate

Color Reproduction Inaccurate Process Control

Prepress
Printing form

Process Control
Printer Calibration
& Conformance



- Visual assessment
- Solid densities in production
- **TRC***: TVI/GB off production

⇒ Process is unstable and inconsistent

*TRC = Tone Reproduction Curve

Process Color Reproduction

Accurate Process Control

Prepress
Printing form

Process Control
Printer Calibration
& Conformance



- Solid Aims and Tolerances: ISO 12647, ISO 15339...
- TRC calibration: ISO 10128
- TRC Adjustment file format: ISO 18620
- Automated closed-loop: measurement → correction → device → measurement...
 - solid colourants
 - TRC
 - ICC Profile

⇒ Process is stable and consistent

Color Conformance

Inaccurate assessment

Print Control
Print Assessment
& Conformance

Color Control
Color Assessment
& Conformance



- Brand Colors:
 - Visual, Density, CIEAB
 - Process Colors:
 - Process inks, Density, Solids only
- ⇒ Mismatch between
- printer assessment
 - customer assessment



Color Conformance Accurate

Print Control
Print Assessment
& Conformance

Color Control
Color Assessment
& Conformance



- Brand Colors:
 - Spectral measurement: ISO 17972 (CxF)
 - ΔE_{00} , Δh° ...: ISO 12647-6 , ISO 19302...
 - Metameric index: CIE 15 Publication
 - Process Colors:
 - ΔE_{ab} , ΔE_{00} , CRF
 - ISO 15339 data sets, Fogra...
- ⇒ Match between
- printer assessment
 - customer assessment



Ideal = Actual Printing Workflow

Color Definition

Design

PDF Generation,
Proofing



Color Reproduction

Color Management

PDF Production, Proofing



Prepress

Printing form



Process Control

Printer Calibration
& Conformance



Color Conformance

Print Control

Print Assessment
& Conformance



Color Control

Color Assessment
& Conformance



Data Set A

ISO 15339 - ISO 15930
ISO 12647-7...

ICC CM: ISO 15076
ISO 12647-7...

RIP
LUT

TVI/NPDC-G7®
TS10128
ISO 12647
CGATS TR015

ISO 16751-2
CGATS TR016



Standardized Workflows: ISO 19302

- Printing Workflows Definition, Requirements and Testing
- Color Conformity Assessment of Printed Products
- Commercial, packaging, label, special applications

Design
PDF Generation,
Proofing



Color Management
PDF Production, Proofing



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Printing form

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Print Control
Print Assessment
& Conformance



Color Control
Color Assessment
& Conformance



Standardized Workflows Benefits

- Feedback from more than 150 PSO and G7[®] sites worldwide
- Realistic figures (up to)

Ink < ΔE < MI
Print < ΔE

Color Preflight -50%
Proof Mismatch -50%

Process Control -50%
Colorant Saving -30%

Color Problems - - -
Customer Satisfaction +++

Design
PDF Generation,
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Color Management
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Print Control
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Color Control
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Standardized Workflows: Bottom Line

- Non quality issues cost printers 5%+ net profit (Observatoire des medias, UNIC France)
- **Automation** and **Education** are Key to profitability.

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Thank You

Alwan

Color Expertise

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