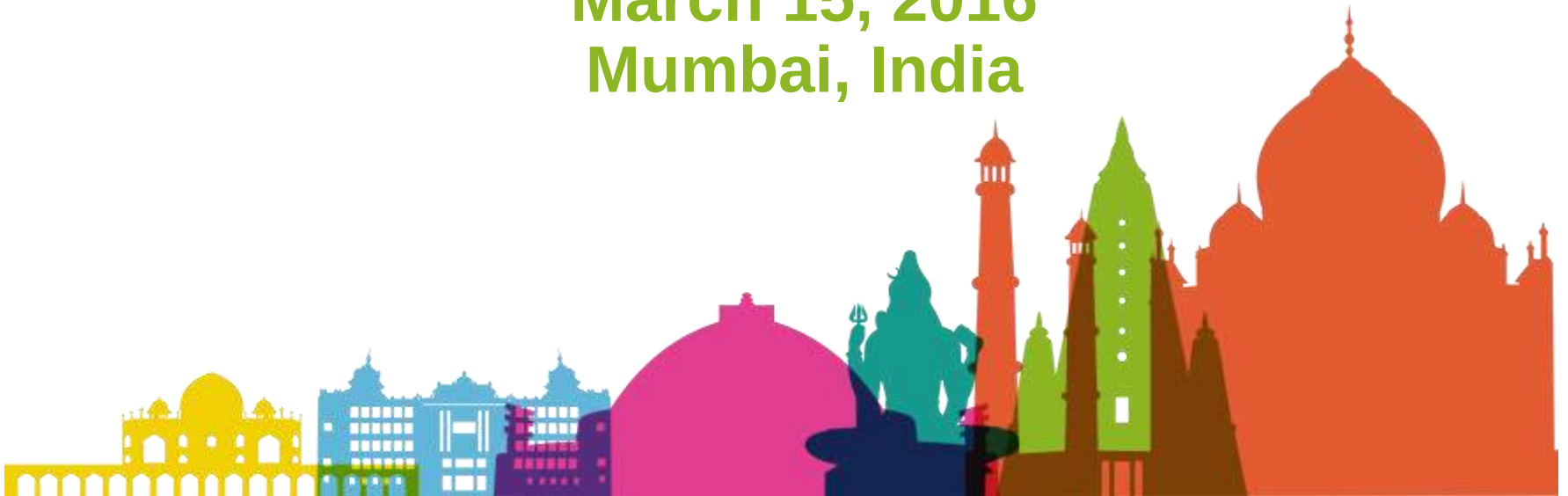


CREATING FUTURE PRINT THROUGH TECHNOLOGY AND INNOVATION



PRINT BUSINESS OUTLOOK CONFERENCE 2016

March 15, 2016
Mumbai, India



“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... »



Universal Printing WORKflows

Job Color Definition

Design
PDF Generation,
Proofing



Process Color Reproduction

Color Management
PDF Production, Proofing



Prepress
Printing form



Process Control
Printer Calibration
& Conformance



Product Color Conformance

Print Control
Print Assessment
& Conformance



Color Control
Color Assessment
& Conformance



Ideal Printing Workflow

Job Color Definition

Design
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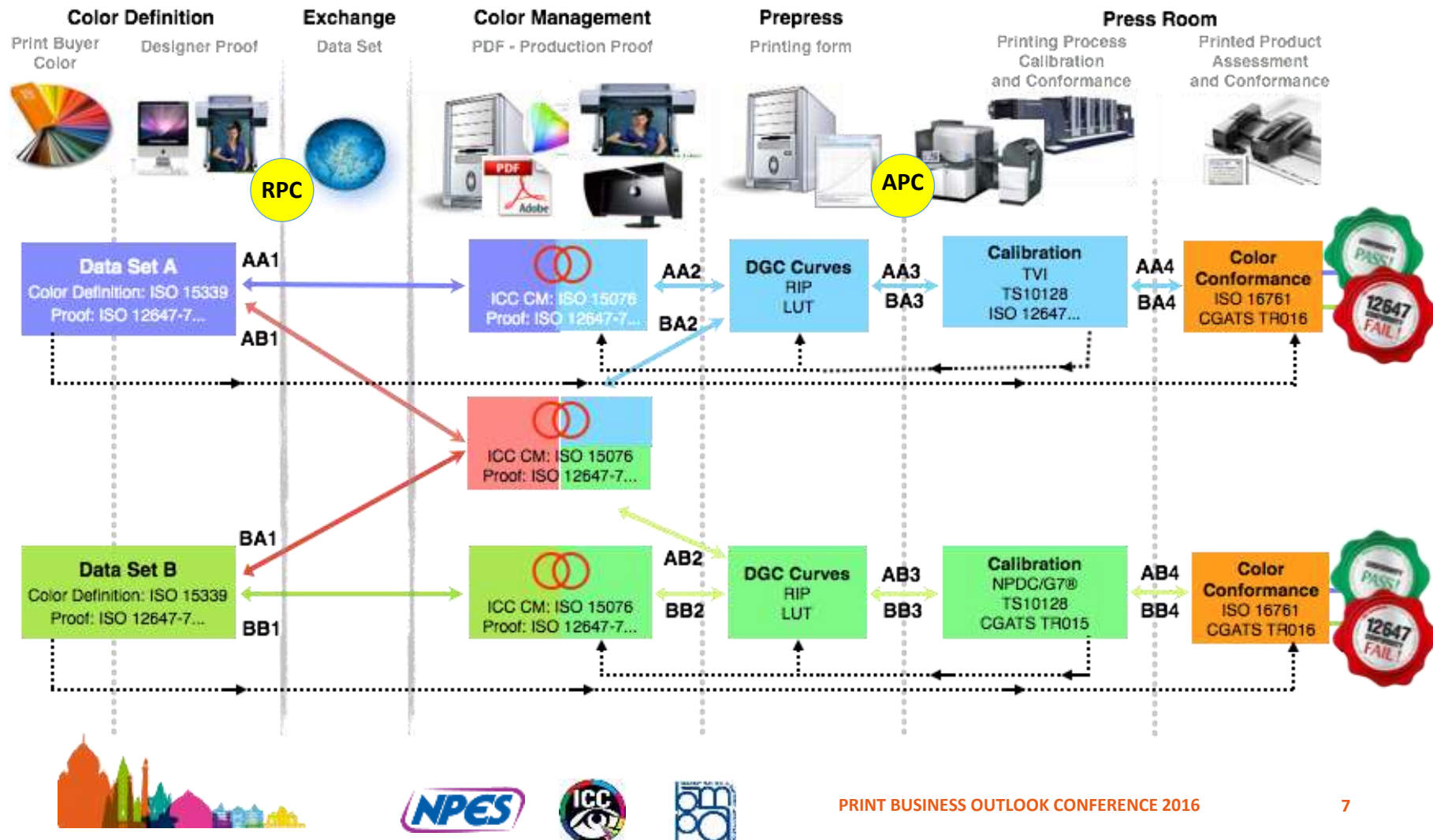
Color Control
Color Assessment
& Conformance



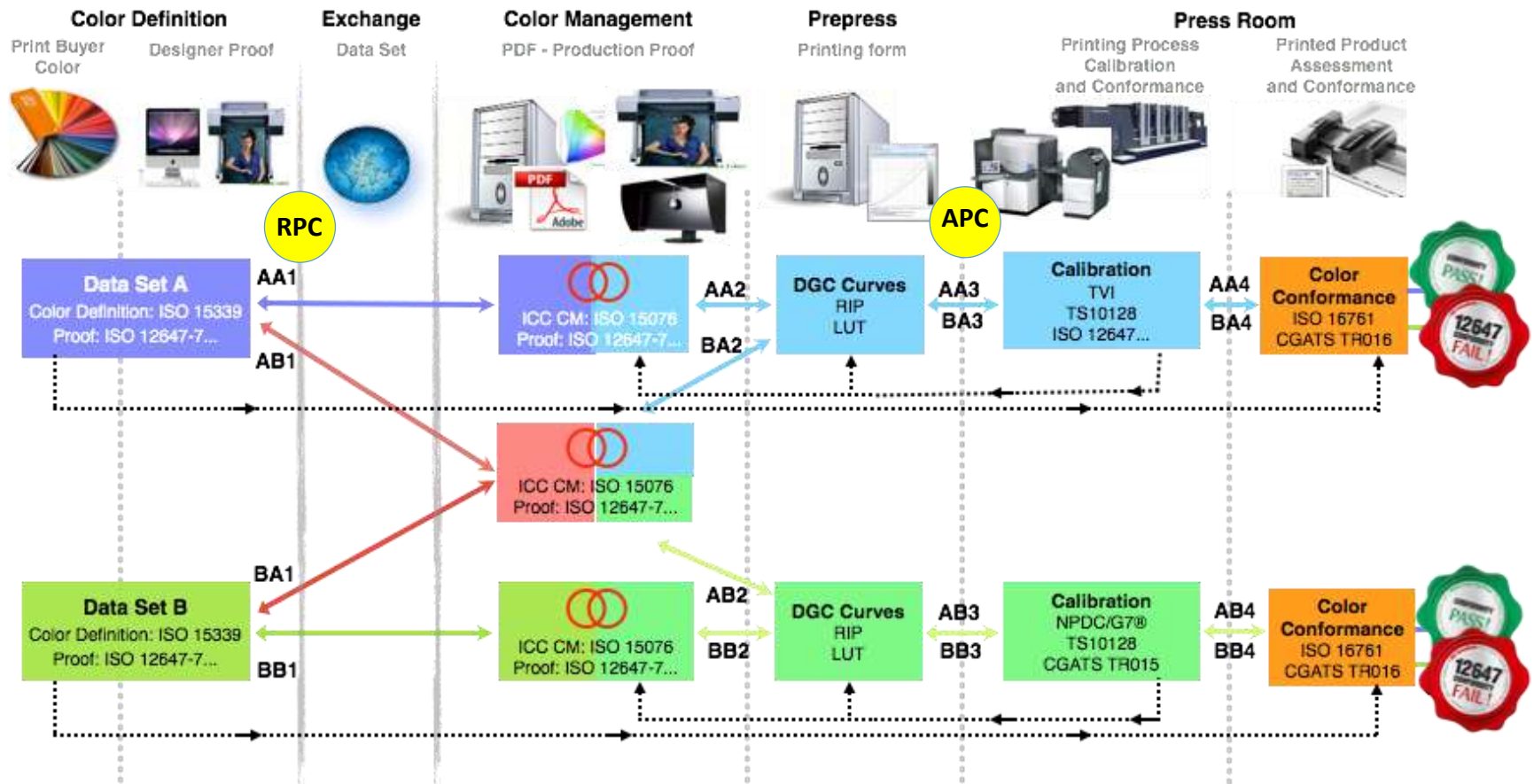
Reference Printing Conditions = Actual Printing Conditions = Product Color Match
CMYK, Spot Colors, n-color... match process capabilities



Actual Printing Workflows



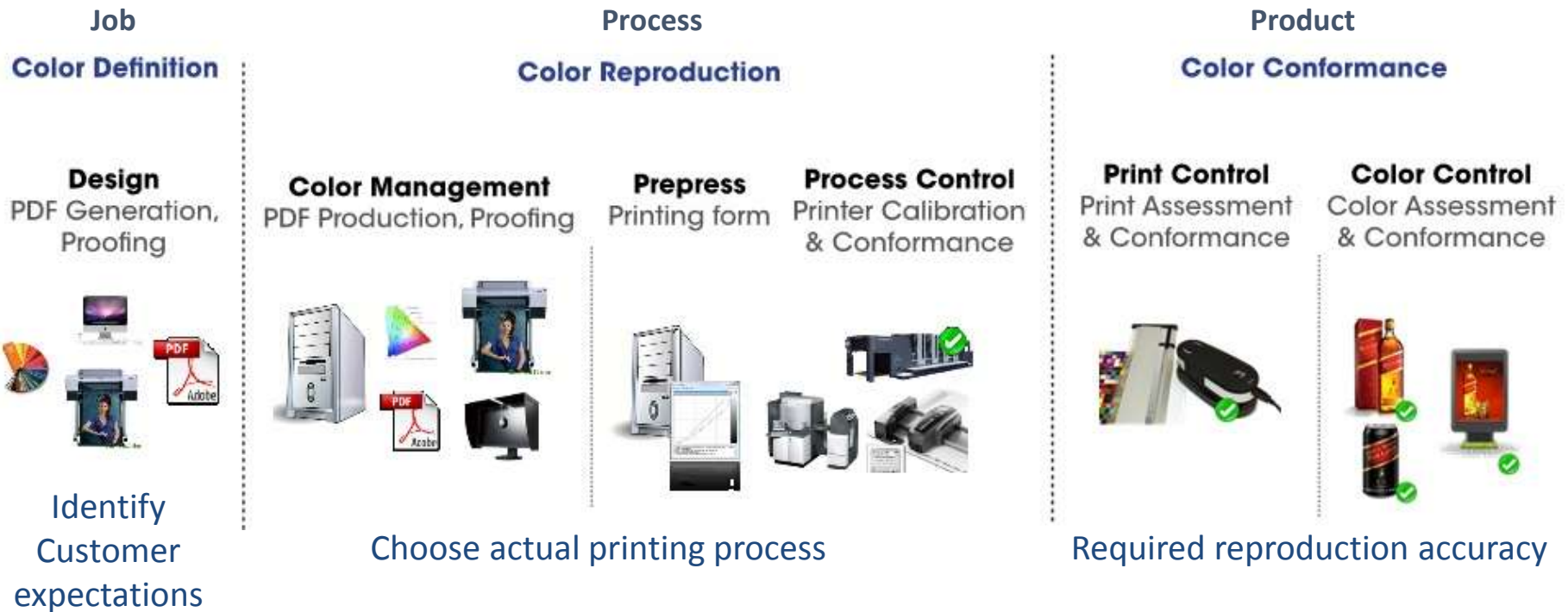
Actual Printing Workflows



Reference Printing Conditions ≠ Actual Printing Conditions = Product Mismatch



Universal Printing WORKflows



Color Definition: Inaccurate



- 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



- 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



- 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



- 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 **Color Control**
Print Assessment & Conformance Color Assessment & Conformance



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



Color Conformance Accurate Assessment

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:

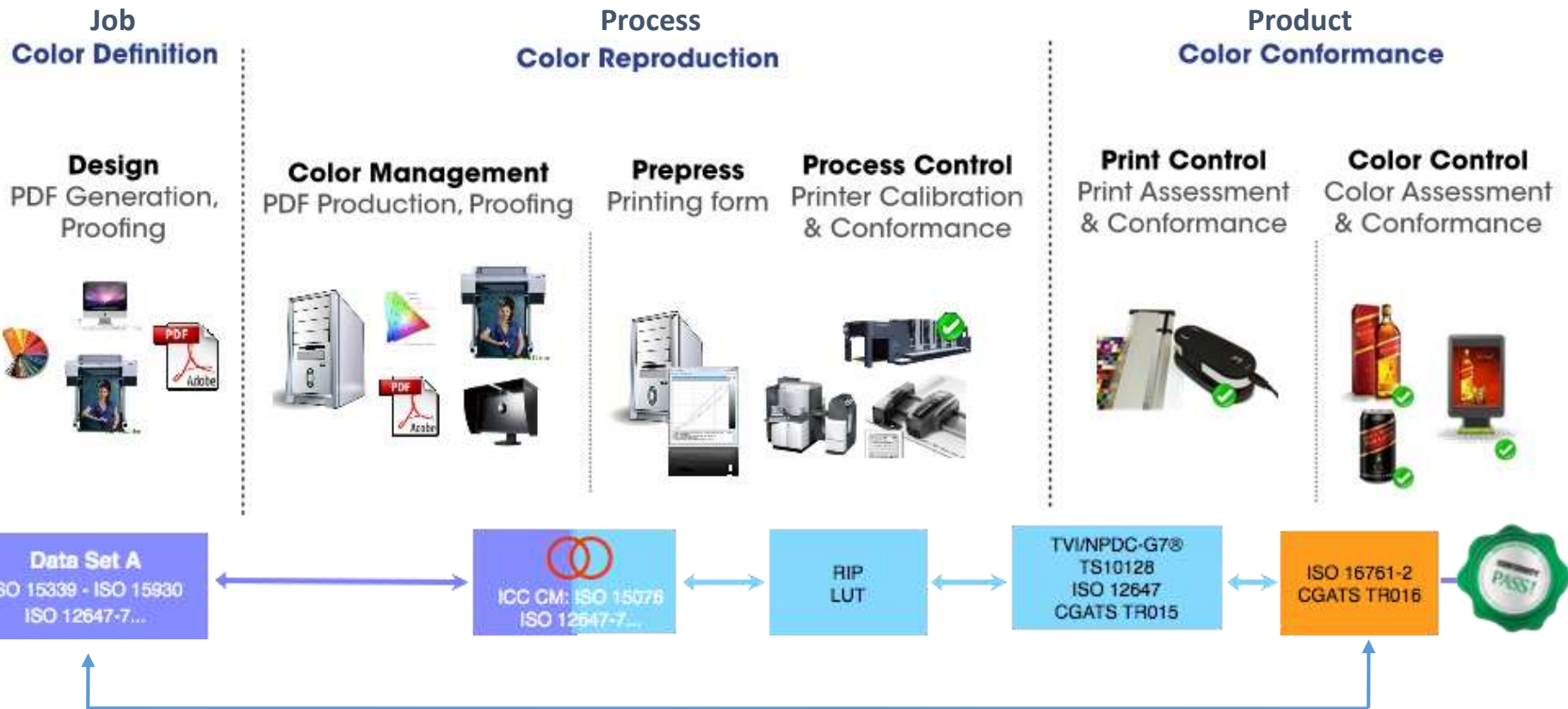
- ΔE_{ab} , ΔE_{00} , CRF
- ISO 15339 data sets, Fogra...

⇒ Match between

- printer assessment
- customer assessment

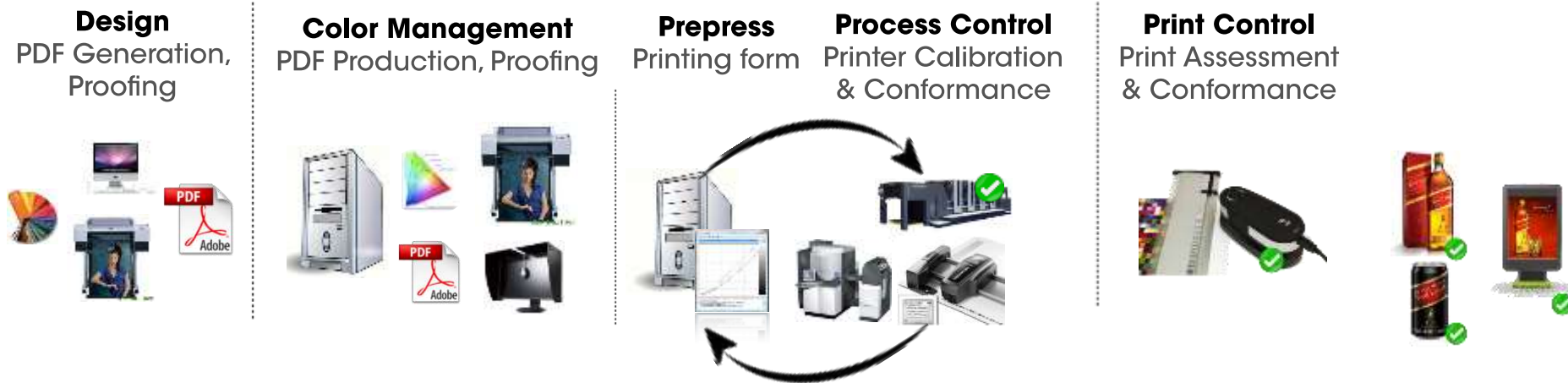


Ideal = Actual Printing Workflow



Standardized Workflows ISO 19302

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



Standardized Workflows Benefits

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

Ink < ΔE < MI

Print < ΔE

Design

PDF Generation,
Proofing



Color Preflight -50%

Proof Mismatch -50%

Color Management

PDF Production, Proofing



Process Control -50%

Ink Saving -30%

Prepress

Printing form

Process Control

Printer Calibration
& Conformance



Color Problems - - -

Customer Satisfaction +++

Print Control

Print Assessment
& Conformance



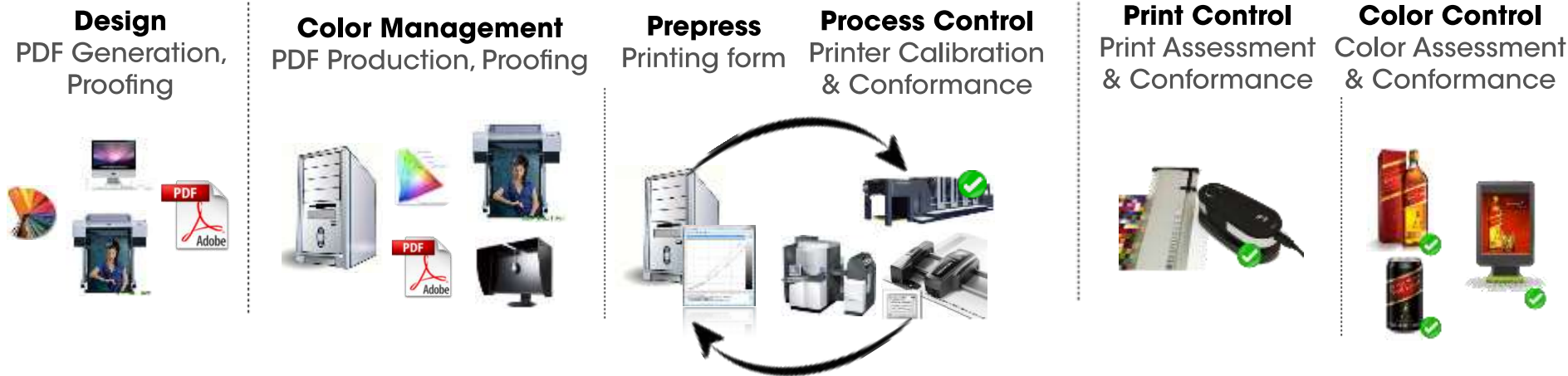
Color Control

Color Assessment
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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.



Thank You!

