



AFP Color Consortium Update – XPLOR 2006

Reinhard Hohensee, IBM

Tim Lynn, Elixir

Don Maxwell, Crawford Technologies

Joerg Schmidt, Oce

Jean Aschenbrenner, IBM

Carlo Sans, Xerox

Topics



- **Introduction – Reinhard Hohensee; IBM**
 - **AFP benefits for transaction print**
 - **Need for AFP color management - formation of AFP Color Consortium**
 - **Consortium membership, goals, and status**
 - **Components of an AFP Color System**
- **Role of color management in system components – functions, challenges, benefits**
 - **Document Formatters – Tim Lynn; Elixir**
 - **Transforms – Don Maxwell; Crawford Technologies**
 - **Print Servers – Joerg Schmidt; Océ**
 - **Printer Controllers – Jean Aschenbrenner; IBM**
 - **Printers – Carlo Sans; Xerox**
- **Summary**
- **Q & A**

AFP Benefits



- ❑ AFP has long been the de-facto standard for monochrome transaction print because its technical foundation is tailored to the requirements of this industry:
 - **Object-oriented format** supports parallel processing and data stream manipulation
 - **Architected error detection, reporting, and recovery** supports print integrity
 - **Outboard formatting** supports print re-purpose without changes to application printfile
 - **Centralized resource management** supports automatic, efficient, non-redundant resource processing
 - **High print speeds** supported by fast text, graphics, image objects and management of recurring resources
- ❑ As industry moves toward color, need to extend AFP to optimally support highlight color and process color

To make AFP a truly color-capable architecture, need to add color management



- AFP color architecture (developed in 2000) lacks ICC-based color management
- Customers demand accurate colors regardless of output device
- Customers demand consistent colors across multi-vendor configurations and workflows
- To protect significant color investment, products must be based on open standards
- Many companies provide AFP products, need broad buy-in to have an industry-wide solution

***** Solution: Develop AFP color management architecture in an open manner with industry partners and competitors = AFP Color Consortium *****

Current AFP Color Consortium Membership (27)



- **Document Composition & Resource Creation:**

- Cincom
- COPI
- DocuCorp
- Document Sciences
- Elixir Technologies
- Exstream Software
- GMC Software Technology
- Group 1
- Inventive Designers
- Isis-Papyrus
- Metavante
- PrintSoft
- StreamServe

- **Servers & Transforms**

- CDP Communications
- Compart Systemhaus
- Crawford Technologies
- Emtex
- MPI
- Solimar Systems
- Xenos Group Inc.

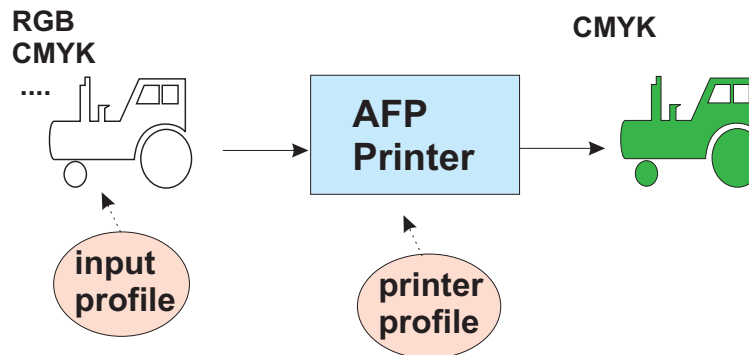
- **Printers & Controllers**

- IBM
- Intermate
- Kodak
- Lexmark
- Oce
- Xeikon International
- Xerox

Objectives of AFP Color Management:

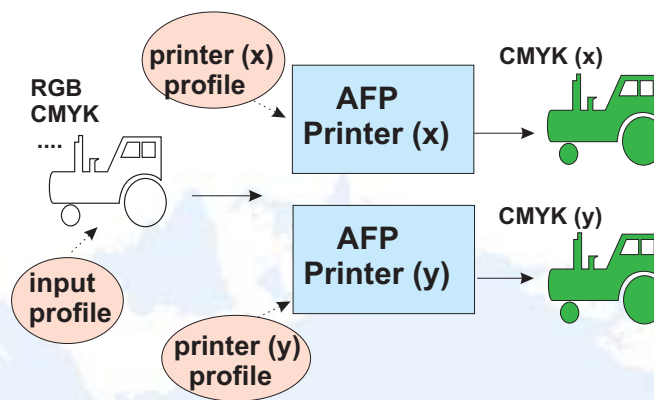


- **Accurate** output color if input color properly defined



- **Standards-based** (ICC) architecture

- **Consistent** output color and grayscale simulation on different devices driven by different applications



Objectives of AFP Color Management (Cont'd):



- **Tunable** output color



AFP
Printer

halftone
(x)



halftone
(y)



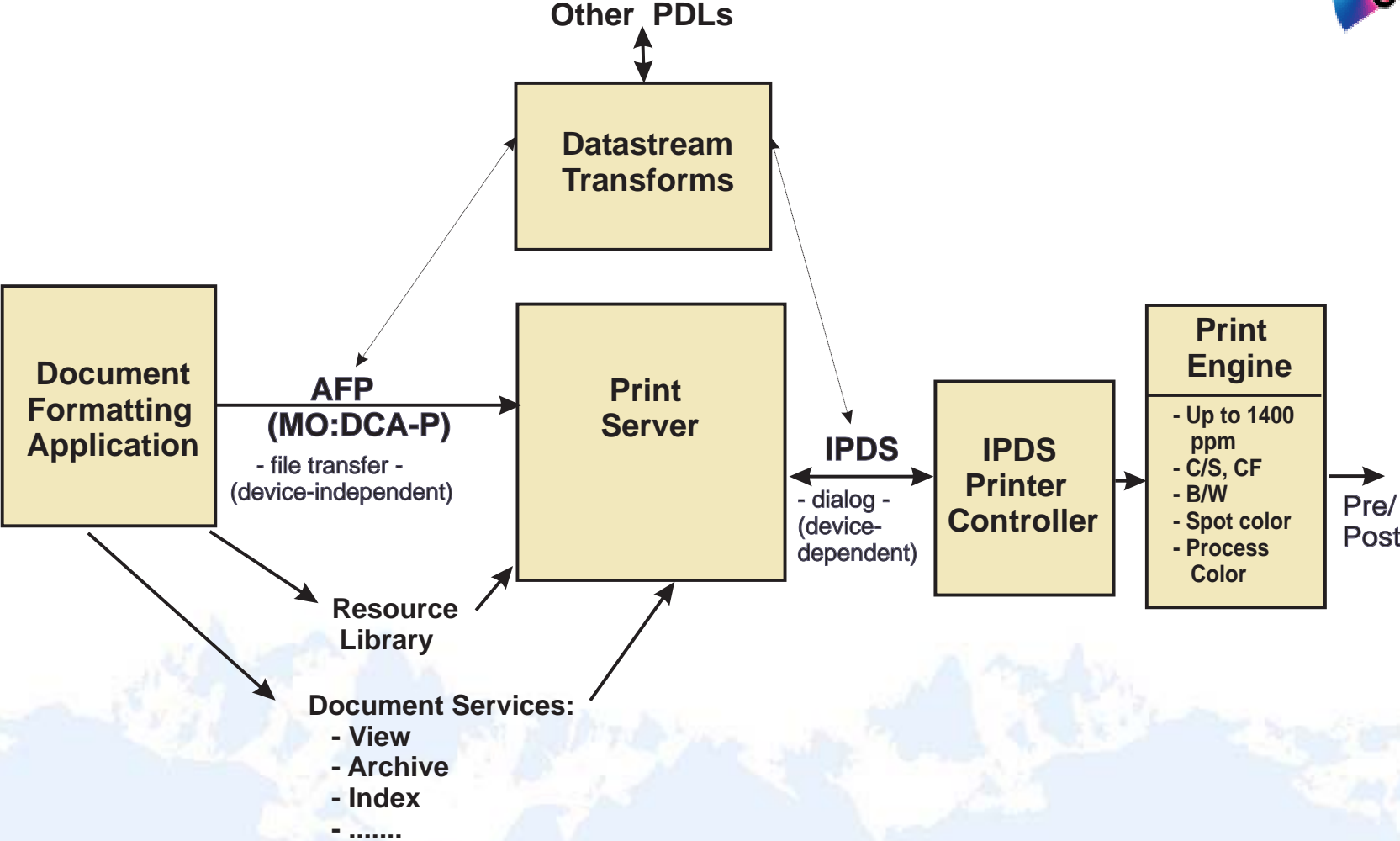
- **High-speed** output color:
integrate ICC profiles as
AFP resources to leverage
performance gains from
AFP resource
management

Status of AFP Color Consortium work



- Invitation process started in summer 2004
- AFP Color Consortium announced Oct. 26, 2004 at XPLOR
- Each member has one vote; approval is by majority
- Five meetings in Boulder in 2004 - 2005
- Reached general agreement on architecture July 22, 2005
- Held validation/feedback sessions with selected customers 9/20/05; feedback largely positive
- First release of architecture was formally approved January 20, 2006
- Consortium web site at *afpcolor.org* contains AFP Color Management Architecture White Paper and other consortium information
- Remainder of architecture will be published 1Q06

Major components of a typical AFP system



Document Formatters

Tim Lynn, Elixir Technologies



❑ Background

❑ Elixir's experience with the Consortium

- A unique opportunity
- Truly a collaborative effort
- Seeing all sides: “A rising tide lifts all boats”

Document Formatters - Functions



Document formatting involves two key areas in the document production process – Design and Composition

□ Design

- **Document layout and data merging rules**
- **Color specification**
- **Page objects**
- **Proofing**

□ Composition

- **Merge data using design rules**
- **Access resources**
- **Construct document stream**

Document Formatters - Challenges



What are the challenges document formatters face in a full-color environment?

□ Our Mission

- **Facilitate the design of data-driven documents**
- **Generate documents that will print efficiently and with fidelity**

□ General architectural challenges

- **Anticipating what will be needed**
- **Evaluating all phases of the AFP workflow**
- **Keeping the architecture vendor-neutral**
- **Maximizing speed and efficiency**

Document Formatters - Challenges



□ Domain-specific challenges

- Accessing resources
- Creating efficient document streams
- Controlling color at the right levels
- Translating color profiles
- Ensuring portability
- Proofing accurately

Document Formatters - Benefits



The efforts of the Consortium benefit both users and vendors

- ❑ How does it help solution developers like Elixir?**
 - Builds on existing AFP framework
 - Allows use of familiar graphic arts conventions
 - Enables a more robust solution

- ❑ More importantly, what are the potential benefits to you?**
 - Preserve investment in existing AFP infrastructure
 - Use common resource formats
 - Reduce application development time and cost
 - Minimize the learning curve
 - Helps us help you

Transforms

Don Maxwell, Crawford Technologies



❑ Background

❑ Our experience with the Consortium:

- An incredibly refreshing and bold step from IBM to open up the architecture to others (including competitors) before publishing!
Way to go!
- A forum to discuss challenges and expectations with colleagues who are at the same point in the learning curve

Transforms - Functions



Convert a file from one page description language to another

- Specific to the consortium, it is:
 - AFP to anything
 - AFP to PCL, PostScript, Xerox metacode, PDF
 - Anything to AFP
 - PCL, PostScript, Xerox metacode, PDF to AFP

Document Enhancement

- Add / remove data from the page
- Postal Sort
- Extract information off the page for indexing, web delivery
- Split a large run into tiny documents (PDF) for personal delivery

Transforms - Challenges



What are the challenges transform vendors face in a managed full-color environment?

□ Education

- **Many of us here know how to construct black and white, high speed, transaction-based applications today**
- **Few of us know how to do the same in full color**
- **Even fewer of us know about real color management, ICC profiles, device profiling and calibration**

- **It's going to take a while to get everyone up to speed.**

Transforms - Challenges



- ❑ How many buttons and knobs do we expose to our users?
 - Too few → removes ability to tweak an application
 - Too many → and they will be overwhelmed by all of it
- ❑ The choice of included object (IOB) types that is architecturally supported vs the number (and the types) that are actually supported by printers, transforms, print servers, etc
 - There is no mandatory list of object types you must support to claim you do AFP color
 - I would recommend TIFF and JFIF as a minimum so that there is consistency across the industry
 - Make sure all your vendors know what you expect/require!

Transforms - Challenges



- ❑ **Incompatibility between print streams.**
 - **PostScript uses Color Space Arrays (CSAs) and Color Rendering Dictionaries (CRD) which predate ICC profiles, but can be converted to ICC profiles (Acrobat Distiller does it)**
 - **PDF – uses ICC profiles for color management**
 - **AFP – uses “wrapped” ICC profiles, but there are some twists for performance**
 - **PCL doesn't do color management**

Transforms – Benefits



- ❑ (Color) Benefits are no different than for B/W transforms:
 - Ability to load balance / backup different (color) printer types and PDLs
 - Corporate buy-out, each corporation using different (color) print methodologies
 - To allow all (color) print (of different types) to go through a single (color) print architecture for single management, accounting, capacity planning, etc (consolidation model)
 - Distribute and print to (color) device of different type
 - Convert (color) to web-based delivery formats (PDF)
 - Store (color) output in an archive system that may not support the same PDL as your print infrastructure
- ❑ But color management is a requirement for color print stream interoperability

What Transform vendors need to do to support AFP Color Management:



❑ Converting ***FROM*** AFP:

- Handle all CMR resources “without barfing” – Consortium term!
- If the target print stream supports color management
 - Convert the CMR into the color management scheme of the target, if possible
 - Passing along AUDIT CMR information – “tell me about the images”
 - Otherwise, strip out the color management information, and pass the image along

What Transform vendors need to do to support AFP Color Management:



❑ Converting ***TO*** AFP:

- If the source print stream supports color management, and can be converted to an AFP CMR, then create the appropriate CMRs
 - Audit information as a base
 - If the device type and model is known, then perhaps even generate the instruction CMRs

Print Server

Joerg Schmidt, Océ Printing Systems



□ Océ's Motivation

□ Print Server Functionality

- Major component of an output management architecture
- Manages jobs designed for output to reach their destination
- Controls the data and information flow
- Enables access to the various devices
- Provides optional content and device make ready
- Supports integration of transformations, pre-viewing and proofing
- Extensive accounting to keep track of TCO
-

Print Server – Challenges in Color Environments



□ Mission

- Deliver the data in FPC and HLC to the respective devices
- Provide opportunities to improve the color quality if the data do not fit to the requirements
- Provide consistent color quality over all output devices

□ General architectural challenges

- Manage the increased amount of data
- Drive the output devices in full speed
- Support the new AFP workflow including Color Management
- Manage the required resources
- Data stream and device independent architecture

Print Server – Functions Affected by Color



- Wide range of well known functionality
- What needs to be enhanced for color support?

- Job Reception
 - Preflight including CMR's
 - Data Normalization without changing CMR's
- Preview and Proofing in HLC or FPC
- Content Make Ready
 - Image Improvements
 - Color Management for quality improvement
 - Trapping if not provided by the output device
- Device Make Ready
- Output Back-Ends

Print Server – Efficiency of Work



❑ 3 level of data input

- Content (layout/data) and device (printer/finishing) ready – ideal case
- Content ready – requires additional device make ready
- Unknown (any data) – requires content and device make ready

❑ 3 ways to create data

- Custom programmed
- Standard Desktop Publishing and Transactional Print programs
- Vendor specific application tools

❑ To achieve maximum color quality

- Publish programming rules (best practice) for PDL creation
- Publish best practice how to use DTP / TP programs
- Publish best practice how to use vendor tools

Print Server – It is all about Efficiency



Conclusion

- ❑ Transactional Printing must be done in a cost effective way
- ❑ Data input with different quality levels affects TCO
- ❑ Be in control of all workflow steps or your costs increase
- ❑ That is what AFP CC stands for!

Printer Controllers

Jean Aschenbrenner, IBM



□ Color Management Resource (CMR) Architecture

- IBM started CMR development
- Changes to MO:DCA, IPDS, IOCA, ...
- New tower: CMOCA → Color Management Object Content Architecture
- AFP Color Consortium – revised, refined, added to, blessed

□ Advantages of AFP Color Consortium

- Members share different directions and experiences
 - PS/PDF; calibrating output; user-control
- Diverse areas of expertise: application design → print
- Sharing enthusiasm!!!! Confirmation!!!!

Printer Controllers - Functions



- ❑ Use CMRs to interpret input and to create output
 - Select the CMR to use from the hierarchy
 - Process the selected CMRs
 - Use Link Color Conversion CMRs to speed performance
- ❑ Determine if the CMR is applicable
 - Correct color space
 - Media-matching
- ❑ Do error-handling and reporting for color management
- ❑ Supply CMRs to servers
 - ICC profiles for output color conversions
 - Device-specific CMRs to replace Generic CMRs

Printer Controllers - Challenges



Performance

- Color conversion and halftoning are compute intensive
- Re-use ripped objects efficiently

Customer satisfaction – in your own hands

- Education of customer so that you use the CMR you need

Color management information may be embedded within objects

- Determining how internal info interacts with CMRs
- Link CMRs must be created

Media matching – can this CMR be used?

- OK if media is completely specified in CMR and it matches
- OK if not specified in CMR at all
- Options if it is partially specified or doesn't completely match

Printer Controllers - Benefits



- ❑ **The printer controller knows how the input was created**
- ❑ **Output controlled knowing printer/media characteristics**
 - **Printer selects best instruction CMRs (defaults)**
- ❑ **The user can control the ‘look-and-feel’ of the output**
 - **Done in the printer controller, not just in the server**
 - **At OBJECT level: photos vs. graphics**
 - **Use calibration and rendering intent**
- ❑ **Performance: improved by Link Color Conversion CMRs**
- ❑ **Highlight colors can be mixed using Indexed CMR**

Print Engines and AFP Color Management Architecture



- ❑ Presenter: Carlo Sans, Xerox Corporation
- ❑ Xerox involvement in the AFP Color Consortium

Print Engines - Role of Print Engines in ACMA



- ❑ Last step on imaging the pages !!!

Print Engines – Key Attributes



- Color Gamut
- Halftoning
- Resolution
- Image Quality (IQ) consistency
- Reliability
- Media support
- Finishing capabilities (built-in and in-line)
- Speed

Print Engines - Challenges



- Print Engines are electro-mechanical devices
 - Maintaining good and consistent IQ for long periods of production requires sophisticated and fast control mechanisms
 - IQ and reliability may be impacted by environment
 - Highest IQ in full color may impact speed

Print Engines – ACMA Benefits for Users and Vendors



- Based on standards (ICC profiles)**
- Leverage current printing technology (laser, inkjet, etc...)**
- Designed to evolve with printing technology**
- Consistent output color and grayscale simulation on different devices**