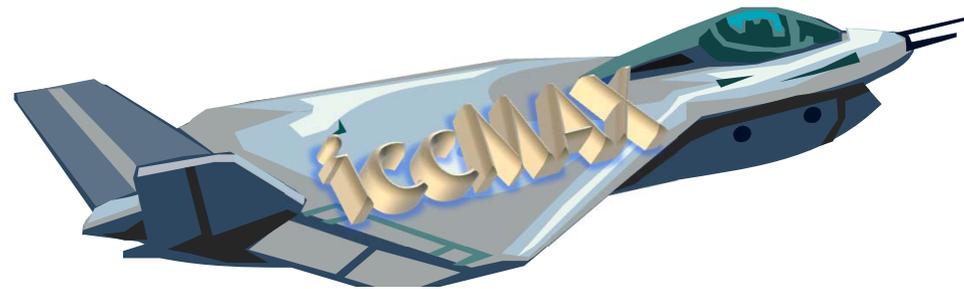DevCon 2016

# iccMAX: Overview and Motivation

**William Li**
**Kodak**

# What…

iccMAX takes off where v4 ends…

2 related but different profile formats.

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# Current Colour Management

ISO 15076-1:

- ❏ v4 ICC profile
- ❏ Defines data container format for colour management interchange.
- ❏ Widely used around the world in many, predominantly graphic arts workflows.
- ❏ Widespread adoption in commercial and academic software.
- ❏ First introduced to public in 2003 by ICC.
- ❏ Very successful at spreading colour management.

**So why change?**

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ICCMAX: OVERVIEW AND MOTIVATION

# What is v4 Good For?

- Viewing and colour matching under standard lighting conditions similar to D50.

- Enabling colour tuning in colour managed workflows.

- Providing standard container for specifying colour interchange.

- Enabling cross-platform, vendor-neutral consistent colour in graphic arts applications.

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# Motivation for Change

- Basic assumptions of ICC v4 profiles limit applications.
    - D50/2° colorimetric PCS (profile connection space)
    - Colorimetric, not spectral connection space
    - Diffuse uniform illumination assumption
- Structure of ICC v4 unsuitable for some lightweight workflows.
- Desire to open colour management platform and stimulate new development beyond ICC members.

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# iccMAX: High-Level Overview from Bottom Up

**Connection Space Extensions**
- Spectral profile header extensions
- Profile Connection Condition (PCC) tags
- PCS Transforms
- Sparse matrix encoding
- Material Connection Spaces

**multiProcessingElements**
- 1-D Look Up Tables (LUTs)
- Matrices
- N-dimensional LUTs
- Calculator element
- ICC Color Appearance Model element
- Tint Array element

**Hierarchical tag types**
- Named Color Tag Array
- Support for angular dependencies via Bidirectional Reflectance Distribution Functions (BRDF)
- *Profile Sequence Information*

**Other Extensions**
- Color Space Encoding profiles
- Gamut Boundary Description encoding
- *Color Measurement (CxF) tag encoding*
- *UTF8 text & UTF16 encoding*
- *Additional Numeric Array Types*

**CxF**

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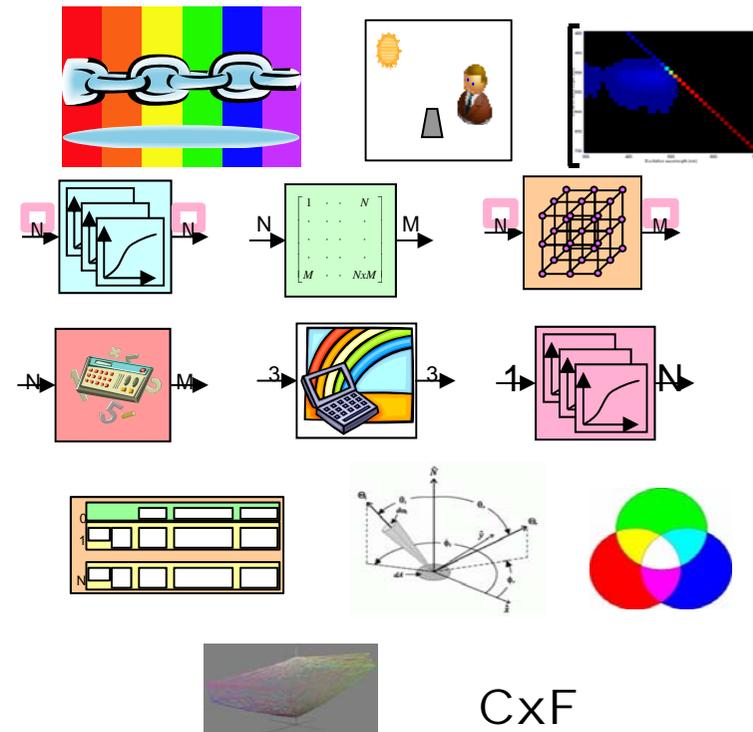
## iccMAX vs. v4

- iccMAX profiles have same header + tag structure as v4 profiles, but:
    - Different values possible in header.
    - Some retained tag types from v4, some new tag types.
    - Some v4 tag types deprecated.
    - New color space types, PCS types, data tags.

- iccMAX CMMs generally intended to use v4 profiles, but v4 CMMs will not need to be compatible with iccMAX profiles.

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# iccMAX Connections

iccMAX supports five types of inter-profile connections

- **Named Color connections**
  - Provides relationship between named colors and colorimetric, spectral as defined by header PCS fields as well as optional BRDF information
  - Can be linked with colorimetric and spectral connection tags
- **Colorimetric Connections** (How does an observer see it?)
  - Connection provided by B in A2Bx/B2Ax transform tags
  - Can be linked with both Colorimetric and Spectral connection tags
- **Spectral Connections** (What is its relationship to light?)
  - Connection provided by B in D2Bx/B2Dx transform tags
  - Can be linked with both Colorimetric and Spectral connection tags
- **Material Connections** (What is it?)
  - Connection provided by M in A2M0, M2A0, M2B0, and M2A0 transform tags
  - M2B0 tags can be connected to B2Ax Colorimetric connection tags
  - M2S0 tags can be connected to B2Dx Spectral connection tags
- **BRDF Connections**
  - Profile transforms provided in BRDF tags

Either Colorimetric or Spectral tags (or both) can be defined in the same profile

Input class profiles can optionally include Material (A2M0) tag in the same profile

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ICCMAX: OVERVIEW AND MOTIVATION
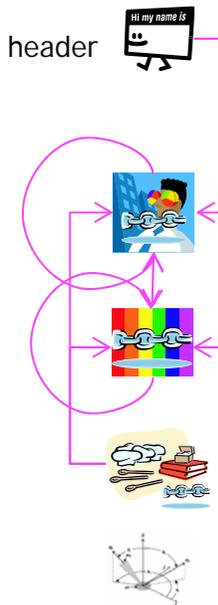
# Small Profiles

- Color space profiles
- N-color profiles

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# Material Connection Profiles

- Fine Art
- Histology

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# Spectral Profiles

- Named Color
- Lighting

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# BRDF Profiles

- Color by Direction

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# Why iccMAX?

- **Physical Goods:**
  - ❑ Multi-illumination colour management
  - ❑ Spot colour embedding
  - ❑ Internet sales
- **Medical:**
  - ❑ Histology
  - ❑ Telemedicine
  - ❑ Diagnostics

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# iccMAX Development Approach

- ## Open source development
  - Reduced risk for individual adopters.
  - Improved access to leading research for level playing field.

- ## Flexible architecture
  - Different application-specific form factors: not "one size fits all" but "many sizes fit all".
  - Reduced implementation cost for adopters, limited to solutions for particular industries.

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# What Next?

- ## ISO 20677
  - Full iccMAX specification.
  - On ISO development track.

- ## ICS Development
  - Interoperability Conformance Specification.
  - Describes subset of iccMAX for specific feature set.

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- **Adoption**

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