



# **iccMAX Interoperability Conformance Specifications**

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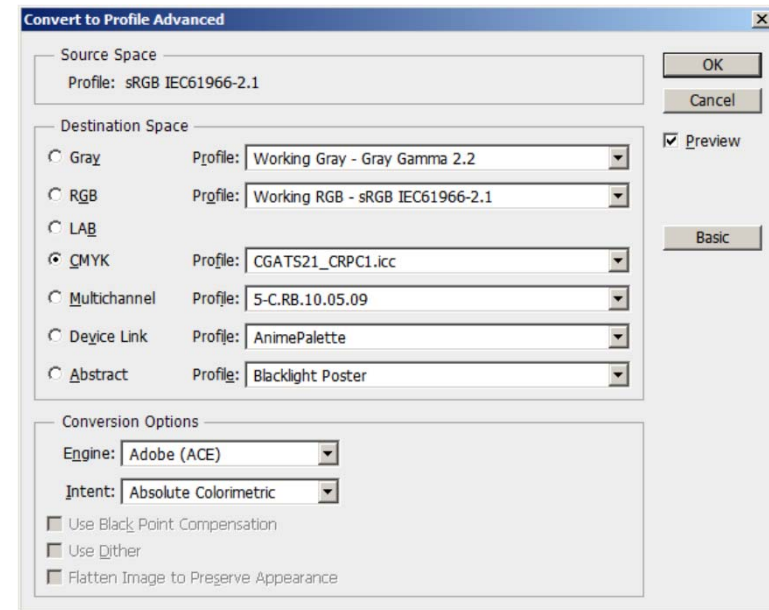
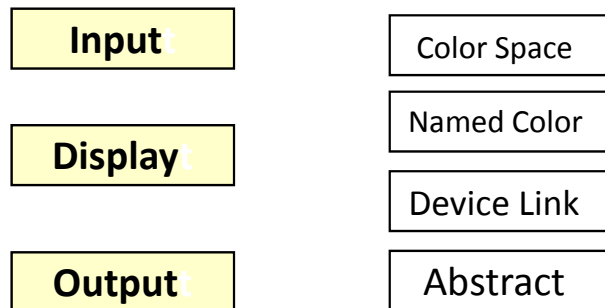


# Outline

- What is an ICS?
- Who will use an ICS?
- How is an ICS used?
- Who writes an ICS?
- What goes into an ICS
- How is an ICS approved?

# What is an ICS?

ICC.1 defines 7 profile classes



- Each profile class is associated with a different set of required tags
- Profile creation software, applications and CMMs commonly support a sub-set of these 7 classes
- Input, Display, Output + optionally Color Space, Named Color, Device Link, Abstract

# What is an ICS?

ICC.2 takes this concept a step further

In any given workflow, only a sub-set of the tags available in the complete iccMAX specification will be needed

An ICS defines the required sub-set of tags needed for the workflow

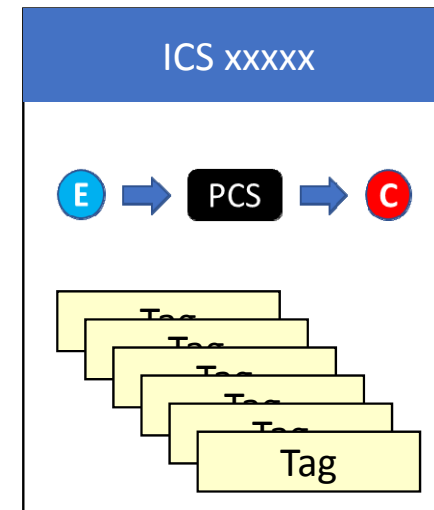
An ICS is a restriction of ISO 20677



# What is an ICS?

An ICS also defines connection scenarios:

- PCS
- Profiles that can be connected to
- Connection type (e.g. colorimetric, spectral,...)
- Rendering intents
- PCC override



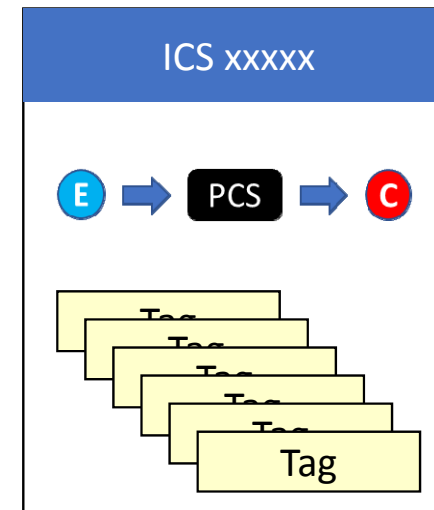
# What is an ICS?

## Connection scenario implementation

Profiles defined by an ICS can participate in *any* scenario identified by the ICS

General purpose CMM's should provide implementation support for *all* scenarios of a supported ICS

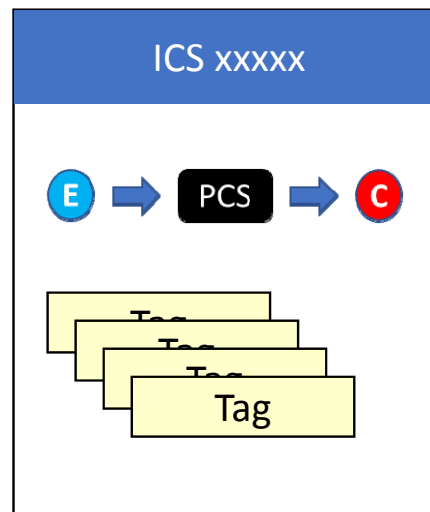
An application only needs to support the scenarios from an ICS that are *relevant* to the application



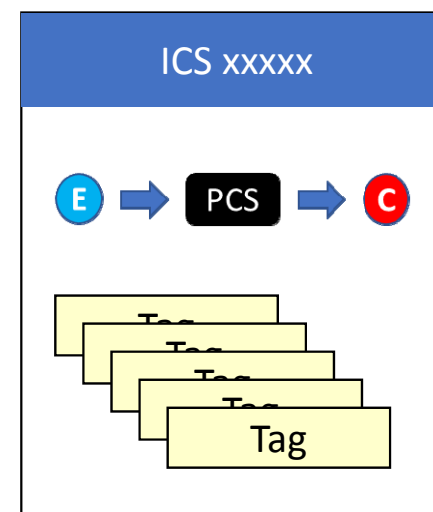
# What is an ICS?

An ICS may have multiple parts

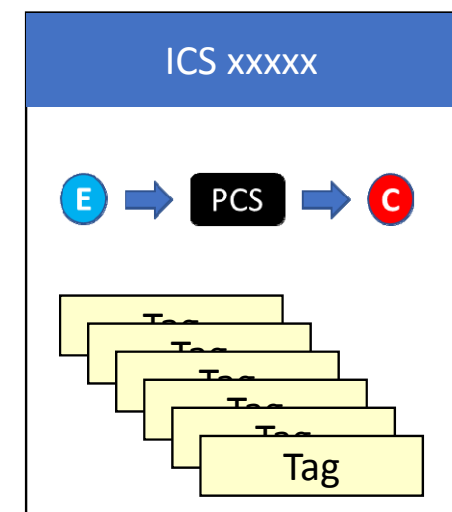
- Different parts can define different levels of workflow scenario and CMM controls
- This enables organisations to choose whether to support more complex features of ICC.2, such as the Calculator element



ICS xxxxx Part 1



ICS xxxxx Part 2



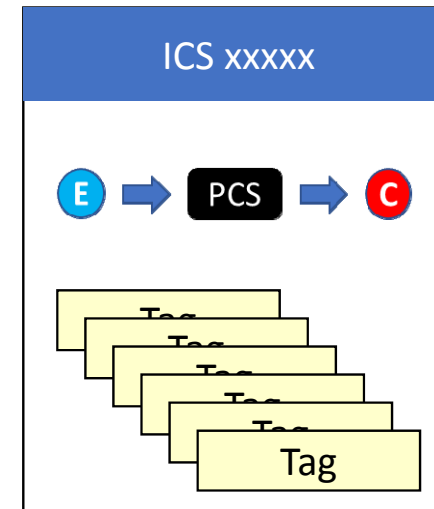
ICS xxxxx Part 3



# What is an ICS?

An ICS defines conformance requirements for profiles and CMMs

An ICS gives confidence to all parties that the different workflow components are compatible, interoperable and will deliver the expected results





# What is an ICS?

## Example:

- An application is developed to address a colour management need that cannot be addressed in ICC.1
- The application developer prepares an ICS to enable profiles to be created that will work seamlessly with the application
- Profile creation software developers can choose to support this ICS, and to indicate this option to users
- Users can select workflow components that identify their conformance with the ICS

# Who will use an ICS?

Trade bodies

Profile creators

Application developers

Users

CMM developers

# Who will use an ICS?

## Trade bodies

Can coordinate workflows across an industry sector

Can set conformance requirements for participating companies

Can simplify user education

Can ensure interoperability across the sector

# Who will use an ICS?

Profile creators

Can target specific markets

Can rely on an unambiguous definition of how a conforming profile should be built

Have guidance on selection options to provide to the user creating profiles

# Who uses an ICS?

Application developers

Can leverage technology of profile creator to provide workflow solution

Can rely on an unambiguous definition of how a workflow can connect data channels

Have guidance on selection options to provide to the user creating profiles

# Who uses an ICS?

## Users

Can select workflow components from different sources with assurance they will interoperate

Can avoid trial and error when building a workflow

Can promote conformance with relevant ICS in marketing

# Who uses an ICS?

## CMM developers

Can build a CMM to support a given application without having to support all data channels, profile classes, tags and operations in ICC.2

Can use ICS in conjunction with example profile(s) and ReflccMax to verify correctness of output

Can choose the level of CMM controls and element support to provide to the user

- E.g. may opt to omit or support more complicated aspects of ICC.2 in situations where there is a concern about profile or implementation security



# What goes in an ICS?

An ICS has multiple sections:

- Scope, normative references and definitions
- Use case
- Workflow
  - Connection requirements
- Profile sub-class requirements
  - Required and optional tags
- Conformance
  - Conformance conditions for profiles and CMMs

# What goes in an ICS?

## Use case

- Domain of application
  - e.g. Graphic Arts, Medical Imaging, Displays,...
- Intended use
  - High-level description of area of application for ICS

# What goes in an ICS?

## Workflow

- Channels to be connected
- One or more profile sub-classes whose tags are defined
- One or more profiles not defined in the ICS but that represent possible connections
- One or more workflow scenarios showing connection sequences and associated control parameters



# What goes in an ICS?

## Workflow

- Channels to be connected
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Profile	CMM Control Parameter	Value
E	Rendering Intent	Any
	Transform Type	Colorimetric
	PCC Override	None
C	Rendering Intent	Any
	Transform Type	Colorimetric
	PCC Override	Any

Example from ICS-Colorimetric Part 1

# What goes in an ICS?

## Profile sub-class requirements

- Tag names
- Signatures
- Required content

Tag name	Signature	Required content
AToB1Tag	'A2B1'	LutAtoBType or multiProcessElementType using any combination of curveSetElement, matrixElement, CLUTEIment, extendedCCLUTEElement, and tintArrayElement
BToA1Tag	'B2A1'	LutBtoAType or multiProcessElementType using any combination of curveSetElement, matrixElement, clutElment, extendedClutElement, and tintArrayElement
customToStandardPccTag	'c2sp'	multiProcessElementType containing a single 3x3 matrix element
standarToCustomPccTag	's2cp'	multiProcessElementType containing a single 3x3 matrix element
spectralViewingConditionsTag	'svcn'	Structure defining observer, illuminant and (optionally) surround

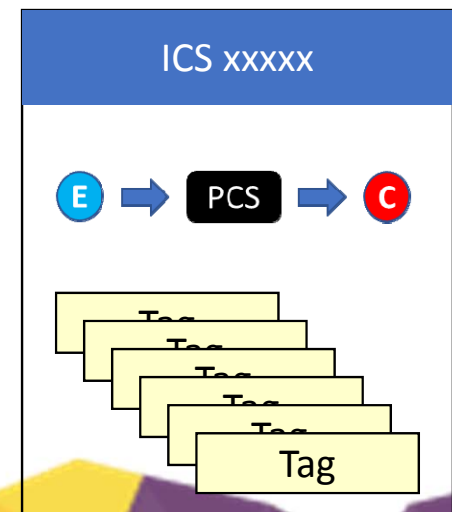
Required tags example from ICS-Colorimetric Part 1

# What goes in an ICS?

## Conformance

Identifies conditions for conformance of profiles and CMMs

- Profiles
  - Channels
  - Header
  - Tags
- CMM
  - Tag support
  - Results obtained



# What goes in an ICS?

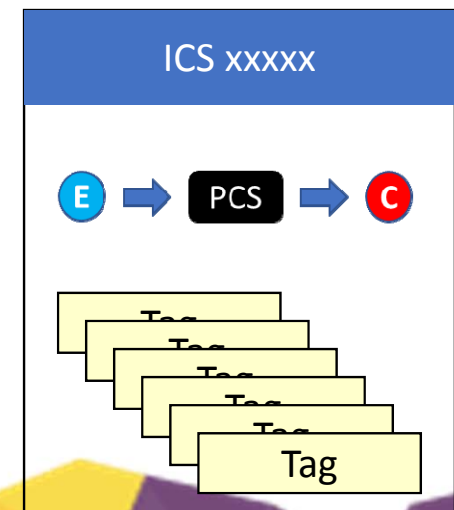
## Example profile

For any ICS there must be one or more example profiles available that conform to the ICS

A corresponding xml file can be provided

- or can be generated using lccToXml

The example profile can be used in conjunction with the demo implementation ReflccMax to provide benchmark results for test and verification purposes





# Who writes an ICS?

ICC envisages that ICS documents will be developed by bodies such as:

- Trade associations
- Application developers
- Profile makers
- Developers of workflow tools
- ICC

# Who writes an ICS?

Guidance is available to ICS developers

- ICC White Paper 54: An Introduction to Interoperability Conformance Specifications
- ICS page on color.org gives guidance: (<http://www.color.org/iccmax/ics.xalter>)
- Draft core ICS examples (<http://www.color.org/DevCon/devcon2020/workshop/DRAFT-Basic-ICS-Workflows.zip>)
- Making Connections with iccMAX ([http://www.color.org/iccmax/connecting\\_with\\_iccMAX.xalter](http://www.color.org/iccmax/connecting_with_iccMAX.xalter))
- Advice on connection scenarios, ICS preparation and standardization (contact the ICC Technical Secretary)

# Approval

- An organisation developing an ICS can submit it to ICC for approval
- ICSs will be approved by the Steering Committee (via a review and ballot of SC members)
- Organisations may also choose to submit an ICS to ISO (or other standards body) for adoption as an international specification or standard
- Timescales for approval vary, but as a rough guide:
  - 3 months for review and ballot by ICC (assuming no changes are needed)
  - 24 months from first submission to final publication by ISO

# Approval

## ICS Registry

- ICC will maintain a registry of approved ICSs for the convenience of the colour management community
- Submission to the ICS registry will be on a similar basis to the ICC Profile Registry
  - Submitters provide ICS document, example profiles and other metadata
  - Submitters warrant they have title to any IP and accept ICC patent policy
  - Registration is free
  - ICC hosts registered content on color.org ‘in perpetuity’

# Current status

ICS documents currently in technical review by ICC

- Colorimetric (Parts 1-3)
  - Supports different PCS, illuminants and observers
- Spectral Reflectance (Parts 1-2)
  - Supports spectral and colorimetric connection
- Extended Output (Parts 1-2)
  - Supports connection of spectral and colorimetric data to print
- Extended Range (Parts 1-3)
  - Supports HDR

# Summary

- An ICS defines a subset of ISO 20677 for a specific application
- An ICS may be a multi-part document with different levels of element support
- An ICS also defines workflow scenarios, CMM control parameters and conformance requirements
- Any organisation can develop an ICS and submit to ICC for approval and registration

# Thank you!