International Color Consortium

Workflow Working Group

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Chiba University

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Workflow WG Charter

- To identify a small number of the most commonly used workflows
- To recommend effective ways for applications to use ICC profiles
- To recommend improvements to the specification, or implied architecture, in order to make the workflows more efficient
- To identify where predictability and consistency are required in workflows and insure that the ICC recommendations enable them
- To recommend what procedures are required to ensure ease of use with the recommendations made
- To identify any liaison relationships that need to be established

ICC Workflow WG Introduction

- **An ICC workflow is**
  - The sequence of color encoding and color transformation steps used to process digital color information from input to output
- **In the ICC we understand that**
  - ICC profiles are used by many different kinds of users in many different workflows

ICC Workflow WG Activities

- **Develop workflow semantic models**
- **Understand the common needs of different kinds of users and workflows**
- **Entry point for ICC involvement in specific workflow issues and needs of users in particular markets**
- **Spawns specific working groups when unique user needs are realized**
  - E.g., Digital Photography WG and Digital Cinema WG formed out of initial Workflow WG activities in recent years

ICC Workflow WG Models

- **Color Control Factors Model**
  - Describes the elements in any workflow that contribute to color management quality
- **User Expectation Model**
  - Models the tradeoff between user control and ease of use
- **Workflow Functional Primitives**
  - An iconic representation of workflow elements
  - Used to represent different kinds of workflows using a common set of workflow functional primitives
  - Makes use of the Image State Model in ISO 22028-1
- **Workflow Dimensions and Patterns**
  - Models the influences important in ICC workflow design

Current Projects

- **Print Condition Tag addition to ICC Profile Specification**
  - Primary goal is to improve profile ease of use by assisting or fully automating printer profile selection
    - » Ideally the user selects paper and printer settings
    - » Profile is selected automatically [in the print path software] based on matching these settings to attributes in the profiles
  - Specific print condition attributes identify paper and printer settings for which the profile is built
  - Attributes are encoded in the profile to ensure traceability
- **ICC Usability and Application Consistency in Multi-Vendor Environments project**
  - Initiated in Fall 2006
  - COMMON USER TERMINOLOGY sub team formed to work on standard terminology for ICC related CM user interactions

ICC Workflow WG Models

Color Control Factors Model

A partitioning of color management processes that control color results
Explicitly via purposeful control
Implicitly via lack of control
These 7 color control factors can be examined in any digital color system

- **For types of users, regions of the world, markets**
  - Visualization
- **For each device**
  - Device Calibration
  - Characterization
  - Color Aim Definition

Understanding human visual color preferences

Controlling and modeling the device

Fitting human visual color preferences into the capability of the particular device

Color Control Factors Model

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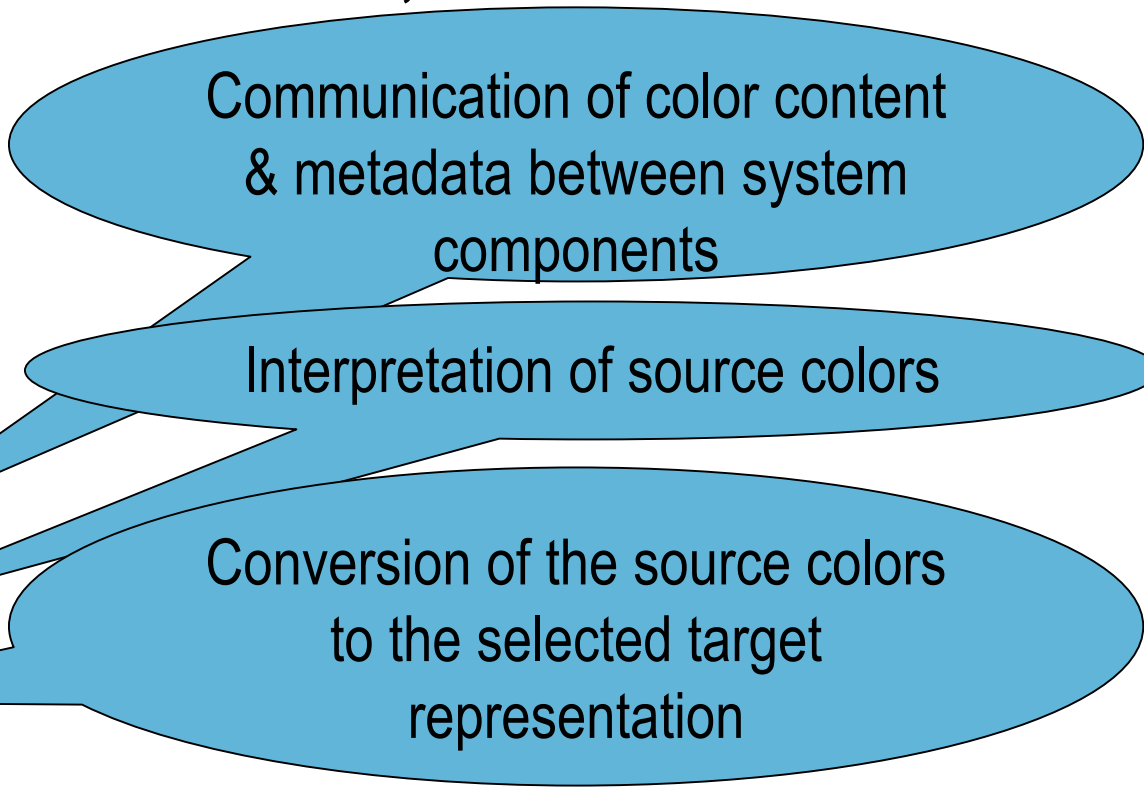
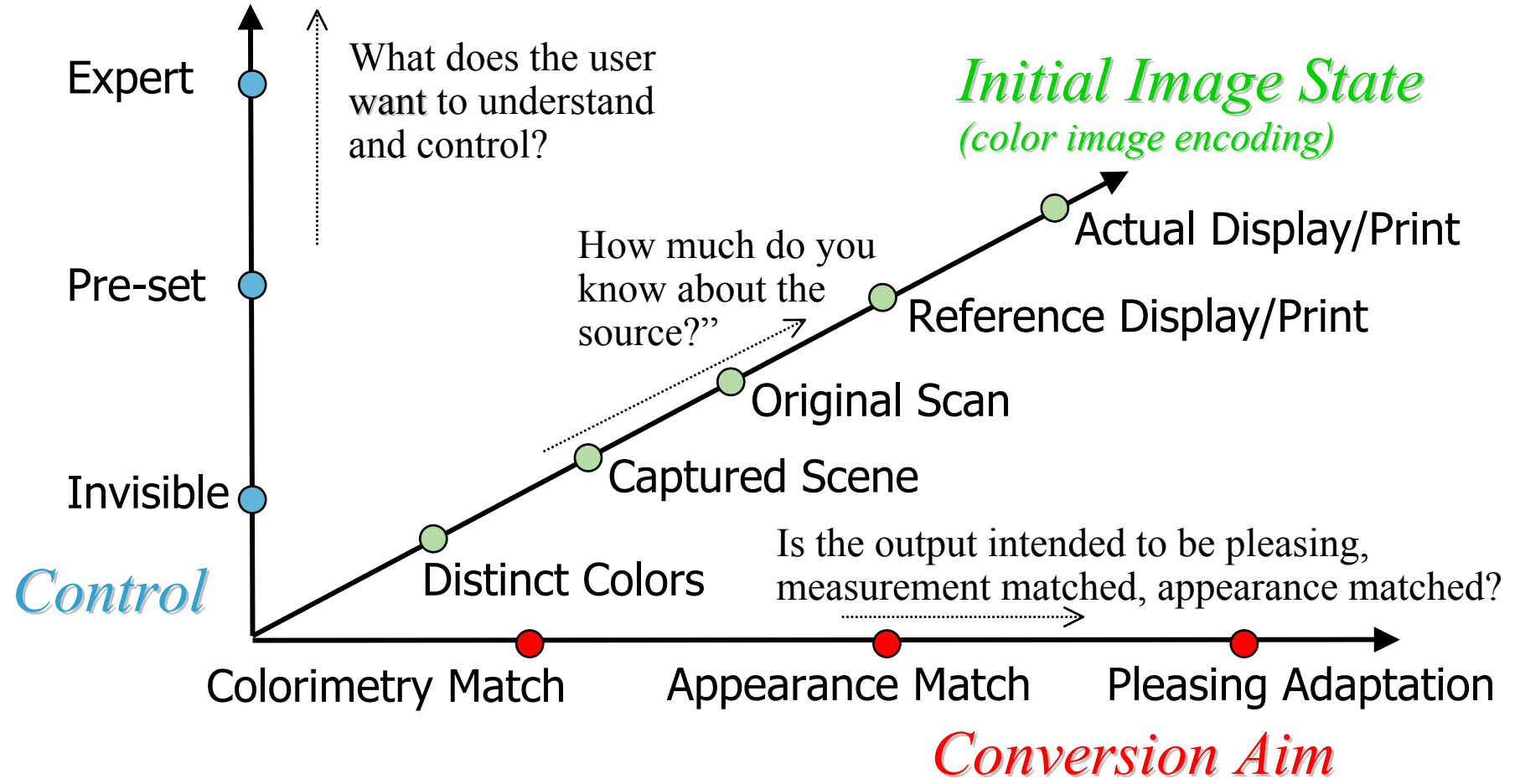
- **For types of users, regions of the world, markets**
  - Visualization
- **For each device**
  - Device Calibration
  - Characterization
  - Color Aim Definition
- **For the system**
  - Communication
  - Interpretation
  - Conversion



User Expectation Model:

Three dimensions of color management complexity



User Expectation Model:

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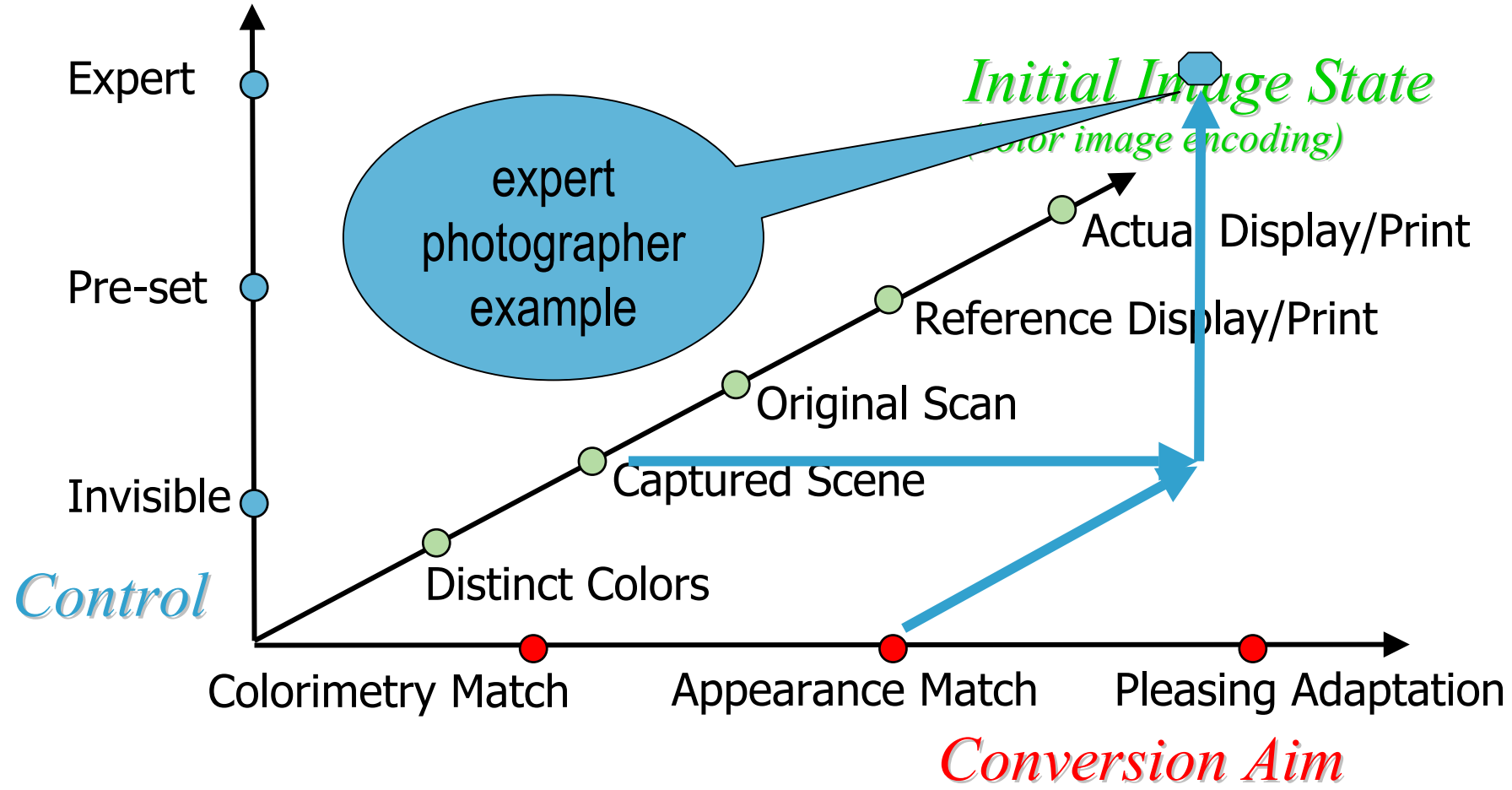
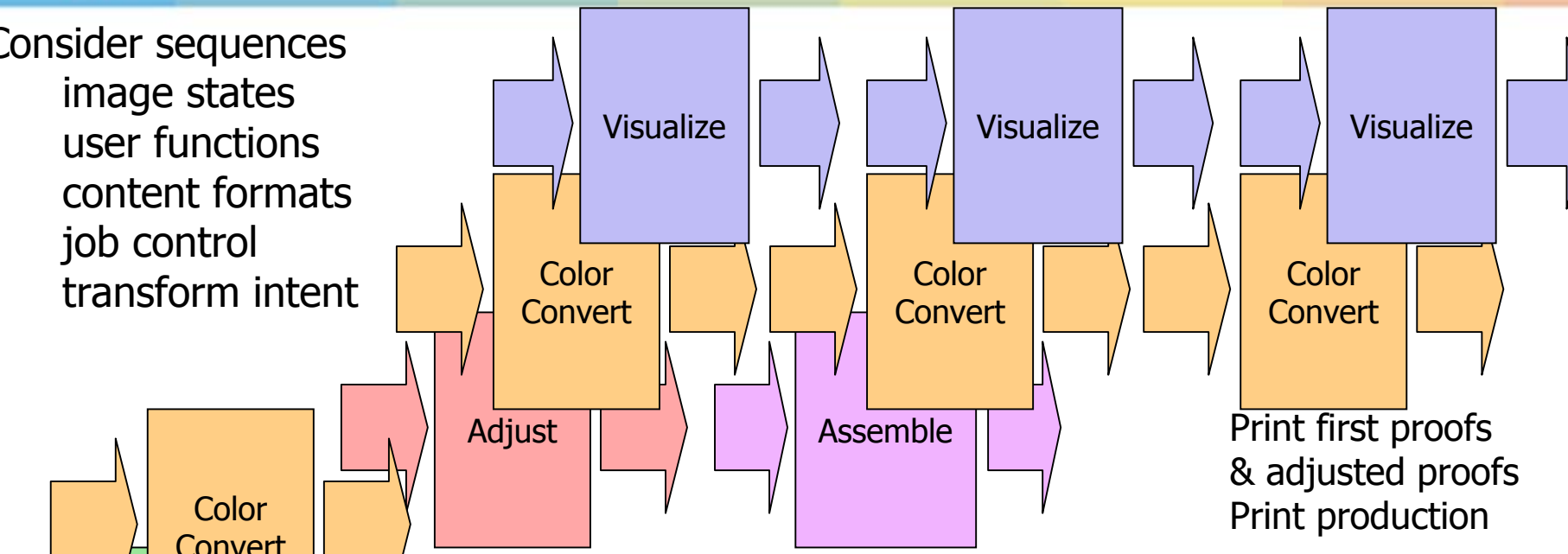


Workflow Functional Primitives

Consider sequences
image states
user functions
content formats
job control
transform intent

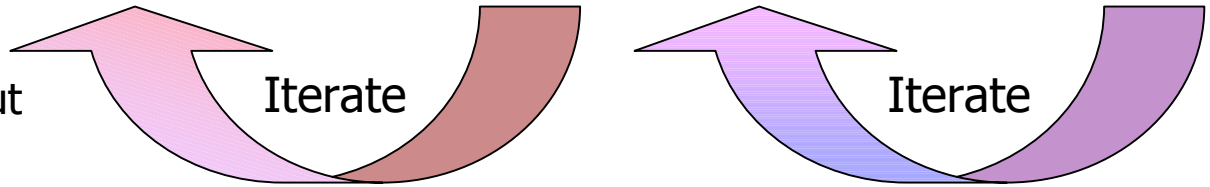


Print first proofs
& adjusted proofs
Print production

Adjust RGB objects
Visualize softcopy

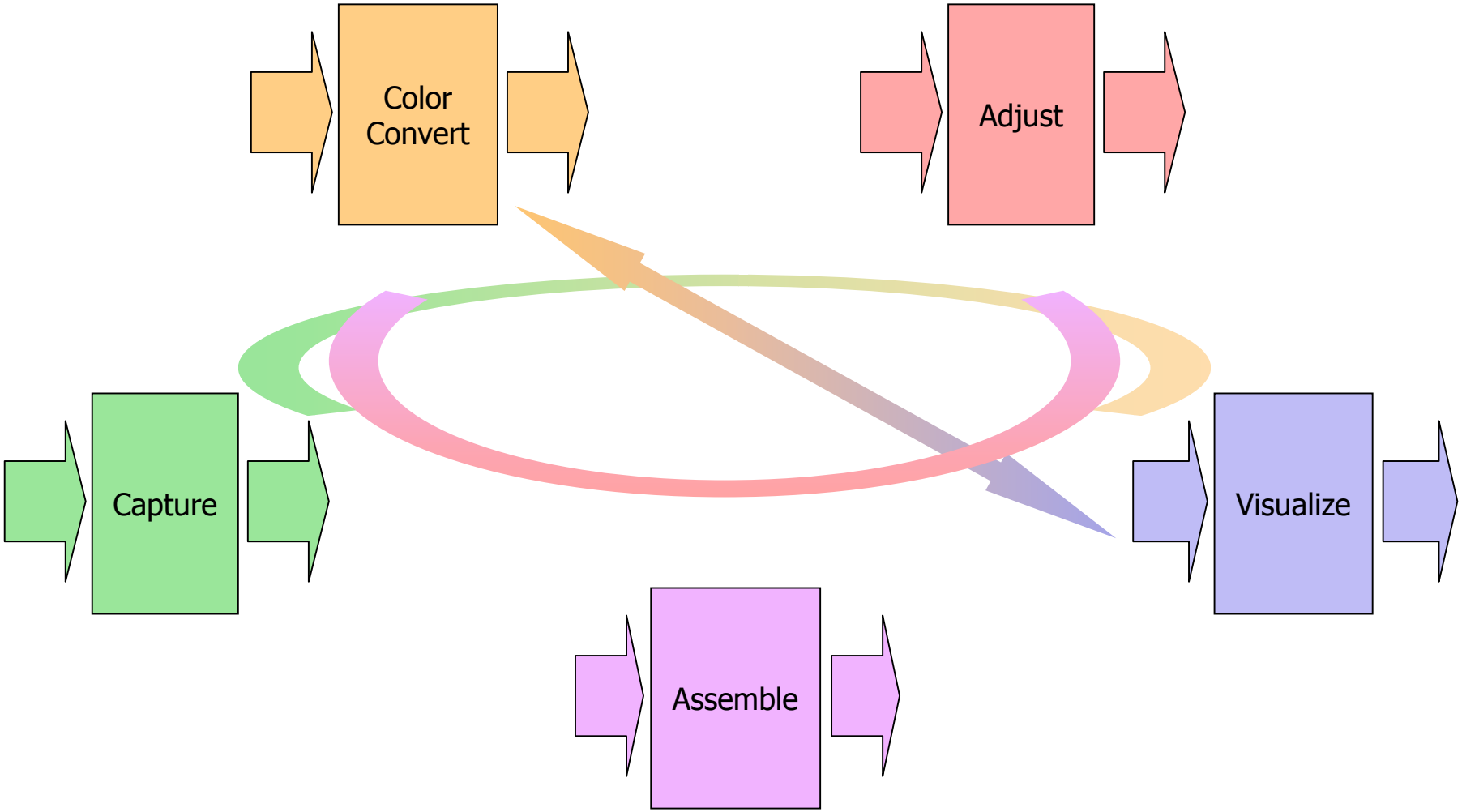
Create layout
Select objects
Normalize formats
Combine objects
Softproof layout
Configure job

Capture originals
and
Color-Render to Wide Gamut
Standard RGB



Workflow Functional Primitives

Differentiated according to color management role



Workflow Dimensions and Patterns

- What comprises a unique workflow and what differentiates one from another?
- “Use cases” can tell us at a high level what a user wants to accomplish
- The next level of workflow detail is needed in order to derive color management requirements

For example:

- Is ‘capture’ being done by a creative expert user or by a document production worker? Digitized for a single use? For open-ended use?
- Is adjustment intended to improve the match to the original? Or intended for artistic effect?
- Is the print intended to match the original? To be an enhancement? Defaulted to a “generic” look and feel? Targeted to a special viewing environment?

Workflow Dimensions and Patterns

- **Image state**
- **Image encoding**

} *Attributes of each content element*

- **Workflow step**
- **Function allocation**

} *Attributes of the physical workflow system*

- **Content control owner**
- **User involvement**

} *Attributes of various users*

- **Conversion intent**
- **Conversion method**

} *Variables in the conversion process*

- **Mechanical state**
- **Defined content hierarchy**

} *Complex attributes of the content dealing with content relationships*

These dimension models build on the previous models

Thank You

Additional detail has been published on the ICC website

[http://www.color.org/info_profiles2.html]

and in IS&T EI2006 Image Quality and System Performance III, 6059-18