

# CIE TC 8-05: Communication of Colour 1<sup>st</sup> Technical Committee Meeting

26<sup>th</sup> March, 1999

## MINUTES

### Attendees

Lindsay MacDonald, University of Derby, UK, Chair  
Todd Newman, Canon, USA, Director OF CIE Division 8  
James King, Adobe, USA  
Robert Buckley, Xerox, USA  
Steven Swen, Apple Computer, USA  
Ronnie Luo, University of Derby, UK  
Naoya Katoh, Sony, Japan, Chair CIE TC 8-04  
Philip Green, London College of Printing, UK  
Kevin Spaulding, Kodak, USA  
Osvaldo da Pos, University of Padua, Italy  
Hiroaki Sugiura, Mitsubishi, Japan  
Anthony Johnson, London College of Printing, UK  
Danny Deroo, Barco, Belgium  
Tad Yoshida, Canon, Japan  
Tim Kohler, Canon, USA  
David McDowell, Kodak, USA  
Mike Wilsher, FujiFilm Electronic Imaging, UK  
Sabine Süssstrunk, EPFL, Switzerland

### Apologies

Michael Stokes, Hewlett-Packard, USA  
Maureen Stone, StoneSoup Consulting, USA  
Gary Starkweather, Microsoft, USA  
Alastair Reed, Symbolic Sciences, Canada  
Klara Wenzel, Coloryte, Hungary

### 1. Terms of Reference

Todd Newman, Director of CIE Division 8, introduced the Terms of Reference for TC 8-05, as approved by the CIE Board of Directors:

*To standardise a minimal set of techniques that enable unambiguous and efficient communication of the colour information in images. Two fundamental approaches will be addressed:*

- 1. The association with the image data of additional data that describes the colour space of the image data.*
- 2. The representation of the image data in a standard colour space.*

*The standard will also define a minimal set of standard colour spaces that addresses a wide range of imaging applications. Whenever possible, existing standard colour spaces will be used in preference to creating new ones.*

Todd Newman presented his view of the goals for the new Technical Committee:

- Unambiguous
- As few standard spaces as possible
- Compatible with existing software

And possible solutions:

- Device-specific ICC profiles exactly match an actual device;
- Generic ICC profiles match a prototypical device;
- Standard spaces may be based on a prototypical device or the human visual system.

It was noted that the goal of “compatible with existing software” might actually be more of a constraint than a goal. Tony Johnson suggested that the TC should take more of a theoretical approach; getting the results to work with software might be trivial. Todd Newman replied that the presented goals were his own interpretation, and not part of the CIE-approved terms of reference. Lindsay MacDonald noted that although compatibility might be highly desirable, it should not be binding for the work of the TC.

Jim King asked what the differences were between the first two “possible solutions”. Tony Johnson raised the question of whether defining device-specific colour spaces is even necessary, because they might become outdated when devices change. His interpretation was that the TC was formed in order to define a PCS. Todd Newman replied that defining a PCS is only one possible outcome. The question was raised whether there is a need for both device specific spaces and interchange colour spaces.

Jim King observed that the word “image” is exclusive, because non-bitmapped objects, such as text and graphics should also be included. Tim Kohler replied that “image” does in fact include these elements. A long discussion ensued about whether defining a more general term would be appropriate, as the committee is interested in an all-inclusive strategy. Todd Newman noted that the terms of reference couldn't be changed without approval from the CIE Board of Directors.

Tony Johnson suggested that the committee should define one device independent colour space and associated procedures for dealing with it. Tim Kohler recommended that we should look at all the existing colour spaces and choose a few for standard industry practices. Steve Swen asked who would use the recommended colour space(s) and whether the committee had enough expertise to define colour spaces for all imaging applications, such as television and graphic arts.

Steve Swen asked if the committee would also define how to associate colour data with image data. Todd Newman replied that defining the exact mechanism should be left to the ICC. It was pointed out that number 1 of the terms of reference seems to imply that the TC will at least report on the issue. Lindsay MacDonald said that the final recommendations should avoid specific implementation details, as far as possible. It was pointed out that the minimal requirement of the TC is to define criteria on how to select a standard colour space for a given application. Tony Johnson proposed that the committee should also look at encoding options, and how to associate colour with them.

Jim King suggested that the terms of reference might not reflect the true purpose of the committee, because committee members seem to have different opinions of what the TC should accomplish. Ronnie Luo reported that there is a widely-accepted model of how any CIE TC should operate: A theory is developed, and then technical experiments are conducted to test it. Technical evidence is always necessary to convince industry that CIE recommendations are sound.

## 2. Objectives

In order to clarify the *raison d'être* of the TC, committee members went through the exercise of writing down the objectives they felt the TC should address, subsequently grouping them into six categories. The following table was developed:

A	What's there already	<ol style="list-style-type: none"> <li>1. Catalogue all existing colour spaces used in imaging</li> <li>5. Define techniques for describing colour spaces</li> <li>6. Develop a taxonomy of colour representations/spaces</li> <li>11. Define reference (prototypical) devices</li> <li>14. List the standards organisations that would be able to use our output</li> </ol>
B	How well does it works (evaluation)	<ol style="list-style-type: none"> <li>3. Develop evaluation criteria for colour spaces</li> <li>2. Evaluate the usability for data exchange of all colour spaces catalogued in (1)</li> <li>4. Test colour spaces identified in (1) in typical applications</li> <li>8. Classify suitability of applications for each colour space</li> <li>10. Define procedures for evaluating the effectiveness and accuracy of image encoding techniques</li> <li>13. How to encode an image in n-bits</li> <li>15. Use technical evidence to support recommendations</li> <li>20. Find a way to test the efficiency of a colour space for communication</li> <li>21. Make image archivists happy (reduce the number of colour spaces).</li> </ol>
C	What isn't addressed	<ol style="list-style-type: none"> <li>9. Define procedures for handling data (transforming between a colour space and an encoding space)</li> <li>12. Define colorimetric conversion</li> </ol>
D	How can it be improved	<ol style="list-style-type: none"> <li>17. Create a wish list for the perfect colour space(s)</li> </ol>
E	Recommendation	<ol style="list-style-type: none"> <li>7. Recommend colour spaces for existing technologies/applications and for future ones</li> </ol>
F	Other	<ol style="list-style-type: none"> <li>16. Do something CIE-like, i.e. authoritative</li> <li>18. Include other graphic objects besides raster "images"</li> <li>19. Provide for multiple classes of images</li> </ol>

### 3. Questionnaire

As first step, a catalogue of all colour spaces in use by imaging applications should be compiled. A questionnaire should be made available on the CIE web site for open commentary. Tony Johnson proposed to add simple questions such as: What colour spaces do you use? What do you use them for? What do you like about them? What don't you like about them? What data format do you use?

Tim Kohler offered to set up and maintain the TC web site at the address <http://www.colour.org/tc8-05/>. He suggested that, in addition to the web site, each committee member should be responsible for getting in-depth feedback from particular industry segments/applications (e.g. graphic arts, television, motion pictures, medical imaging, remote sensing, computer graphics, etc.). One good way of gathering information would be to identify an expert in each domain, who could provide most of the information directly. All professional societies (IS&T, SID, SMPTE, SPIE, OSA, IEEE, ACM and TAGA) should also be approached through their Vice-President for Technical Affairs. The questionnaire should also be disseminated through suitable electronic news groups (e.g. CVNet)

Mike Wilsher observed that the current draft questionnaire (document 1\_3) is too much oriented to encoding. Lindsay MacDonald agreed to rewrite the questionnaire to be posted on the web site, and send the URL to Dave McDowell within a week. Dave McDowell will publicise the URL of the questionnaire in the standards section of the upcoming *IS&T Reporter* (to be published on April 20th).

The following dates were established:

- Lindsay MacDonald will send the URL of the web site with the revised questionnaire to Dave McDowell before April 2<sup>nd</sup>;
- The web site has to be up by April 20<sup>th</sup> (Publication of the *IS&T Reporter*);
- Lindsay and Todd will delegate tasks (industry segments) to TC experts by April 30<sup>th</sup>
- TC experts' analysis of specific industry segments/applications due by early July;
- Catalogue of different colour spaces to be done by early September;
- Preliminary analysis on the criteria for colour space evaluation ready by Meeting in Scottsdale.

### 4. ROMM\_RGB Proposal

Kevin Spaulding of Kodak presented the proposal for a Reference Output Medium Metric RGB (ROMM\_RGB) colour space. This is intended to be used for performing manipulations on images that exist in a *rendered image state* and has a large enough colour gamut to encompass most common output devices. It is defined in a way that is tightly linked to the ICC profile connection space (PCS). Discussion on this proposal was curtailed because time was running short, but it will be considered as a serious contender in the list of candidate colour spaces to be considered by the TC for adoption as a standard.

### 5. Next Meeting

The next meeting of CIE TC8-05 will be held at the Color Imaging Conference in Scottsdale in November, 1999.