

CIE TC8-05 meeting  
April 13, 2000, Derby, UK

Attendees:

Peter Bodrogi, bodrog@almos.vein.hu (observer)  
Rob Buckley, rbuckley@crt.xerox.com (member, chairman)  
Byoung-Ho Kang, bhkang@etri.re.kr (observer)  
Lindsay MacDonald, L.W.MacDonald@ziggy.derby.ac.uk (member)  
Hideto Motomura, motomura@mrit.mei.co.jp (observer)  
Todd Newman, todd.newman@cisnc.canon.com (member)  
Charles Poynton, poynton@poynton.com (observer)  
Klaus Richter, klaus.richter@bam.de (observer)  
Kevin Spaulding, kevin.spaulding@kodak.com (member, technical secretary)  
Mike Wilsher, mike.wilsher@jjei.co.uk (member)

- Welcome by Rob Buckley, and review of agenda

1. Intros & Expectations
2. Overview & Status
3. Terms of Reference
4. Working Group Reports
5. CIE Experts Symposium
6. Next Steps

1. Introductions around the table

- Review of expectations of committee members

- The group was in general agreement that we hope to develop a plan for delivering the experiments/studies needed to produce the results according to the terms of reference. This would include assigning specific research/analysis tasks. Mike Wilsher's expectation was coming up with suggestions on coding images, including what works and what doesn't, supported by an analysis of the data.

2. Rob reviewed the status report recently submitted to CIE TC8. There was also some discussion about the relationship between the work being done by this committee and that being done by other standards organizations. Invite other standard organizations to work with us.

- The CIE Experts Symposium was covered in the status report, which was sent to reflector. The symposium is planned for Scottsdale, Arizona on Saturday, November 11, 2000--the day after the CIC 2000. The theme of the symposium is the communication of color information, i.e. this committee's work. Because of the timing, papers are being invited or solicited for the symposium, although a couple of slots have been reserved should their be an unsolicited proposal or a late-breaking development. The Symposium agenda will include time for an open discussion.

- Hideto Motomura reviewed the work being done by “J-CIE” (Japan CIE) which has been formed to provide input from Japanese companies to topics relevant to the CIE. JCIE has had one meeting so far. The Director of JCIE D8 is Prof. Yaguchi of Chiba University. Motomura-san was encouraged to solicit input from the J-CIE group relative to the work being done by this committee.

- Membership in CIE TC8-05 was discussed. To this point, everyone who has ever come to a meeting has been included on a list of “members” but it is not clear how many of them intend to be actively involved. There was a desire to get a more accurate list of official members. We will ask the current list of “members” whether they would like to be official members. We may also want to solicit specific individuals who we believe can contribute to become advisors. National bodies should also be invited to suggest members.

3. Rob reviewed the terms of reference, and initiated a discussion of whether the current activities are heading in the right direction to fulfill these terms. It was suggested that we should evaluate the preliminary list of criteria against the terms of reference--do they contribute to "unambiguous" and "efficient." There was extensive discussion of what is meant by “unambiguous” and “minimum set” etc., as well as what applications the solution would need to apply to. As a path forward, this group can continue to develop the criteria, and then work with other standards groups to evaluate the criteria against their requirements. One suggestion was to also document the requirements for “unambiguously” specifying color (i.e., what parameters (metadata) are necessary to convert color signals to color appearance, etc.) The application of the criteria to a set of candidate color spaces would result in a report documenting their strengths and deficiencies. The procedure for evaluating the criteria against color encodings that are identified in the future. This is what users want: there are too many color spaces, not a small set, narrow down the number to meet our (and presumably their) criteria.

**Agreement on TC Outputs: Focus on technical report, containing:**

1. Metadata

- "reference" viewing environment
  - not the same for all spaces/applications
- do for areas where we have the expertise
- not tied to (different than?) CIECAM 97s
  - may be getting into cross-media reproduction, which has previous work.

2. Color space metrics

- For given criteria
- Metric = Number + Procedures
- How are using metadata

3. Commentary on Color Spaces

- Include deficiencies
- Objective = fact-based
- The kind of stuff that usually isn't written up in a standard or specification

4(a) Report from Terminology Working Group.

- Mike Pointer was unable to attend, but he spoke to Kevin Spaulding earlier in the week to give a status report. His suggestion was to take the draft report that had been generated and pass it on to CIE TC8-06, which is tasked with defining terminology. Peter Bodrogi passed on some comments from Janos Schanda, the chair of TC8-06, describing what they are working on, and inviting participation in that group. Lindsay MacDonald indicated that he would be participating; so did Rob. It was agreed to pass on our report, and request that we be kept apprised of their progress with periodic reports. As we become aware of new terms that need to be defined, we can pass requests on to that group.

4(b) Report from Criteria Working Group:

- Kevin Spaulding, WG lead, described the need for reviewing (and pruning) the preliminary list of criteria, with a view to eventually attaching weights according to applications. The list from the March 1999 Derby meeting needs to be checked to make sure the criteria there are captured on the preliminary list. Todd believes there are criteria that are directly related to the terms of reference, and others that aren't, such as compatibility with common workflows. There are many detailed issues to be considered, for each criterion, that we will not have time enough to adequately discuss today. A brief discussion of each criterion yielded the comments shown in Appendix A.

4(c) Report from Color Space Working Group:

- Skipped so that we could spend more time on evaluation criteria.

5. CIE Experts Symposium

See No. 2.

6. Next Steps & Action Items

Action Items:

Todd will ask to password ILV on the TC8-05 web site

At CIE Board Meeting, Todd will bring up posting an HTML glossary on public web site (provides content but not look--where does the value lie?)

Next TC meeting will be in November, 2000 in Scottsdale, possibly in conjunction with the CIE Experts Symposium.

Respectfully submitted, Kevin Spaulding, technical secretary

## Appendix A: Group Comments on Evaluation Criteria (posted on web site)

### **Gamut volume**

- If Delta E can vary by a factor of 4 across color space, the cube can vary by a factor of 64! Is there a better “uniform color space” for computing gamut volumes?
- Using CIELAB means you have chosen an illuminant, i.e. it is illuminant dependent. Can it be otherwise?

*Aside:* be consistent about use of Delta E

- using a color difference metric for reporting color volume?

### **Dynamic Range**

- Remove as separate item—possibly move headroom to encoding part, rest goes with gamut volume
- Headroom-important to not?
  - An encoding issue? Need info beyond what can be represented in output image
  - Do we need “footroom” to go with headroom?
- What about metallic colors?

### **Quantization**

- IIA Measure for an enumerated set? 18 CIE colors, defined where? Mononumerosis—a single number will not capture subtleties and possibly significant variations within the color range.
- Effect of noise? It can mask quantization errors. Use computer-generated images?
  - Audio example: deliberately adding a half-bit of noise before AD converter; performance spec looks worse, but audio sounds better
- How many bits do you need to reduce worst case jump to below threshold, per some Delta E

### **Visual Uniformity**

- Related to quantization.
- Is Delta E 94 a good measure of uniformity?
- How uniform is CIE 2000?
- If we are going to measure uniformity, we need some metric?
- Lightness uniformity—automatically biased against RGB-type spaces
- What does uniformity mean? Of color differences? Of visual appearance?
- Is this a coding efficiency issue? Do you have enough bits, to avoid contouring?
  - contouring could be media independent
- Munsell? OSA?
- Hue and chroma uniformity may be the first to drop.
- What problem is this solving? For example, the real issue is “do I have enough bits to avoid contouring in such and such a situation?” Develop criteria based on a list of questions such as these

### **Complexity of Transforms**

- Remove CMYK from the list-not a significant differentiator?

### **Compressibility**

- Hard to measure in the absence of a standard quality measure
- Image dependency of compression algorithm performance?  
Drop this, unless we can come up with a good measure of evaluating results?

Discussion stopped at this point due to time.

- A request was made for any others who would like to be added to the criteria working group. Todd Newman indicated that he would like to be added, and Charles Poynton indicated that he would like to be cc'd on the groups activities; Motomura-san will respond later (after May J-CIE meeting).
- We need more commitment and response from the Criteria Working Group. We had hoped to do the evaluation of some color spaces before the November meeting.