



COMMISSION INTERNATIONALE DE L'ECLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

ACTIVITY REPORT DIVISION 8

IMAGE TECHNOLOGY

March 2001

Division Officers:

Director: Todd Newman US

Assoc. Director - Reporters: Noboru Ohta JP

Editor: Mike Pointer UK

Secretary: Dave McDowell US

The officers can be contacted via the Division 8 web site: www.colour.org

Division Terms of Reference:

To study procedures and prepare guides and standards for optical, visual and metrological aspects of the communication, processing, and reproduction of images, using all types of analogue and digital imaging devices, storage media and imaging media.

This activity report represents an overview of the status of CIE Division 8 – Image Technology at the beginning of 2001; it is the first such report issued by this Division.

The Division aims to work primarily by electronic means in order to make efficient progress. This method of working has proved worthwhile and good progress is being made in several areas.

Since its inauguration in September 1998 at a CIE Meeting held in Baltimore, US, the Division has held meetings in Warsaw, Poland (1999) as part of the CIE Quadrennial meeting and in Derby, England (2000) in association with the conference *Colour Image Science 2000*. It is planned that the next meeting will be held in association with the *IS&T Color Imaging Conference* in Scottsdale, Arizona in November 2001.

There follows a summary of the status of each of the committees in Division 8 – Image Technology.

TC 8-01 Colour Appearance Models for Colour Management Applications

Year established: 1998

Terms of Reference

To study, develop, and recommend a colour appearance model based on CIECAM97s for use in digital colour management and to develop clear usage guidelines for common applications. Consideration is to be given to colour and engineering requirements for open colour management systems.

Chairman: Nathan Moroney nathan_moroney@hp.com
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TC Members

Paula Alessi (US)	Gary Dispoto (US)	Mark Fairchild (US)
Xiao-Fan Feng (US)	Robert W.G. Hunt (UK)	Hitoshi Komatsubara (JP)
Ronnier Luo (UK)	Mark Mahy (BE)	Nathan Moroney (US)
Nenad Vujovic (US)	Hirohisa Yaguchi (JP)	

Additional Listserver Subscribers

Ellen Carter (US)	John Dalrymple (US)	Sharon Henley (US)
Tony Johnson (UK)	Naoya Kato (JP)	Alan Kravetz (US)
Gabriel Marcu (US)	David McDowell (US)	Hideto Motomura (JP)
Todd Newman (US)	Mike Pointer (UK)	Kazuhiko Takemura (JP)

Working Programme

Winter 2000: Review proposed simplifications and revisions

- ?? Gather data regarding linear Chromatic Adaptation Transforms
- ?? Gather data on chroma scaling

Winter/Spring 2001: Merge and test simplifications and revisions

- ?? Select one linear Chromatic Adaptation Transform for use
- ?? Accept or reject chroma & saturation revisions

Summer/Fall 2001: Draft technical report on revisions

- ?? Incorporate modifications to lightness
- ?? Incorporate revisions to Nc for dim surround
- ?? Determine appropriate name: CIECAM97i?

Winter 2001: Final version of technical report

Progress Report

The previous revisions to lightness and Nc for the dim surround have been published and are in general use. Overall, there is general convergence on a subset of useful simplifications and revisions. The two open issues currently under investigation are the chromatic adaptation transform and the chroma scaling. Once these two issues are investigated sufficiently, the technical committee will begin to prepare a draft technical report.

Currently we are evaluating three linear chromatic adaptation models for use as a simplified chromatic adaptation model. Luo, Fairchild and Finlayson have shown that it is possible to match or even exceed the performance of the nonlinear Bradford CAT currently in CIECAM97s with a linear CAT. The current issue is deciding which of the three proposals to incorporate. We are also reviewing Fairchild's revised chroma scale and Luo's revised saturation scale. Ideally, the various proposed revisions and simplifications would be incorporated into a single revised CIECAM97s. Moroney, Fairchild and Luo are working on combining these revisions into a single model.

The next physical meeting of the TC will be on Saturday 30-Jun-2001 in Rochester, New York, following the AIC Congress.

Three documents are available on the TC8-01 web site: <http://www.colour.org/tc8-01/>

TC 8-02 Colour Difference Evaluation in Images

Established: 1998

Terms of Reference

To study and recommend methods to derive colour differences for images.

Chairman: M R Luo m.r.luo@derby.ac.uk
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TC Members

P Alessi (US)	O Da Pos (IT)	M Fairchild (US)
G Field (US)	J Gibson (US)	B Hill (DE)
R Hunt (UK)	D McDowell (US)	M Lo (Individual)
M Mahy (BE)	B Rigg (UK)	M Stokes (US)
K Takemura (JP)	J Uroz (SP)	S Viggiano (US)
H Yaguchi (JP)		

Progress report

- ?? Version 4 of the draft technical report has been distributed to TC members for comment by 15-Dec-2000. Three new studies were conducted and reported by Uroz (Derby), Song (Derby) and Gibson (RIT). It has been agreed that a web site will be established that will include all available experimental data for evaluating colour differences for complex images.
- ?? An experiment was completed by GATF and SWOP on proof verification. The data analysis is in progress.
- ?? The new Japanese standard XYZ/sRGB SCID images are available for future studies.
- ?? A set of test images will be produced based upon the JIS/SCID images. These images will be distributed between different sites for assessing their perceptibility and acceptability thresholds.

TC 8-03 Gamut Mapping

Established: 1998

Terms of Reference

Established: 1998

Chairman: Jan Morovic ??@derby.ac.uk
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TC Members

Gus Braun (US)	Bodrogi Péter (HU)	Fritz Ebner (US)
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Tony Johnson (UK)	Byoung–Ho Kang (KO)	Naoya Katoh (JP)
M. Ronnier Luo (UK)	Marc Mahy (BE)	Gabriel Marcu (US)
John McCann (US)	Ethan Montag (US)	Hideto Motomura (US)
Todd Newman (US)	Raimondo Schettini (IT)	J.A. Stephan Viggiano (US)
Geoff J. Woolfe (US)		

Progress Report

- ?? Byoung–Ho Kang has joined the TC.
- ?? A survey of gamut mapping has been accepted for publication in the Journal of Imaging Science and Technology.
- ?? A meeting of the TC was held on 14-Apr-2000 in Derby (UK). Of the 20 participants 11 were TC members and the meeting focussed on discussing the fifth draft of the guidelines – in particular the media and test images sections. In addition to this, Dr. Hideto Motomura (Matsushita Research Institute of Tokyo) gave a presentation about his GMA work. The minutes of this meeting are available at http://www.colour.org/tc8-03_14-04-2000.pdf.
- ?? A meeting of the TC was held on 6-Nov-2000 in Scottsdale (USA). Of the 6 participants 4 were TC members and the meeting focussed on discussing the eighth draft of the guidelines – in particular the workflows section that has been added since the previous physical meeting. The minutes of this meeting are available at http://www.colour.org/tc8-03/tc8-03_06-11-2000.pdf.
- ?? The current draft of the guidelines is Draft 9 and it incorporates the outcome of the Scottsdale TC meeting.

Future plans

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| ?? Complete test images section of guidelines | January or February 2001 |
| ?? Tenth draft of guidelines | End of February 2001 |
| ?? Closure of guidelines | End of March 2001 |
| ?? Run experiments | March through October 2001 |
| ?? Present results | Discuss at the next Color Imaging Conference |

TC 8-04 Adaptation under Mixed Illumination Conditions

Established: 1998

Terms of Reference

To investigate the state of adaptation of the visual system when comparing soft-copy images on self-luminous displays and hard copy images viewed under various ambient lighting conditions.

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TC Members

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Janos Schanda (HU)	Peter Bodrogi (HU)	Paula J. Alessi (US)
Klara Wenzel (HU)	Itala Kucsera (HU)	Monica Billger (SE)
Peyma Oskoui (US)	Elizabeth Pirrotta (US)	Elie Khoury (FR)

Observers

Mark D Fairchild (US) M Ronnier Luo (UK)

Working programme and time lines

Original Timeline

- ?? Sep-29-1998: New work proposal at CIE/Division 8 meeting
- ?? Until End 1998: Gather interested members/organizations and form a new TC
- ?? Until End 1999: Survey past relevant works and share a standard method and guideline for cross-examination
- ?? Until End 2000: Perform cross-examinations at different laboratories and publish a CIE Technical Report (or Progress Report)

However, as the last target was not achieved (see progress report) and so the targets is now:

- ?? Until End 2001: Perform cross-examinations at different laboratories and compare the results
- ?? Until End 2002: Publish a CIE Technical Report (or Progress Report)

Progress Report

The targets for 1999 were accomplished but the experimental work targeted for several locations during 2000, was not achieved. During 2000, the chairman provided the agreed model in the form of a spreadsheet. Sony has provided three standard images that might be used for the cross-examinations, and a color-blind test was provided by one member, Dr. Wenzel of Coloryte. For personal reasons, however, the two most active members were not able to perform the required experiments. Interest has been shown by several people from

outside the TC membership and so it is hoped that the experimental work will proceed during 2001.

TC 8-05 Communication of Colour Information

Established: 1999

Terms of Reference (from <http://www.colour.org/tc8-05/>)

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.

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TC Members

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Todd Newman (US)	Michael Pointer (UK)	Kevin Spaulding (US)
Ingeborg Tastl (US)	Klara Wenzel (HU)	

Advisors

Jim King (US)	Danny Rich (US)	Mike Wilsher (UK)
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Working Programme and Time Lines

- ?? Draft of evaluation criteria - April 2000
- ?? CIE Experts Symposium on Extended Range Colour Spaces - November 2000
- ?? Sample evaluation - April 2001
- ?? Preliminary evaluations - November 2001
- ?? Draft Technical Report - April 2002

Progress Report

A sample evaluation, including a template and procedure, is under development. It will demonstrate the application of one of the current evaluation criteria to a set of candidate colour spaces, for review by the TC prior to its next meeting. The next TC8-05 meeting has been proposed, but not yet confirmed, for around the time of the IS&T PICS Conference, April 22-25, 2001 in Montreal, Canada.

CIE Division 8 and TC8-05 organized, with support from the IS&T, CIE Expert Symposium 2000 on Extended Range Color Spaces, held November 11, 2000 in Scottsdale, Arizona and proceeding will shortly be issued: <http://www.colour.org/info/Symposium2000.htm>.

The D8 Director (Todd Newman) and CIE TC8-05 Chair (Rob Buckley) have requested a Category A liaison with the forthcoming IEC/ISO JTAB-proposed Joint Working Group between IEC/TC 100 and ISO/TC 42. The charter of this working group is expected to include extended range colour spaces. While ISO observed that the working groups themselves are not normally open to liaison (their parent bodies are), they did note the CIE interest in nominating one or more experts to participate in the future ISO/TC 42 and IEC/TC 100 joint working groups.

TC 8-06 Image Technology Vocabulary

Established: 2000

Terms of Reference

To liaise with TC 7-06 and collate definitions of terms associated with image technology.

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Members

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H Ikeda (JP)	S Laget (FR)	L MacDonald (UK)
D McDowell (US)	J Morovic (UK)	T Newman (US)
M Pointer (UK)	K Richter (DE)	J Schanda (HU)
M Stokes (US)		

Working Programme and Time Lines

Up to November 2000, work was carried out by correspondence. The Chairman has submitted parts of several terminology documents to members to consider what should be included in a technical report. At the TC 8-06 meeting in Scottsdale on 11-Nov-2000 it was decided that the TC should collect a terms and definitions and place them in a database.

Members and Liaison Persons (from ISO TCs) will send recommendations; the chairman will consolidate the material. The time-scale is:

- ?? Input to the Chairman: 2000-12-15
- ?? Circulation of database: 2001-01-31
- ?? Feed-back to the Chairman: 2001-03-15

- ?? 2nd draft: 2001-06-30
- ?? Translation of terms, feed-back: 2001-09-30
- ?? 3rd draft: 2001-12-15

Progress Report

At the last meeting in Scottsdale, Arizona, in November 2000, several further people announced interest in the work of this TC.