



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

Central Bureau: Kegelgasse 27, A-1030 Wien, Austria

MINUTES OF THE 1st MEETING OF DIVISION 8: IMAGE TECHNOLOGY

Tuesday 29th September 1998
Baltimore, USA

1. Attendance

| | | |
|-----------|--------------------|----------------|
| T Newman | Director | United States |
| M Stokes | Associate Director | United States |
| M Pointer | Associate Director | United Kingdom |

A full attendance list is appended to these minutes.

2. Apologies

| | | |
|------------|--------------------|---------------|
| D McDowell | Associate Director | United States |
|------------|--------------------|---------------|

3. Introduction

The inaugural meeting of CIE Division 8 was opened by the Director designate, Todd Newman, who welcomed everybody and explained that the meeting was, in a sense, unofficial because the balloting process to establish the new Division is still in progress.

4. Communication

The Director emphasised that the new Division was to be broad-based and would attempt to bridge the gap between industrial needs and technological answers. The Division would be required to establish liaison with many other organisations, both international standardising bodies and industrial consortia.

5. Intellectual property

It was recognised that this was an issue and that the Division would follow the policy established by the CIE Central Bureau, i.e. to follow a policy similar to that established by ISO.

6. 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.

Prof Ikeda raised the point the Terms did not include reference to the original scene. This is important in evaluating the WYSIWYG capabilities of imaging systems. This was not a deliberate omission and will be explained in an accompanying paragraph when the Terms are formally published.

To help describe the potential activities of the Division the Director showed a framework linking together various individual elements.

Communication

- └ Archival format
 - └ Active format
 - └ Standard colour space
 - └ Device profile
 - └ Aesthetic intent

Processing

- └ Gamut mapping
- └ Spectral
 - └ Required accuracy

Reproduction

- └ Device characteristics
- └ Media specific adjustments
- └ Soft proofing

Visual

- └ Appearance modelling
- └ Colour difference evaluation
- └ Region-based imaging models
- └ Viewing conditions

7. Technical committees

Each provisional Technical Committee was introduced.

TC8-01: Colour Appearance Modeling for Colour Management Applications

Chairman: Gary Dispoto

Terms of Reference

To leverage work of TC1-34 in the development and recommendation of a colour appearance model for use in desktop digital colour management. Consideration is to be given to both the colour and vision and engineering and implementation requirements for open colour management systems.

Working Programme

Fall 1998/Winter 1999: Assess initial colour and engineering requirements for a colour appearance model to be used in colour management applications.

Requirements will be identified in the areas of computational efficiency, visual phenomena accounted for, and viewing condition inputs

Winter/Spring 1999: Investigate and assess mathematical models which meet colour and engineering requirements. Leverage heavily off the work of TC 1-34, which developed CIECAM97s. Pursue refinements of CIECAM97s that model the colour appearance phenomena that are required, while meeting implementation requirements. Issue short interim progress report, with an emphasis on any interim recommendations that can be made.

Summer/Fall 1999: Development and testing cycle for model.

- Complete initial model development.
- Complete initial development of guidelines for using the model in particular applications and setting the viewing condition inputs.
- Perform psychophysical testing of model performance, using a variety of imaging technologies
- Finalise model and input parameter guidelines.

Winter 2000: Issue final Technical Report.

TC 8-02 Colour difference evaluation in pictorial images

Chairman: Michael Stokes

Terms of Reference

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

Working Programme

Spring 1999: Interim recommendations based on CIE TC1-47 and CIE TC1-34 work and incorporating image specific requirements. This should include recommendations on statistical processing of colour differences, colour reproduction index and methods to implement these recommendations based on both visual and measured data for a variety of colour imaging technologies.

Fall 1999: Develop guidelines to implement these recommendations based on both visual and measured data for a variety of colour imaging technologies. Determine whether there is sufficient data on hand to verify or model a quantitative model of colour differences for pictorial images for an average observer under conditions typical of industrial imaging applications. If not, write guidelines for co-ordinated research and collect data.

Spring 2001: Analyse and derive an industrial colour-difference evaluation method based on a quantitative model of colour-differences for pictorial images for an average observer under conditions typical of industrial imaging applications.

TC 8-03: Gamut Mapping

Chairman: Jan Morovic

Terms of Reference

To recommend a standard solution to the gamut mapping problem, which could be applied to the areas of colour reproduction in general and colour imaging in particular. This solution would consist of (a) a standard way for calculating colour gamuts and (b) a gamut mapping algorithm or a set of gamut mapping algorithms and rules for deciding when each of them is to be used.

Working Programme

December 1998: Review current gamut mapping algorithms and algorithms for calculating gamut boundaries.

May 1999: Provide guidelines for the evaluation of gamut mapping algorithms.

December 1999: Review results of gamut mapping algorithm evaluation done according to guidelines.

March 2000: Recommend a standard gamut mapping algorithm or a small number of algorithms and rules for deciding when each of them is to be used.

TC 8-04: Adaptation Under Mixed Illumination Conditions

Chairman: Naoya Katoh

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.

Working Programme

Sep.29-Oct.1/1998: 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)

TC 8-05: Communication of Colour Information

Chairman: Lindsay MacDonald

Terms of Reference

To recommend a minimal set of standard techniques to enable unambiguous and efficient communication of 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.*

Recommendations will also be made for a minimal set of standard colour spaces that address a wide range of imaging applications.

Work Programme

July 1999: Survey of the colour spaces used in imaging applications for image encoding and digital colour communication. Survey of all the relevant standards (CIE, ISO, IEC, ASTM, etc).

Dec 1999: Understand the derivation of each colour space, including factors related to materials and processes, and compare the differences between them..

Apr 2000: Select a minimal set of colour spaces consistent with the requirements of the applications.

Dec 2000: Produce recommendations for colour spaces.

8. Results of brainstorming session

An open brain-storming session produced the following topics which are rate High, Medium or Low priority.

Colour management architecture H
Tackle questions where CIE expertise applies H
Terminology M
Image quality for compression M/L
Explain Terms of Reference and include image evaluation H
Relevant perceptual information for images M/H
Colour preferences - preferred reproduction L
Standard viewing position H
Spatio-temporal effects on imaging H
Optimal palette for pseudo-colouring medical images L
Optimum tone reproduction for VDUs M
Spectral modelling M/H
Spatial based uniform colour system e.g. SCIELAB H
Automatic determination of image white point H
Fluorescence effects M
Database of typical spectral reflectance data H
How to define an image

Original scene vs. 2D image M
Virtual reality L
Aesthetics L
Grading of measurement instruments for imaging H
Guidelines for metrology H
Moving Technical Reports to Standards H
Standard images for evaluation H
Archiving of images L

9. Liaisons - Standardising bodies

The following organisations were listed for potential liaison.

CIE Division 1:

TC1.27 Specification of colour appearance for reflective media and self-luminous display information

TC1.34 Testing of colour appearance models

TC1.44 Practical daylight sources for colorimetry

TC1.47 Hue and lightness correction to industrial colour difference evaluation

CIE Division 2:

TC 2.42

CIE Division 3:

ISO:

TC 6 Paper and pulp

TC 36 Cinematography

TC 38 Textiles

TC 42 Photography

TC 130 Graphic arts

TC 159 Ergonomics

TC 171 Document image architecture

JTC1:

SC24 Computer graphics and image processing

SC28 Office equipment

SC29 Coding of information

ITUR SG11 Broadcast television

ITU SC? Colour facsimile

JTAG2

IEC:

TC100 PT61966 Multimedia

SC47C Displays

SC39 Cathode ray tubes

Liaison - Industrial consortia

| | |
|--------------|--|
| ICC | International Colour Consortium |
| ASTM | American Society for Testing Materials |
| ITSMB (ANSI) | Image Technology Standards Management Board |
| VESA | Video Electronics Standards Association |
| EBU | European Broadcasting Union |
| SMPTE | Society of Motion Picture and Television Engineers |
| JEIDA | Japanese Electronic Instrument Development Association |
| JMBA | Japanese Business Machine Association |
| PIMA | |
| EIAJ | Electronic Industries Association of Japan |
| CGATS | Committee for Graphic Arts Technologies Standards |
| CEMA | Consumer Electronics Manufacturers Association |
| EIA | Electronic Industries Association |
| IFRA | INCA-FIEJ Research Association |
| ATSC | Advanced Television Standards Committees |

Liaison - Academia

RIT, USA
 Chiba, Japan
 Derby, UK
 Aachen, Germany
 Helsinki, Finland
 Leeds, UK
 Chalmers, Sweden
 Genoa, Italy
 Westminster, UK
 Veszprem, Hungary
 TU Budapest, Hungary
 Simon Fraser, Canada
 Tokai, Japan
 Stanford, USA
 ENST, France

10. New committees, reporters and liaison

The following reporters were suggested:

Grading of instruments: Yoshni Ohno
 VDU metrology: Andrew Hanson, Chair of TC2.34.
 IEC TC100: Hiroaki Ikeda
 Fluorescence issues: Cal McCamy

Terms of reference will be written later.

The following liaisons were suggested:

| | |
|------------------------------|--------|
| CIE Division 1: Mike Pointer | Agreed |
| CIE Division 2: Yoshi Ohno | Agreed |

11. Division officers

Michael Stokes agreed to be the Division Secretary. He will therefore cease to be an Associate Director

12. Action items

The Division Officers to review the Terms of Reference of the proposed Technical Committees before forwarding them, together with the names of the Chairmen, to the Central Bureau for voting.

The Division Officers will write Terms of Reference for each of the proposed Reporters before forwarding them, together with the names of the Reporter, to the Central Bureau for voting.

The Division Officers will write a paragraph to accompany the Division Terms of Reference to elaborate the goals of the Division.

The Division Director will set up a web-site and Newsgroup.

13. Next meeting

An informal meeting will be held in association with the colour imaging meeting in Scottsdale, Arizona, November 1998.

The next formal meeting of the Division will be as part of the next quadrennial meeting of CIE to be held in Warsaw, Poland, June 1999.

Attendace List

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|-------------------|--------------|----------------------------------|
| Werner Adrian | Canada | Chair of CIE D1 TC1.19 |
| Monica Billger | Sweden | |
| Ellen Carter | USA | |
| Olkan Cuvalci | USA | |
| Francois Denner | South Africa | Secretary CIE D1 |
| Oswaldo da Pos | Italy | National Representative |
| J S Diamond | UK | |
| Gary Dispoto | USA | Chair of CIE D8 TC8.01 |
| Marjukka Eloholma | Finland | National Representative CIE D1 |
| Liisa Halonen | Finland | |
| Bernhard Hill | Germany | National Representative CIE D8 |
| Jack Hsia | USA | President CIE |
| Eckhard Hubner | Germany | |
| Hiroaki Ikeda | Japan | Chair of IEC TC100 |
| Norbert Johnson | USA | Associate Director CIE D2 |
| | | Chair of ASTM E12 |
| Naoya Katoh | Japan | Chair of CIE D8 TC8.04 |
| Paula Knee | UK | |
| Ronnier Luo | UK | Chair of CIE D1 TC1.52 |
| Marc Mahy | Germany | |
| Cal McCamy | USA | Chair of CIE D1 TC 1.38, TC 1.53 |
| Sharon McFadden | Canada | |
| Yasuhisa Nakano | Japan | Chair of CIE D1 TC ?? |
| Todd Newman | USA | Director of CIE D8 |
| Jim Nobbs | UK | |
| Yoshi Ohno | USA | Secretary of CIE D2 |
| Naburo Ohta | USA | |
| Mike Pointer | UK | Associate Director CIE D1 |
| | | Chair of CIE D1 TC 1.49, R 1.15 |
| | | Associate Director CIE D8 |
| Alan Robertson | Canada | CIE Vice President |
| Ken Sagawa | Japan | Director CIE D1 |
| | | Chair of CIE D1 TC 1.22, 1.37 |
| Janos Schanda | Hungary | Chair of CIE D1 TC 1.18, R 1.17 |
| H Schmidt-Clausen | Germany | Chair of CIE D1 TC 1.51 |
| Michael Stokes | USA | |
| Kazuhiko Takemura | Japan | Chair of D8 TC 8.02 |
| Heinz Terstiege | Germany | |
| Pat Trezona | UK | |
| Rengin Unver | Turkey | National Representative |
| Francois Vienot | France | Chair of CIE D1 TC 1.36 |
| Klara Wenzel | Hungary | |
| Klaus Witt | Germany | Chair of CIE D1 R 1.04 |
| Hirohisa Yaguchi | Japan | Chair of CIE D1 TC 1.26 |