Digital Motion Picture Working Group

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Chiba University

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Digital Motion Picture WG Charter

- **Codify a color management system architecture for digital production of motion pictures**
  - Open, vendor-neutral, cross-platform
  - Enable utilization of ICC color management

Agenda

- **Drivers for color management in movie production**
- **Standards development**
- **Establishing an ICC working group**
- **Accomplishments and work in progress**

Hollywood goes **Digital**

- **Hollywood is transitioning from analog to digital workflows**
  - Digital processing will soon dominate ALL production stages in US
  - Cost effective, short turn-around, flexible, higher image quality
- **Digital Capture, Editing, Distribution, and Projection**
  - **Digital Capture** reduces turn-around, costs, needs HDR, speed, storage
  - **Digital Editing** (also known as Digital Intermediate)
    - Improves color control, replaces costly on-location work
    - Widely adopted, nearing 100%
  - **Digital Cinema** (Theater Distribution and Projection)
    - Reduces distribution costs and piracy, improves quality
    - Enables new revenues such as 3D movies
    - Requires large investments $5B in theaters (Source: NAB)
    - Standards are furthest along in this area (DCI, SMPTE DC28)

Hollywood drives Color

- **Color-Managed Capture, Editing, Distribution, and Projection**
  - Preserve the director's artistic intent throughout the workflow
    - Set color at capture; confirm in editing; expect in theater
- **Demands consistent projection quality on all screens**
  - Primary release for Movie Theater - revenue $9B
    - Draft colorimetric standards in place for Digital Cinema
    - Weaker distribution standards for film
  - Secondary release for TV, PC, Mobile - revenue $40B
    - Requires color conversion to video, iPod, web, print
    - Challenging re-rendering to preserve intent
- **These are areas of active standards development**

Standards Needed for Interoperability

- **Developing standards for digital movie production**
  - SMPTE - Society of Motion Picture and Television Engineers
  - AMPAS - Academy of Motion Picture Arts and Sciences
  - ASC - American Society of Cinematographers
  - ICC - International Color Consortium

SMPTE - Society of Motion Picture and Television Engineers

- **Main US standards-setting body for filmed entertainment**
- **Committee on Digital Cinema (DC28) - 2002**
  - DC28.10 Mastering WG
  - DC28.20 Distribution WG
  - DC28.30 Exhibition WG
  - DC28.40 Stereoscopic WG
- **Developing standards for digital cinema mastering, distribution, and projection**
  - Codifying specifications from DCI - Digital Cinema Initiative
  - Meets every three months
  - Several documents ready to publish as standards
- **ICC members collaborating on color management**

AMPAS - Academy of Motion Picture Arts and Sciences

- **Best known for the Annual Academy Awards - the Oscars**
- **Developing post-production recommendations**
  - Image Interchange Framework Project
  - Developing an image interchange framework to serve the interchange needs and efficiency demands of motion picture production
    - Document best practices for image data representation and encoding, and common transforms and equipment calibration
  - 30 industry experts from US, JP
  - Requirements for an image framework in draft stage
  - Currently working on researching un-rendering, rendering
- **ICC collaborating on color science, rendering, and interoperability**

ASC - American Society of Cinematographers

- **ASC - an educational, cultural and professional organization**
  - Membership by invitation only, currently 340 members
- **The ASC Technology Committee**
  - Advises the ASC membership about the challenging technology issues affecting cinematography and how these issues impact the role of the cinematographer
  - Influences the production community, as well as standards setting organizations worldwide
- **Develops recommendations for preserving the artistic intent - the "look" - from scene to theater**
  - Shadow detail (monster in shadows) must be same on all devices
- **ICC collaborating on color management, educating ASC members, exploring problem areas**

ICC - International Color Consortium

- **Digital Motion Picture Working Group**
  - Formed 2004
  - 30 experts from ICC and movie industry
  - Three face-to-face meetings per year, e-mail
- **Focus wider than movie industry**
  - Media convergence and interoperability
- **Collaborating with movie organizations**
  - Drive media and device interoperability requirements
  - Provide color management knowledge
- **Independent research**

Process of Discovery

- 2002: Movie industry experts ask ICC for help
- 2003: Cinema color management at Color Imaging Conference
- 2004: ICC meets with invited industry experts on color workflows and issues
- 2004: ICC forms Digital Motion Picture Working Group
- 2004: ICC hosts first annual session at Siggraph Conference
- 2004: ICC visits facilities in Hollywood
- 2005: ICC and Linux Movies Group publish white paper
- 2005: ICC starts collaboration with AMPAS STC and ASC TC

ICC Accomplishments So Far

- **Documented color issues for motion picture production**
- **White paper on how ICC profiles can be used in workflows**
- **Held sessions at Siggraph and Linux Movies**
- **Analyzed challenges in creating profiles**
- **Developed mathematical models for color on film**
- **Developed sample profiles for film and digital projection**
- **Established liaisons with other organizations on developing color standards for motion picture production and identified issues**
  - Address adopted white versus calibration white
  - Use of tone curve rendering
- **Defined floating-point ICC profile format for high dynamic range**
- **Demonstrate that ICC profiles can be used in motion picture production**

Work In Progress

- Continue collaboration on standards development
- Educate users in motion picture industry
- Resolve open issues for color management
- Demonstrate preserving look in printing of film frames
- Develop scanner calibration target
- Develop glossary on motion picture terminology
- Recommendations for digital capture and color encoding

Learn more

- **Presentation today at 2:10 pm**
  - Using ICC profiles for Motion Picture production / Lars Borg
- **ICC DMP web site**
  - http://www.color.org/membersonly/DMPWG.html
- **ICC DMP Working Group**
  - Tokyo, June 22, 2007 at 10:30 AM
  - Albuquerque, November 3, 2007
  - For membership, contact Kip Smythe ksmythe@npes.org
- **Siggraph BOF: ICC on color management in movie production**
  - San Diego, August 8, 2007 at 10:00 AM