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Color Management in the Graphic Arts



This webinar from the Inter-Society Color Council illuminates the sometimes-mystifying world of color management in the graphic arts. The term *color management* means different things to different industries. The color characteristics of textiles, paints, and theatrical lighting, for example, all rely on precise management of color to maintain consistency and predictability.

In the graphic arts, ICC-based color management is woven through the digital workflows that typify today's graphic production processes. In graphic media, color management describes the techniques used to produce consistent color appearance across different instances where an image is displayed.

Color management came into being in the early 1990s when digital photography and digital presses enabled fully-digital workflows in the production of graphic documents. Throughout the 1990s, digital imaging capabilities rapidly advanced—more capable cameras and presses; more sophisticated image processing; and new output devices, like large-format inkjet printers, markedly changed the options available to marketers and brand owners. The release of the World Wide Web onto the Internet in 1991, and the lifting of commercial use barriers in 1995, converted desktop computer screens into color output

devices for selling color-sensitive products to consumers. In the 21st century, the rapid growth of mobile devices, and the conversion of the television and cinema industries to digital processes has added to the complexity of graphic arts color management.

As digital graphic options proliferated, it became common for marketers to repurpose the most successful and iconic digital assets. For example, if a photographic image was created for the cover of a holiday catalog, it might also be used for the company's annual report, or website. Or, it might be used to image a large format banner to display at a trade show.

The dilemma to this scenario is that each different output system has its own color bias. Any output of a color image that can be viewed in the real world is referred to as device-dependent color, meaning that the color seen in the image is dependent on the characteristics of the device. For example, a color image printed in a magazine is dependent on the characteristics of the inks, the paper, and the printing process. If you used the same inks and paper but a different printing process, the appearance of the color image would be different.

Device independent color spaces only exist as theoretical constructs. The most useful of these in color management is the CIELAB color space, which is a perceptually uniform space that organizes all the colors that a standard human observer can perceive, under a defined illumination source.

Color management uses standardized color targets, software, and color measuring instruments to make ICC (International Color Consortium) profiles for every device in the reproduction chain. These include input, display, and output devices. The profiles are used to map the image data from the device dependent color space to the device independent PCS (Profile Connection Space). When an image is represented on two different devices and is expected to match, then the two sets of image data are mapped in the PCS through their appropriate profiles, and a process of gamut mapping takes place.

The different devices will invariably have different gamut limits, meaning that the image represented in one device will contain out-of-gamut colors on the other device. Gamut mapping is performed to convert image data from the source device into the color space of the destination device in a manner that will create the optimal color match within the confines of the rendering intent of the customer.

The webinar will provide information and examples of how profiles are made and used in the digital workflow. The input, display, and output profiles will be explained together with how they are used and stored in the workflow. There will also be an introduction and explanation of the use of device link profiles. The concept of characterization data sets will be presented.

Finally, the current status of color management will be presented, including areas of success and unmet challenges. The webinar will end with questions and discussion from the participants.