TAGA 2002 ASHEVILLE
TAGA Meets the Challenge!

Renaissance Asheville Hotel
April 14–17, 2002

This year’s TAGA conference is organized into six parts: general sessions, which are a response to Grant Miller’s 2001 keynote speech, tutorials, and four specialty track sessions, including How to Find the Sweet Spot on a Press, Advances and Alternatives in Color Science, Advanced Engineering, and Peer Reviewed Papers.

The conference will begin with a keynote speech by John Nallen, Director of Manufacturing at Newsweek magazine. Mr. Nallen will present Newsweek’s current production objectives and will discuss how the graphic arts R&D community can focus on research that will provide publishers with real improvements, gains in ROI, and improved competitiveness with non-print media.

Tuesday’s featured speaker will be Ghilad Dziesietnik, Vice President, Core Software and Workflow Applications at Electronics For Imaging, Inc. and Chairman of the Print On Demand Initiative (PODi). Mr. Dziesietnik will show TAGA members how they can print documents such as presentations, e-mail and Internet pages securely anytime, anywhere through the use of mobile Internet-enabled devices such as cell phones, PDAs, and Blackberries, as well as what integrating EFI’s PrintMe electronic infrastructure into printer and systems solution vendor applications would entail. Some of the conference highlights include:

**General Sessions**

General sessions address the needs of the print production community as well as key technical developments discussed in detail. The conference will conclude with a Printer’s Evaluation and Challenge Panel—A small group of select technical managers from printing companies that have been asked to review the entire TAGA conference and evaluate the conference relative to the challenges that Grant Miller of RR Donnelley & Sons put forth in his 2001 keynote address. The group will highlight where the R&D community has been on the mark and where the mark was missed. They will also present an update on the priorities for the printing community and TAGA challenge for 2002–2003. Some of the many general session papers include:

- How Does the Product Influence Productivity?
- Certified PDF
- Innovation in Book Publishing and Distribution
- Offset Blankets, Print Quality, and Sheet Movement
- Thermal Transients on a Web Offset Press
- Enterprise Application Integration (EAI) for Small Printers
- Characterizing Ink Properties and Inkjet Printing
- Transforming XML Document Structures Using XSLT: A Comparison Between Direct Coding and an Interactive GUI Based Approach
- An Improved Method for the Routine Measurement of Ink Colorimetrics
- Consistent Inkjet Proofing
- An Investigation on Print Color Difference for Major Digital Presses
- ... and much more!

**Tutorials**

Basic tutorials have been eliminated in favor of tutorials on cutting-edge topics that include knowledge you can put to work immediately. (In fact, some TAGA members have commented that the tutorials alone are worth the cost of travel and conference registration!) This year’s four tutorials are:

**TAILORING ICC COLOR MANAGEMENT TO PRINT SYSTEMS AND PRODUCTION**
by Craig Revie, Fuji Film Electronic Imaging Limited and ICC Graphic Arts Special Interest Group Chair

The ICC specification is set for a major release this Spring that will feature changes specific for graphic arts applications. This tutorial will include concepts for using ICC specifications in professional graphic arts applications, recommendations for using ICC specifications in production workflows in print production, achieving “open color” with ICC applications, and much more.

**IMPLEMENTING CIM**
by Dr. Tim C. Claypole, Director and senior lecturer, Welsh Centre for Printing and Coating, University of Wales Swansea

Implementing CIM with a focus on achieving maximum availability of the press, (i.e., maximizing the profit.) Students will look at monitoring, maintenance and repair strategies, discuss how to take advantage of the available data, and explore additional measures that might be considered as well as deciding on the best CIM Implementation strategy.
The Nominating Committee has put together a full slate of candidates for the TAGA 2002 Election of Officers and Directors. Look for your ballot and the profiles of the candidates to arrive in your mailbox in mid-February. Don’t forget to cast your important vote for the candidates of your choice.

**VICE PRESIDENT TECHNICAL PAPERS**
Richard Goodman, Kodak Polychrome Graphics

**VICE PRESIDENT MEMBERSHIP**
Charles Gehman, Printable Technologies, Inc
Sam Ingram, Clemson University

**SECRETARY/TREASURER**
Ed Granger, Ontario Beach Systems
Anthony Stanton, Carnegie Mellon University

**DIRECTORS**
Tim Claypole, University of Wales-Swansea
Paula Gurnee, Ink Systems Inc.
Helene Juhola, VTT Information Technology
Michael McLean, Day International
Stig Nordqvist, Swedish Newspaper Publishers Association
David Romano, Agfa Corp.
Joseph Webb, Strategies for Management, Inc.

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**PRESIDENT’S MESSAGE**

TAGA President Bruce Blom, Mead Corp.

Dear TAGA Members:

You will soon receive the TAGA 2002 Asheville conference brochure. Last year’s keynote speaker, Grant Miller of RR Donnelley, discussed the R&D priorities of printers, and we turned Miller’s presentation into a challenge to the TAGA membership. The papers are in, and the agenda is set, and I can say that the response has been outstanding. Not only is the agenda exceptionally well balanced, but it has also been organized to facilitate an ongoing dialogue between the R&D community and the printing community. In a year of tight budgets, everyone has to be particularly selective in deciding how they will spend their money. Technical Papers Chair Dr. Richard Goodman, volunteer TAGA members, and staff have done an exceptional job at putting together a conference that not only provides educational value, but also will clearly help TAGA members get the most out of their own investment in the future. If you can only attend one industry event this year, TAGA 2002 Asheville is it!

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**2002 Election of TAGA Officers and Directors**

The Nominating Committee has put together a full slate of candidates for the TAGA 2002 Election of Officers and Directors. Look for your ballot and the profiles of the candidates to arrive in your mailbox in mid-February. Don’t forget to cast your important vote for the candidates of your choice.

**SECRETARY/TREASURER**
Ed Granger, Ontario Beach Systems
Anthony Stanton, Carnegie Mellon University

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**YET FURTHER IMPROVEMENTS TO THE ICC SPECIFICATION**

Major Revision to Key Industry Reference

The ICC specification has recently undergone a major revision. The new version of the specification is designated ICC-1-2001.12 and is available for free download from the ICC website (www.color.org).

**SUMMARY OF THE MAIN CHANGES:**

- For perceptual rendering the dynamic range of the PCS, and the assumed level of illumination for viewing has been identified. These attributes were not identified in previous versions of the specification and this led to ambiguities when specifying gamut mapping that resulted in white and black being misinterpreted and tone reproduction ‘errors’.
- Chromatic adaptation information is now required. When data is intended for viewing in illumination conditions other than those specified by ISO 3664 (i.e. D50) the transformation required for correction of the data must be specified. A procedure that specifies how the CMM should handle this transformation (depending on the chromatic adaptation condition assumed for the various profiles being processed) is now specified. This change is particularly important for colour monitor profiles (which rarely assume a D50 chromatic adaptation state) but can have applications elsewhere (e.g. where prints or transparencies are expected to be viewed in non-standard conditions).
- Where profiles involve more than the usual 4 (CMYK) colorants it is now required that the colour of the additional colorants be specified by their XYZ or L*a*b* co-ordinates. The sequence of printing may also be specified. This helps to avoid ambiguities when building profiles for such processes.
- New look up table (LUT) specifications have been provided that overcome some issues of invertibility of the previous LUTs – as well as offering some other benefits of profile management by having a similar structure for all types of profiles. Another specification enables a simpler specification of 1-d LUTs for typical display devices.
- Various clarifications have been introduced into the document covering such issues as rendering intents, the definition of the tags for three-component devices, the content and structure of monochrome profiles, the relationship between PCS XYZ and PCS L*a*b* and how to handle colours that can be represented in one and not the other.
- Various new procedures have been specified to avoid confusion when using profiles such as improved naming and dating procedures, and to permit profiles containing multiple rendering intents to be specified for input and display devices as they currently are for output profiles.

For more information, please be sure to register for the Tailoring ICC Color Management to Print Systems and Production at TAGA 2002 Asheville. This tutorial will be taught by Craig Revie, Fuji Film Electronic Imaging Limited and ICC Graphic Arts Special Interest Group Chair.
TAGA 2002 ASHEVILLE
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(continued from page 1)

JDF SCHEMA AND IMPLEMENTATION
by Dr. Rainer Prosi, Manager, and Research & Development at Heidelberger Druckmaschinen AG

CIP4 is set to make a major new release of the Job Definition Format Specification concurrent with the TAGA conference. Dr. Rainer, one of the JDF schema’s authors and architects, will provide an overview of the JDF schema, a review of what is new and what has changed, and will discuss JDF implementation strategies.

CORPORATE SUSTAINABILITY, TECHNOLOGY INNOVATION AND “THE GREENING OF PRINT”
by Don Carli, Principal of Nima Hunter Inc.

Global 2000 companies are developing and promoting “beyond compliance” green procurement, supply chain management, and sustainability practices as strategic and operational imperatives. This tutorial will teach how major corporations and leading publishers can both be profitable and responsible in the way they purchase printing and packaging, including enabling technologies and environmentally preferable methods of production.

Advances and Alternatives in Color Science
This session track, moderated by Roger Siminoff, Senior Manager of Marketing at Apple Computer, will be dedicated to looking at alternative color models and color management methods, and will also focus on methods of optimizing the color management environment for users.

- Evaluating the quality of commercial ICC color management software
- Reference Printing Conditions: Where Can It Lead Us?
- Evaluation of a Method for Correcting for Measurement Errors caused by Adjacent Colors
- Soft Proofing using LCDs
- Characterizing the Output of Color Cathode Ray Tubes Used for Graphic Arts Proofing
- Cross-Media Color Management via the Internet
- Plus more papers and a Color Management, Premises and Practice Technical Focus Group
  led by Roger Siminoff of Apple Computer.

Advanced Engineering
This track, chaired by Dr. Tim C. Claypole of the University of Wales Swansea, will be dedicated to computer-integrated manufacturing topics as well as development and application of micro-

- electronic mechanical devices (MEMS) to printing systems. Topics include:
  - The Integration of E-commerce Enabled Expert Systems for Automated Printing Control Networks in Printing and Publishing
  - Opportunities for the Printing Industry in Electronics
  - Printing of Micro-fine Structures
  - Automation of Prepress Workflow on a Cellular Basis

A SPECIAL DAY-LONG, THREE-PART SESSION:
How to Find the “Sweet Spot” on a Press

When a printing press is printing at its “sweet spot”, the printing variables have reached a state of equilibrium, where they tend to stay without changing. All the press’s settings have been fine-tuned and materials are consistent, so that the print quality will not vary unless an assignable cause forces one variable to change. While press optimization and control have been an important topic for years at TAGA, we are still finding better ways to improve and control color quality. How does one determine a press’s “sweet spot”? Join moderator Miles Southworth, RIT Professor Emeritus, for a three-part session that will include technical papers, an expert panel discussion and a technical focus group discussion that will explore questions such as:

- How can a press be controlled so that it remains in its “sweet spot”?
- Which print attributes must be controlled for the least variability?
- What effect does each variable have on the print quality?
- Can we improve a press’s “sweet spot” to produce a better product?
- Can a press be trimmed and trained to always run at its “sweet spot”?

- How can we increase the speed and accuracy of measurements?

Peer Reviewed Papers
Selected authors whose papers have been accepted by the TAGA Journal of Graphic Technology will be invited to present their papers in detail in this track moderated by Dr. Anthony P. Stanton of Carnegie Mellon University. Papers under review and tentatively scheduled for this track include:

- Identifying Human Capital Competence Requirements for Different Types of Digital Printing Enterprises
- Optimizing the Adaptive Screening Process
- Tools for Design for Environment (DFE) Applications in the Printing Industry
- Exploring the Ideal Book Publishing Format
- The Optimal “n” Value of Yule-Nielsen Equation for Measuring Dot Area on CDs Using Waterless Process with UV Inks

Other conference features include:

- A panel discussion on The Failure of e-Books and the Future of Alternative Publishing in which moderator Dr. William J. Ray, President of Group InfoTech and TAGA Executive VP, and a panel of experts and luminaries will discuss the future of alternative publishing.
- Technology Talk—Ask the Experts: a room with round tables to be used for open discussions where the experts will answer questions submitted by attendees.

TAGA 2002 Asheville includes a grand welcoming reception that will be held off-site at the historic Biltmore Estate, a spouse/guest program that includes two days of tours, and TAGA’s annual awards reception and banquet. If you want a complete copy of the conference agenda, hotel information and registration form, a PDF version can be downloaded from the TAGA website (http://www.taga.org).
**NEW BOOK**

**Handbook of Print Media**

Springer-Verlag New York and Heidelberger Druckmaschinen AG (Heidelberg) are proud to announce the publication of the English-language edition of the Handbook of Print Media—Technologies and Production Methods edited by former TAGA Board Member Helmut Kipphan. Itself an example of the height of the printer’s art, this 1200-page compendium has been crafted to be the definitive and modern reference on the full spectrum of traditional and electronic print technologies and processes. Two dozen media experts contributed the materials under the guidance of Heidelberg Press. The handbook assesses electronic media and multimedia, right up to electronic and web publishing. Reflecting the fact that print media and electronic media ideally complement each other, an accompanying CD-ROM contains the entire manual in fully searchable form complete with a user-friendly database with information on the graphics industry.

“The graphics industry is shaped by far-reaching changes, characterized mainly by digitalization and the networking of steps in production processes,” explains Professor Dr. Helmut Kipphan, head of technology and innovation research at Heidelberg. “Our goal and challenge was to gather the knowledge of experts in an up-to-date standard work that is independent of any one manufacturer. It should take into account the international state of technological development as well as point out trends of the future.”

The handbook tackles traditional printing processes and the workflow with sections dedicated to prepress, press and postpress/finishing. The new computer-aided and digitally controlled processes and equipment for the production of print media and all relevant information about digital printing are described in-depth. For the first time, a modern handbook deals comprehensively with the non-impact printing processes and compares these techniques to conventional printing processes, which require a printing plate.

**BOOK REVIEW BY RAYMOND J. PRINCE, GATF**

The Handbook of Print Media by Helmut Kipphan (Ed.) has been published by Springer in German and English. Dr. Kipphan presented me with a copy of his new book during Print 01 in Chicago. The book is indeed impressive with 24 authors, 1227 pages, 1276 figures (800 in color), and 92 tables, with CD-ROM with a total weight of 6.1 lbs.

The English edition was translated and then Prof. Frank Romano and Prof. Frank Cost, both of Rochester Institute of Technology, did the final polishing of the translation.

Most people do not read handbooks cover to cover, but since I was asked to review the book, I felt that reading the entire handbook was a must. Twenty hours of intense reading has convinced me that this is a book you should purchase and keep as one of your primary reference books on the industry. The last primary reference written was The Printing Industry by Victor Strauss in about 1967.

A handbook, to be useful to the reader, must be organized in a very careful and logical manner. The logical progression makes it easy for the reader to explore an area of technology with which they may not already be familiar. So many handbooks written by groups of people read like 24 books put together. This book reads as if one person wrote the entire book. Due to the subject matter, I am sure this task was indeed difficult. There is also much to be learned from the excellent figures and tables. A good example is having the inking systems of three different presses side by side using the same graphics and scale.

The book encompasses fifteen chapters as follows:
1. Fundamentals
2. Printing Technologies with Permanent Printing Master
3. Prepress
4. Computer to . . . Technologies
5. Printing Technologies without a Printing Plate
6. Hybrid Printing Systems
7. Print Finishing Processes
8. Material and Data Flow in Print Media Production
9. Production Strategies for Print Media
10. Comparison of Printing and Production Technologies for Print Media
11. Electronic Media and Multimedia
12. Print Media and Electronic Media
13. Special Topics
14. Appendix
15. Subject Index

All in all, it is a great book and a tribute to Print (as a side note: it is also printed well). With all the changes taking place in the industry, I would envision that the book will have to undergo revision at least every five years.

The price of the book is $99, but Springer is extending a special discount offer to TAGA members only for a price of $79. To order and to see some sample pages from the book, go to www.springer-ny.com and enter TAGA in the area provided for Promotion Code on the Secure Checkout screen. This special offer expires on June 30, 2002.

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**Parc des Expositions—Bordeaux, France, October 1–4, 2002**

11th International Printing and Graphics Arts Conference

IPGAC is a unique biennial event traditionally co-sponsored by Canadian PAPTAC and American TAPPI. It is the sole international conference fully concerned with paper and print. Attendance at the conference typically ranges from 200 to 300, with attendees mainly coming from Europe and North America. The conference is being held in Europe for the first time in 2002. It is organized by ATIP and is co-sponsored by PAPTAC, TAPPI, TAGA, and EUCPEA. The Conference Chairman is TAGA past president Patrice Mangin, Centre Technique du Papier, Domaine Universitaire, Grenoble France, while the Program Chairman is Dan Kleemola, Weyerhaeuser Co. Ltd., Brampton, ON Canada.

Revolving around the theme, “Printing with Ink/Toner on Paper in an Electronic Communication Media Society”, the technical program will cover both printing theory and fundamentals, practical solutions to paper printing problems, topics from new techniques of paper surface analysis to paper for offset, flexo or gravure processes, tests of paper printability, coated paper printability, non-impact printing, measurement of image quality, new printing techniques that affect paper requirements, and the complementarity between paper/printing and electronic media.

Authors interested in presenting a paper on these or related topics should submit an abstract by either mail or e-mail to:
Dan Kleemola, Weyerhaeuser Company Ltd., 350 Rutherford Road South, Plaza #2, Suite 220, Brampton ON L6W 4N6; dan.kleemola@weyerhaeuser.com
Patrice J. Mangin, Centre Technique du Papier, D.U. – B.P. 251, 38044 Grenoble, Cedex 9, FRANCE; Patrice.Mangin@ctp.ingp.fr

Please contact Dan Kleemola for standards on submission of abstracts. All papers and presentations must be non-commercial in nature. Deadline for receipt of abstracts is April 12, 2002.

*Please join us for this exciting conference in beautiful Bordeaux!"
STUDENT CHAPTER NEWS

CAL POLY/TAGA STUDENT CHAPTER NEWS

The year 2002 is off to a busy start for the Cal Poly TAGA Student Chapter.

During our second week of the quarter, we had a guest speaker on creative approaches to 3-D modeling of graphic images. January 21st–25th was the Cal Poly Graphic Communication Department’s International Printing Week celebration. This event included our annual industry speakers’ lecture series, our annual Printing Week Banquet, as well as a Career Day with 12 companies that displayed in the morning and actively recruited by conducting interviews in the afternoon.

The lecture series started off with presentations on “Quality Management in the Graphic Arts” by five speakers representing the Pacific Printing & Imaging Association (PPI) which is the PIA affiliate of the six Pacific Northwestern states. As part of this presentation, PPI gave away 42 free student memberships to TAGA.

Other speakers included CEO’s and top executives from companies including Atlas Software; Testing Machines, Inc.; IGT Testing Systems; Heidelberg: MAN Roland; Web Associates; GREIF & Co.; Markzware; One 2 One Direct; and Digimarc.

During this event, our department also dedicated new laboratory facilities including a Heidelberg Quickmaster DI press and a new Substrates, Ink, and Toner lab.

Upcoming events for the Cal Poly TAGA Student Chapter include another business card/postcard fundraiser, lining-up guest speakers for the upcoming quarter, Gravure Day, plus lots of work finalizing the 2002 Cal Poly TAGA Student Chapter Publication!

We look forward to this year’s 2002 Annual TAGA Conference in Asheville, North Carolina. Our chapter is hoping to send ten representatives to the conference.

The Cal Poly TAGA Student Chapter officers for 2002 are: Kellee Rasor, President; Gianna Pietravalle, Vice-President; Sheena McNeal, Secretary; Erin Crosby, Treasurer; Camille Herrera, Publicity; and Jacquelyn Coo, Web Publicity.

For more information about our TAGA Student Chapter, please feel free to e-mail me at: krasor@calpoly.edu.

(Submitted by Kellee Rasor, Cal Poly/TAGA Student Chapter President)

COLUMBIA/TAGA STUDENT CHAPTER

The spring semester will be very exciting for the Clemson Chapter. We have the Printing Process Color on Corrugated Symposium (March 6–8, 2002) and Flexographic Process Printing Symposium (April 17–19, 2002) to look forward to in the upcoming months. (for info e-mail: lahara@clemson.edu). The students await the panel discussions as an opportunity to learn more about industry practices and advances. We would like to thank Bryce Plexico for his work as Clemson/TAGA Student Chapter Treasurer. Bryce graduated from Clemson in the fall and passed his position on to Eric Stone.

This past week we finished our corrugated press runs. We have many press runs to look forward to in the upcoming weeks. These press runs serve two purposes; one, to complete our printed chapter publication, and two as a workshop to teach our newer members more about flexography, lithography and screen-printing.

Some of our TAGA members have been fortunate to get involved in the “Greening of Print”/sustainability with Dr. Ingram and Don Carli. We are very excited to learn more about doing our part to ensure a better future for our industry and the planet.

The Asheville meeting is just around the corner. In the future weeks, we will take a trip up to NC. If there are any questions about the area don’t hesitate to contact Dr. Ingram (sting@clemson.edu) or Michael Heit (michael_heit@hotmail.com). Remember: If we don’t push the boundaries, no one will.

(Submitted by Dr. Sam T. Ingram, Professor, Department of Graphic Communications, Clemson University; sting@clemson.edu)

EFPG/TAGA STUDENT CHAPTER

Some news from France: The French chapter is going well with its 19 active members. Sixteen of us expect to attend the TAGA conference in Asheville. Last week, our annual “TAGA Week” took place at the EFPG conferences, newspaper offices’ visits, a lottery and a final reception! I think people appreciated all of the different events. At the moment, we are trying to work on the publication, the poster, and the undergraduate and graduate papers for the conference. Everyone has a lot of work to do. We are having some trouble with our printer but hope everything will be all right before the Asheville conference.

If you want additional news from France, please write to us at TAGA@efpg.inpg.fr or directly to me: herrise@efpg.inpg.fr. We look forward to hearing from you.

(Submitted by Delphine HERRISE, French TAGA Student Chapter President)

RIT/TAGA STUDENT CHAPTER

The school year is flying by and RIT TAGA is anxiously preparing for the conference in Asheville. Much effort is being put into our chapter publication. We have made lots of progress, but the fun part is just beginning. We look forward to seeing not only our finished project but all the chapters as well. We know that each chapter devotes a lot of hard work, time and energy into their publication and it all shows!

We recently unveiled our new RIT TAGA website. Available on our website is: group contact information, meeting schedules, and links to other TAGA student chapters. Visit us online at www.rit.edu/~rittaga.

Plans are being worked out to bring an exciting learning opportunity to the RIT campus. Though a partnership with the Mead Paper Company, RIT TAGA will host a Paper Knowledge seminar later this spring. We are very excited about this special opportunity and details will be posted online as they are finalized.

Our latest fundraiser is the sale of a comical T-shirt to the printing industry. The shirt will feature a series of six printing industry caution symbols and the phrase “Braving Danger for the Good of the Printed Word” across the back. If interested, visit our web site www.rit.edu/~rittaga to view a sample and to order.

We look forward to seeing everyone at the conference in Asheville!

(Submitted by Sarah Nielsen, RIT/TAGA Student Chapter President)

UNIV. OF WISCONSIN-STOUT/TAGA STUDENT CHAPTER

We are very busy here at Stout getting ready for this year’s conference. Our spring schedule includes editing and printing of our submission for the TAGA Student Chapter Publication Competition, as well as fundraising for the trip. We are well on our way to producing a quality publication, but it seems that time flies past!

We have several new members who are excited to attend their first TAGA conference. Our chapter is looking forward to seeing everyone again at the conference in North Carolina.

(Submitted by Sarah Massuch, UW-Stout Student/TAGA Chapter President)
COLOR CONCEPTS by Gary G. Field

Is “Color Management” Doomed to Fail?

We Have ALWAYS Managed Color!
What is meant by this curious term “color management”? The advertising copywriters and the marketing visionaries essentially co-opted the word “management” and used it to mean “control,” one of the five traditional principles of management. So, color management means color control: what is new about that? Color has been controlled, or “managed,” from the very start of the photomechanical color reproduction process. The characteristics of paper and ink, press dot gain and ink trap, color separation spectral sensitivities, color characteristics of the original, proof vs. press differences, and the influences of the halftoning process have always been understood by the industry’s skilled craftsmen. The knowledge of these influences was used to control (“manage”) the color reproduction process. We did not have unmanaged color before we were blessed with color management; rather, we have always had controlled (“managed”) color. The difference between then and now is the degree of automation that was used to achieve the desired degree of control. Today’s semi-automated color control process requires test images, measuring devices, computer hardware and software. A new term was needed by vendors to sell this new color control package; therefore, we now have “color management.”

Color Systems Engineering
Color control used to be simpler. Early color separation systems were fairly standard, most color originals were artists’ drawings, and the range of suitable substrates and inks was somewhat restricted. Color etchers manipulated film or plate dot values until quality results were achieved. Advances in photographic materials and the refinement of masking systems during the 1930’s and 1940’s led to color correction procedures that were based more upon printed color guides and densitometry than upon manual staging and etching strategies. As the photomechanical color reproduction system became more flexible, and the range of available materials and processes became greater, the first formal color systems engineering models were developed. These early 1970’s models were incorporated into a color chart system (Foss and Field, 1973) that fully addressed the objective ink-paper-press factors as well as the subjective customer preference factors. The next decade saw Eastman Kodak develop color separation test targets (that evolved into today’s IT8.7/1-2 test images) for addressing the objective factors of the interaction between the color separation system and the original photographic images. Kodak also developed a machine-readable press test target to automate the ink-paper-press feedback analysis process. The explosion in desktop color input, display, and output systems during the early 1990’s created a huge color control problem because the operators of these systems, unlike the operators of professional high-end graphic arts systems, had little or no knowledge of the factors that contributed to color distortions. Given that many of the desktop systems were aimed at the consumer market, a method for controlling or predicting color between input, display, and output devices was sorely needed. Enter color management. In principle, today’s color management systems should be capable of accurately “translating” a given input color into an accurate monitor display and an accurate output record. This theoretical achievement of system engineering objective factors related to the color separation and color printing processes may indeed be possible if the input color gamut does not exceed the gamut of the output system. Alas, such is often the case, thus necessitating a perspective (Field, 1984) on color quality objectives that is broader than those incorporated into the initial color systems engineering frameworks.

Inescapable Color Management Dilemmas
The first dilemma that faces developers of color management systems is how to compress input tone and saturation values to fit the gamut offered by the output recording system. This is a common concern. A “perceptual” compression strategy that retains a tonal and saturation separation in the reproduction similar to that possessed by the original is often quite successful for the less-demanding branches of the consumer market. These automated compression strategies, however, often fail when used for the more demanding graphic arts applications. The reason for such failures is that computer systems are incapable of choosing the “interest areas” of the original that are most prized by human observers when viewed within a particular context (e.g., a product advertisement).

Another dilemma facing developers of color management systems is even more difficult than the first: in most cases, people will choose “preferred color” over “accurate color.” The paradox here is that a given reproduction may require that a product color be accurate, but that other colors within the same image be reproduced in a preferred rather than accurate fashion. Sometimes, however, accurate color is chosen over what is usually a preferred color. Caucasian skin tone reproductions, for example, are preferred under most circumstances but, on the other hand, must be accurately reproduced in such cases as skin cancer detection guides.

Color films routinely incorporate “preferred” color distortions to suit consumer markets. Selective alterations to such preferences are made both to incorporate the art director’s aesthetic vision and to accurately reproduce critical colors. These kinds of common graphic arts “corrections” require human judgment; color management is well out of its depth here.

Yet other problems, not unique to color management, have always plagued the process of graphic arts color reproduction: the behavioral and economic factors surrounding the color approval process (Field, 1997). The source of such issues derives from the critical nature of the proof OK process. The proof is the prototype for possibly millions of production images; therefore, careful scrutiny of the proof for possible errors or color distortions is essential. Companies employ print buyers, art directors and others whose responsibilities include proof approval. It is a quirk of human nature that if responsibility for exercising judgments is assigned to an individual, this person will tend to exercise the authority to make changes if for no other reason than to prove that judgment is being exercised. An automatic “OK” may, after all, raise doubts about the diligence of the person who makes color approval judgments.

Color printing may serve a consumer market, but the prototype preliminary color proof serves a market of expert professional critics. Developers of color management systems make a serious misjudgment if they treat the printing industry’s color quality concerns as “consumer quality,” rather than the “professional quality” concerns that are exercised at the proof level. Continued on Page 11
**THE ROOTS OF MARKUP LANGUAGES AND XML**

First of all, XML's roots are print production. And like anything else, if you know its history you'll have a better understanding of what it does, how it does it, and why is does what it does.

In the late 1960's electronic phototypesetting displaced conventional hot-lead typesetting and publishing systems became computerized. However, early typesetting and formatting commands were embedded directly into text files, which posed a problem for publishers: they could not transfer work from one typesetting service to another because most commands were proprietary and often constituted 100% plus overhead in their text files. Often moving a job from one service to another necessitated the cost of re-keying work.* Publishers began to demand that generic markup be applied to their files and that the markup be replaced with commands through computerized substitution upon output to an imagesetter. However, even the use of generic mark languages proved not to be so 'standard' and could be difficult to interchange. The computer syntax, notation, and descriptors, (e.g., the semantics of the markup) varied and were hardly 'standard.' Delimiters could include the use of characters such as "<", "[", "]", and """" others. However, many systems used the same delimiters for different functions, so substitution and conversion from one generic markup language to another wasn't so simple.

**ENTER SGML**

In the mid-1970's the Graphic Computer Communications Association (later renamed Graphic Communications Association, and recently renamed again IDEAlliance) for a committee to study generic markup languages and to create a standard markup language. The committee based their standard on the Generic Markup Language developed by Charles Goldfarb at IBM. Goldfarb was a lawyer rather than a programmer. In 1968 he was asked by IBM management to interview legal publishing firms to determine why they were mining that the systems' functionality was good, but the basic problem was that each of IBM's systems required a different text notation and markup. The result of GCA's work was Gencode®. Gencode® was not a set markup language that each of IBM's systems required a different text notation and markup.

The result of GCA's work was Gencode®. Gencode® was not a set markup language and frequently changed nobody is quite sure of the buzzword's 'true' definition? And what exactly is XML and why should you care?

The name length of any element, sets the delimiters, and turns on or off a data types that will be used such as graphic file formats, sets limitations on the user's markup application in a way that is machine-readable and that In SGML the declaration is used to define the syntax that will be used for the user's markup application in a way that is machine-readable and that can be processed. The declaration sets the character set to be used, special data types that will be used such as graphic file formats, sets limitations on the name length of any element, sets the delimiters, and turns on or off a series of optional features that SGML standardized, such as the ability to omit end tags when a subsequent start tag required so by rule. Declarations can be rather complex.

The DTD is used to define document elements, attributes of elements, and entities, as well as their relationship to one another. A document instance is a text file in which the markup defined in a DTD is applied. A DTD can be used to "parse" an instance and verify its integrity. Let me stop here and try English. The DTD establishes the rules for how a marked up document or data file (known as an "instance") is to be structured and how the tagging is to be applied to the document. The rules may be as simple as "paragraphs are always subordinate to book or article titles." There are software tools called "parsers" that can be loaded with SGML and XML DTDs or XML Schemas (we'll discuss schema later) and the use the DTD or Schema to check that files meet the rules as set in the DTD. (Think pre-flighting!)

**Parsability is the most important feature of SGML and XML Schema for data exchange applications.** A parser embedded into editors or graphic arts systems can be used to relate commands and queries to the appropriate data elements within a document instance, or can be used to relate data elements to their place in a database or other type of record storage. Parsers can be used as standalone applications, but often they are buried into SGML and

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*Consider what types of publications would need to transfer published information for use in future publications: technical documentation, reference publishers, and academic publishers. These types of publishers, and their service providers, have followed the development of the markup languages closely. But for the publishers and printers whose subject matter is more typically "one-off" (e.g., newspapers, magazines, P&F, and general commercial printing), the mark-up languages may have appeared to have disappeared in to relative obscurity; and so XML to them may appear to them as more of a "new thing" than it does for the aforementioned publishers and printers.

**The question is often asked, is XML like C+ or Java; what can I do with it? Although XML is a "computer language" it is not a functional language that is capable of carrying out operations like the programming languages. XML is a descriptive language that is used to describe data in such a way as to create information handles (or metadata) that is associated to your data and can be used to identify, validate, and manage your data openly and independent of an given application.

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**By James E. Harvey, TAGA Director of Program Development**

XML IN PRINTING AND PUBLISHING

If you're like most printers and prepress professionals, it may seem that suddenly, everywhere the extensible markup language (XML) is being touted . . . in graphic arts systems brochures, press releases, on the floor of trade-shows, and in news of developing standards. Is this just another buzzword where suddenly everyone's got one, and systems that you thought you knew claim to have greater scope than you ever imagined, yet little has changed and everybody is quite sure of the buzzword's 'true' definition? And what exactly is XML and why should you care?
XML editors, document database engines, information asset management system, pagination systems, and so forth so that you may not be even aware that they are there. Parsers play a key role in publishing systems that use markup language applications, and you will see that they will play a crucial role in the future of E-business systems in the graphic arts. DTDs and document instances created with the DTDs can also be used to benchmark and test systems that claim to support public SGML or XML standards that are based on DTDs (or Schemas... read on)—empowering the user or buyer to test first-hand whether a system that claims to be “SGML-compliant” is in fact as open as advertised.

It is also important to note that SGML completely divorced formats and fonts from the structure of the content. Early DTD defined “headers,” or “abstracts,” or “paragraphs” as elements and attributes could include data elements that are not rendered in output, but rather provide handles for data management. Example could include “approval,” “ownership,” or “version” but adding formatting instructions is generally forbidden.

The earliest adopters of SGML tended to be users whose information had a long life expectancy, such as airplane manufacturers or U.S. Federal agencies such as the Treasury Department or the Department of Defense—organizations that had equipment whose supporting documentation was required to last decades.* The motivation was application independence, not just independence from formatting instructions. These same companies were pioneering early optical media (what CD-ROMs were called before ISO 9660) and as a result, they made the first use of SGML documents for electronic publishing.

In turn, the use of SGML in electronic media immediately lead to the development of extensions to SGML that could facilitate media other than text and graphics. In 1992, ISO/IEC 10744:1992. Information Technology—Hypermedia/Time-based Structuring Language (HyTime) was published. "HyTime provides standardized means of expressing (1) intra- and extra-document locations, and arbitrary links between them, (2) the scheduling of multimedia objects in finite coordinate spaces; and (3) rendering instructions for arbitrarily projecting such objects onto other finite coordinate spaces, and other constructs." This concept, developed in 1989–1991 by Steve Newcomb, a music professor at Tallahassee State University in Florida, led others to re-think SGML DTD designs.

Document constructs such as text and graphics are variable in length and can't be easily managed with relational database technologies. Inevitably, SGML professionals began exploring object-oriented programming and database techniques. In quick succession in 1990 and 1990, Diane Kennedy of Datalogics and the ATA DTD committee decided to publish DTD fragments or “bricks” that users could build complete DTDs with, rather than complete DTDs that were not good fits for airplane documentation applications. Pushpa Merchant, an XML consultant, developed the brick concept into one that dealt with “frames” of information that were to be self-contained, a concept that is today common in Internet publishing. Finally, Jim Harvey (me—yes, I've been called a nerd, but I deny it... more of a 'neo-nerd') then of Volt Information Sciences and the Society of Automotive Engineers, shed the document roots of SGML altogether and created the first truly object-oriented SGML standard. Rather than defining the ultimate automotive service and diagnostics book structure, (which the manufacturers would have never agreed upon), the group based their SGML on objects such as “car,” “assembly,” “component,” and “diagnostics.”

"One interesting aspect of the J2008 recommended practice is that it encompasses only the information and the structure of information relative to itself. Although the Data Model is not specific to any data management technique, companies that provide support to OEMs, such as Volt and Datalogics, have begun to model J2008 data in an object-oriented environment that can facilitate these complex relationships."

Around the same time another change was happening in the SGML community. Bell Atlantic Engineers, in 1987, introduced an online service that featured graphic representations of office documents, in color, exchanged over the Internet. They had two options: employ a simplified generic SGML DTD as their exchange format or use the editorial-based DMI format. They picked the wrong option—perhaps one of the worst business decisions ever made! Another product, designed for optical media publishing, called Guide from Owl, Ltd. introduced a simple four-tag SGML DTD that could be used to interpret any document into their retrieval program. Although neither of these first simplified SGML applications survived, some folks at CERN were paying attention, wrote their own simplified tag set, the hypertext markup language (HTML), developed a browser and gave it away! It caught on and the worldwide web was born.

THE INTERNET BOOM AND BUST: E-BUSINESS ROUND ONE

Tim Berners-Lee, who was then working for CERN, developed HTML in the late 1980's. (Berners-Lee is now the chairman of the Worldwide Web Consortium.) HTML uses SGML syntax in a simple set of tags that a web browser could use to interpret and present information. The browser provides the look of the page; style is not carried in the tagged document. (Admittedly, many web designers use HTML features to jerry-rig their layout.) Furthermore, a simple DOS or ASCII editing tool could be used to created HTML files. The original browser was a freeware software package called Mosaic. Mosaic is the basis that Microsoft Explorer and Netscape Navigator are built upon. <HTML> is the tag that begins the html document and tells the browser that it is an HTML document. The tag <BODY> begins the part of the document that will display to the screen. Tags that appear between <HTML> and </BODY> are typically meta tags that provided information such as keywords for searchability. This is where the concepts behind XML began to creep into the Internet culture.

The first HTML users were for the most part from the academic community. They didn’t care much about formatting or graphics. In 1994 the worldwide web began to be viewed as something that could be used in the commercial arena, and the need for better presentation and graphics became important. Furthermore, web tools such as HotMetal and FrontPage began to appear that provided a graphical editing environment. These packages made heavy use of font calls and presentation control.

However, HTML lacked depth and flexibility and in 1996 the browser wars lead to a greater need for additional style functionality; hence, style formats such as Cascading Style Sheets (CSS), and later the XML style language (XLS), were created. Cascading Style Sheets assign design to individual html tags. An example of a large blue italic header might look like:

H1 {color:blue; font-size: 18pt; font-style: italic}

HTML caught on in a big way, but soon users were dissatisfied with its limited capabilities and its dumb, document-oriented tag selection. For instance, HTML was used to present products in catalog form on the web, but once the product and pricing data was moved to HTML for web processing, there wasn’t much that could be done with the information. This dissatisfaction with HTML inspired the development of the Document Object Model (DOM), which picked up where the J2008 effort left off. The Document Object Model (DOM) is a platform- and language-neutral interface that permits scripts to access and update the content, structure, and style of a document. The DOM includes a model for how a standard set of objects representing HTML and XML documents are combined, and an interface for accessing and manipulating them. With the DOM, content authors can:

- Move one part of the document tree to another without destroying and re-creating the content.
- Create elements and attach them to any point in the document tree.
- Organize and manipulate new or existing tree branches in a document fragment before inserting the objects back into the tree.

In 1995 companies started using Internet technology to allow employees to share information and to allow customers to access their systems remotely (e.g., Intranets and Extranets). Furthermore, in 1993 and 1994, advertising was introduced to the worldwide web and in 1995 and 1996 the first consumer commerce applications took hold. It didn’t take long for companies to put “two and two together” to add business-to-business commerce applications

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* The Department of Treasury/Internal Revenue Service's Tax Information Publications System (TIPS) was the first public implementation of ISO 8879 (SGML), which used a DTD written by Linda Brandt of the now defunct Infoconversion under contract with the U.S. Government Printing Office.
to their Internet sites. However, HTML was inherently far too simple (read “dumb”) to deal with the complexity of commerce, with or without DOM, and SGML was far too complex for the appetites of the MIS community.

At the XML ‘97 conference, a simplified version of SGML was introduced: the Extensible Markup Language. XML did away with the declaration by standardizing SGML notation (UNICODE), eliminating optional features such as OMITTAG, standardizing the well-known angle bracket delimiters, and so forth. XML also made DTD’s optional by requiring nesting of elements and employing the concept of “well-formedness:” requiring that software application be able to deduce the structure of the document from its tagging. XML also added explicitly object-oriented features such as super typing and sub typing, and other object constructs.

XML marked the beginning of the wild frontier known as the Internet Boom (and later bust) of 1998–2000. You probably never saw XML, browsers did use XML directly until Internet Explorer version 5.0, but it was there in the background, or the server side. Where XML took root was in the interface between web page servers (that feed your browser HTML over the Internet) and the back office systems such as company databases. The modern online catalog queries databases on behalf of customers, fetches prices and product descriptions in the form of XML data, and converts them to HTML for your viewing pleasure. If you want to make a purchase, the cached XML is used to communicate with the fulfillment and payment processing systems.

Although a lot of great Internet and E-commerce services were introduced in this period, there was also a lot of snake oil being sold to the public. Many companies and John-come-lately experts were selling the concept of E-business based upon XML, but XML was not ready nor was it appropriate for inter-enterprise computer-to-computer data exchange.

For E-commerce (read business-to-consumer) everything was fine. The XML exchange was all happening behind the scenes and was closely controlled. In some cases, a server would reach out over the next and pull in a banner or otherwise relatively simple inter-enterprise exchange (ex. Doubleclick), but any lack of rigor was expunged by that fact that there was a human on the other side of the data exchange. Even if browsers interpreted the final data somewhat differently, you (the human) could complete the interpretation.

In E-business (read business-to-business) or computer integrated manufacturing (CIM) applications of XML, there is no room for human, secondary interpretation—The whole point of E-business is to eliminate repetitive human functions (read re-keying data). XML 1.0, even with a DTD, cannot perform some basic data management functions. There is no provision for limiting field length, dealing with lookup tables of codes (ex. Product type codes), or dealing with data typing.* If you have an eight-digit field for price in your purchasing database and a supplier provides you with a ten-digit price... somebody’s going to be unhappy!

So during the Internet Boom, (we’ll call it E-business round one), a lot of E-business services and software providers claimed to use XML, and they did use XML, but their XML could not necessarily be used by a system from another vendor without a lot of needless human intervention or customized programming. The snake-oil aspect was that you could by “open software” or sign-up for an “open E-business” service, but they weren’t really all that open, and many printers complained that they were being trapped into business models that they didn’t like.

XML SCHEMA: THE DOORS OPEN TO E-BUSINESS ROUND TWO

Enter XML Schema. While the great Internet boom was going on, the old-time mark-up folks were working away at something called Schema. Schema provides the parsability and data structures necessary of many aspects of E-business. (See Exhibit 3) Like DTD’s, as used in SGML and XML applications, Schema are intended to be parsable. However, XML Schema goes farther that DTD’s in many aspects, including:

- Schemas provide for primitive data typing, including byte, date, integer, sequence, SQL & Java primitive data types, etc.
- Schemas define a “type system” that is adequate for importing or exporting from database systems (e.g., relational, object, and OLAP)
- Schemas distinguish requirements relating to lexical data representation vs. those governing an underlying information set
- Schemas allow for the creation of user-defined data types, which may constrain certain of its properties (e.g., range, precision, length, mask).

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* To be fair, the XML specification does provide for the following data types, and XSLT (XSL Transformations—1.0, http://www.w3.org/TR/1999/REC-xslt-19991116.html#qname) enable users to “transform” into and out of XML, the process, without the Schema recommendation, is still not conducive to inter-enterprise exchange.

UCS-4: little-endian machine (4321 order)
UCS-4, usual octet order (2143)
UCS-4, usual octet order (2412)
UTF-16, big-endian
UTF-16, little-endian
UTF-8
This last bullet is particularly important for graphic arts applications. In our industry standards and company databases we have many unique lists of codes and special data fields for everything from “product type” to “page sizes” to “color codes” and so on. Schemas allow us to define data types that are unique for our industry and let us embed requirements such as “this field shall not be greater than eight characters.” Schema also provides other features not found in “plain-vanilla” XML, such as defining substitutable elements and inheritance in parent-child data relationships. (See Exhibit 4)

Exhibit 4: FREE TUTORIAL
To learn more about XML Schema and what they do, I recommend Roger Costello’s XML Schema Tutorial, which is available for free download from http://www.xfront.com/. The download (5.4 MB) includes a PowerPoint tutorial and hands-on examples and exercises. You’ll need an XML development tool that can handle schema, such as XML Spy 4.0 (mentioned above.)

What does this mean to you, the graphic arts professional? E-business software and systems that can read and validate schema (read “they have an embedded parser”), are in fact “open.” Once we have industry-specific standard schema for graphic arts applications, you will be better able to integrate your systems with new systems, clients systems, and supplier systems. But most importantly, you will finally be in a position to capture some of the ROI that was promised in E-business round one—the advent of XML schema is the opening of E-business round two, which promises less hype and more value.

WHAT DOES THIS MEAN FOR YOU?
Your direct involvement, use, and knowledge of XML will depend on what your business objectives are and how you envision your role in the printing industry of the future. Where as most people can spend a day looking at html and figure it out in a nearly intuitive fashion, XML, and XML schema in particular, require training and aptitude. A few technical professionals will need to read and write XML or XML schema, more will need to be familiar with XML enabled tools that provide embedded XML tools and more graphical and intuitive working environments, and almost all print professionals will need to understand the role of industry XML standards. Some of the ways you may choose to XML or XML schema may include:

- Creating “house standard procedures” for selecting equipment and software so that your new equipment purchases fit an “open” architecture.
- Selecting, benchmark testing, and implementing devices that use CIP4’s JMF so that they integrate well into your plant and with your command and control systems (read workflow, MIS, and job management.)
- Integrating with clients (directly or through a “E-commerce” company) using XML to avoid having to install multiple front-end systems to work with your client’s existing systems.
- Integrating your order and logistics systems with your suppliers (most likely paper) using XML to avoid having to install multiple systems to support each supplier’s existing systems.
- Providing digital asset management services to clients (internal and external) from one system, but to the multifaceted requirements of clients.
- Providing XML integration services for customers and their document creation and production systems.
- Automating the Estimate->Quote->PO/Contract->Scheduling->Tracking->Report->Billing cycle to minimize administrative labor and costs.
- Providing electronic document delivery and rights management.
- As a engineer or developer at a graphic arts equipment provider, you may want to learn to add XML features to your products.

Some printers will want to focus on traditional printing and will expect that their equipment and tools use XML, but other than being an informed buyer, their XML knowledge may be minimal. Others will want to obtain a competitive advantage by improving the flexibility of their production systems and providing a high degree of direct integration with key clients, (read long-term contracts and regular repeat customers). Others will be looking exclusively for cost-savings. Regardless of your major motivation, there’s an XML or XML schema either out there, or in development, for you. The following list includes a few of the XML standards or XML Schema to look for. You may also want to check out the eb-XML registry of DTDs at www.xml.org/registry.

**Publishing and syndication**
- **PRISM** (Publishing Requirements for Industry Standard Metadata) version 1.0—http://www.prismstandard.org/
- Open Digital Rights Language—http://odrl.net/0.9/ODRL-EX-09.xsd

**Electronic commerce transaction processing**
- **PROSE-XML** (Production Order Specification/EDI XML), a transaction set for orders between printers and publishers, (formerly XPP (XML for Publishers and Printers)—http://www.xmlpub.org/
- **SPACE/XML** (Specifications for Publishers Agency Communications Exchange/XML)—To be published shortly by IDEAlliance (formerly GCA), with endorsement by NAA, DDAP, and others at www.idealliance.org (Note: This may be one of the first W3C compliant schema published anywhere. Contact Mr. Craig Shreader, President of Intersect Technologies and SPACE/XML Committee Chair, for more information at cshreader@intersecttech.com)
- **PrintTalk**, an XML implementation for communicating quotes and orders—http://www.printtalk.org/briefpaper04.pdf
- **PrintML** (Printing Industry Markup Lanaguage), PrintML is an application of XML that covers many messages which are transmitted between the printers, their customers and their suppliers—http://printml.org/index_en.html
- **AdConnexion**, Tidingsutgivarna’s XML schema for newspaper advertising order exchange—write to Stig Nordqvist at sf@tu.se

**Supervisory control and data acquisition**
- **Job Messaging Format** (JMF), a component of CIP4’s JDF (Job Documentation Format) that deals with messaging to and from graphic arts devices (i.e., presses, imagesetters, etc.)—http://www.cip4.org/, and click on “JDF Specifications.”

**Traditional document authoring/editing governed by XML**
- **News Industry Text Format**—http://www.nitf.org/site/dtd.html
- **File Specifications for the Digital Talking Book**—http://www.niso.org/23986.html

**Query formulation and optimization**
- The W3C is working on an XML Query Language, (still in early development)

**Open and uniform transfer of data between applications, including databases**
- **JDF**, the Job Definition Format—http://www.cip4.org/, and click on “JDF Specifications.”
- **IFRATrack 3.0**, IFRATrack is a specification for the interchange of status and management information between local and global production management systems in newspaper production—http://www.ifra.com/, and select “Research & Consulting” and then “IFRATrack”

**Metadata Interchange**
- **UDEX**, IDEAlliance’s Universal Data Element Cross-reference (UDEX), a component of the Industry Architecture Project—http://www.gca.org/iaa/
Is “Color Management” Doomed to Fail?  
Continued from Page 6

Beyond Color Management: Science
The color systems engineering solutions that are applied to the reproduction of within-gamut test targets are a necessary, but not sufficient, foundation for the successful reproduction of pictorial images. The treatment of non-gamut colors, differences between different media, reproduction scale differences, and the influence of image definition factors upon the reproduction all render engineering-only solutions inadequate.

Color appearance models are being developed (Fairchild, 1998) to help cope with the factors that go beyond the strictly colorimetric approach used by color engineers. These models incorporate insights from color vision, cognitive science, and the whole process of human color perception. Once such models have been perfected, they can be incorporated into color management systems. Indeed, Tony Johnson (1996) has provided a blueprint of how such a system may be built.

Beyond Color Management: Art
Color systems engineers have provided such operator choices as “perceptual” or “colorimetric” rendering when processing originals with a gamut that exceed the output media. This kind of “gamut mapping” (compression) provides a starting point for the monitor-assisted manual adjustments that are required for graphic arts level color quality fidelity.

Precise customer-driven changes, however, are best guided by using the kind of color chart system that was described earlier (Foss and Field, 1973) in this essay. Color monitors are inadequate for capturing the texture and gloss substrate influences upon a particular color or image.

Sophisticated color appearance models may indeed solve most of the gamut mapping issues that plague color management systems at present, but some human-based decisions will always remain. Tonal and saturation “interest area” selection, selective color adjustments, preferred color renditions, artistic embellishments, and sophisticated perceptual fine tuning need human judgments. Color charts printed under the normal production conditions with appropriate substrates and inks are indispensable for the finest color quality results. Hard copy color proofs are also indispensable for making sharpness, resolution, moiré and other image structure judgments.

The Outlook: Limited Success
In principle, color management systems can be made to work quite successfully for such tasks as making proof vs. press matches, reproducing reflective color originals that do not exceed the output gamut, and producing “pleasing” reproductions in such cases as editorial color and similar kinds of decorative illustrations.

The measurement systems and software models are not, nor can they ever be, complete enough to simulate the color perception judgments and preferences of any given expert color printing buyer or art director. The developers of color management systems should recognize the fact that engineering solutions can go only so far when they concern questions of graphic arts level color fidelity. The systems for the graphic arts must always be constructed with ample opportunity for the operator to interact with the system controls.

For Further Information

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