# The Technical Components of Electronically Integrated Publishing

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## Abstract

The concept of electronically integrated printing and publishing (EIP) is one that would allow the graphic arts industry to truely capitalize upon the investments that it has made in electronic design and prepress systems. EIP would allow for the smooth integration of design and production as it occurs in multi-site environments, and across a variety of electronic systems. But in order for true EIP to become a reality there are several technical challenges which must be overcome. This presentation discusses these various technical requirements and provides information on technical developments that are addressing these critical areas.

## Electronically Integrated Publishing (EIP)

The concept of EIP is one that infers the smooth flow of data from the creative processes through the prepress processes and ultimately to the printing plate or press. Throughout this process the many considerations necessary to the graphic arts industry must be maintained.

Specifically, there must be design systems in place that respond to the diversity inherent to a variety of creative functions. We must have page imaging models that will allow the vector data (i.e., the geometric placement data, type, tints, etc.) to be transported across a variety of systems while maintaining the editability of these files. Type libraries must have sufficient richness to meet the graphic arts industry requirements. We must have some form of digital color calibration, communication, and control throughout this process. A variety of hard copy output devices, including direct digital color proofing systems, must be available to provide the functionality currently provided by design comps and proofs, position placement proofs, and color proofs. We must have the hardware needed to develop major communication networks (i.e., fiber optics, telecommunications, etc.) and we must have common formats for the data so that the data can be efficiently passed between system developed by different vendors.

## Design System Technology

Today's market offers a profusion of design systems to the creative segment of the graphic arts industry. However, it is important to keep in mind that the creative segment of the graphic arts is composed of a variety of highly specialized functions, and highly specialized individuals.

We are just seeing the beginnings of highly specialized design system technology that responds to the needs of the creative segment.

While the concept of the "do everything design system" for multi-media, not just print, is becoming quite popular from a marketing sense -- we at DTI consider this to be an unfortunate direction that will only serve to further confuse the progressive evolution of design technology for the print application specifically.

We must consider the unique technical requirements inherent to print. First of all the raster file sizes (e.g., for the pictures and scanned line art) needed to satisfy print is quite in excess of other media. For example, a typical raster file for television may be about 750 Kbytes while file sizes in excess of 28.8 Mbytes is not uncommon for print.

It is also important to recognize the data type issues as well. Whereas video uses principly raster files, and slide makers and business graphics systems use principly vector files, the graphic arts industry needs to be able to freely intermix both raster and vecotr files on a routine basis.

It is also important to note that the graphic arts industry has a need to have a very rich diversity of type faces and fonts. It also has critical repeatability requriements for color.

Because of these, and because of pricing issues, we believe that the development of more specialized design systems for print, rather than more generalized design systems for mulit-media, is required.

With the exception of those systems needed for the photo retouching and photo finishing segment of the creative industry, we at DTI believe that most design system technology could be based on microcomputers. The reason why photo retouching and photo finishing are exceptions again deals with the data type and file size issues.

Photo retouching and photo finishing deal almost exclusively with raster files (i.e., pictures). This segment of the graphic arts industry has a very high resolution requirement, even higher than

prepress. With this intensive image processing requirement it is likely that some form of customized hardware assist will be needed.

## Transportable Page Imaging Models and Type

Many of today's design-to-prepress links incorporate popular page description languages (PDLs). The problem with this is that after many of these files are transfered from one system to the next they are often no longer editable or changeable.

This is not to be critical of today's PDLs. They do a good job of satisfying the requirement for which they were intended (i.e., as laser printer drivers to output pages with type and graphics).

However, more and more we are seeing the need to maintain the editability of the data through to the last logical point in the graphic arts design/production process.

With this in mind the ANSI IT8 committee has a working group which is addressing the development of a standardized page imaging model (PIM). The PIM will function much like a traditional PDL but will have the added advantage of being editable through multiple transfers.

In addition, the ANSI IT8 PIM will be a true standard. There is no standard PDL today. There are a variety of products that have obtained varying degrees of market acceptance -- however, these are products, and not standards.

## Transportable Type Issues

The type issue is one that has long delayed the true merger of text and graphics. The problem lies with technical, as well as type liscense issues.

Today however, as a result of multiple type liscensing agreements by the Roman font vendors, we are seeing more flexibility in font sources.

Currently Linotype, Monotype, and ITC fonts are surpported by Adobe, Apple, and Sun font formats. In addition Agfa-Compugraphic and Varityper fonts are supported by Adobe; Berthold and Bigelow & Holmes fonts are supported by Sun; and Apple font formats support Agfa-Compugraphics, Bigelow & Holmes, Varityper, Bitstream, Font Bureau, ATF and URW fonts.

So while the issue of having exactly the same type face on the design system as is on the production system is an expensive solution, it is at least a possible solution -- and one that did not exist not so long ago.

The reason why one needs exactly the same type face on the design system as is on the production system is that this is the only way to accomplish true What-You-See-Is-What-You-Get (WYSIWYG). If the two type faces are not the same then one will get different line endings, paragraph endings, and a completly different balance to type on a page. These results typically do not make graphic arts customers very pleased.

There is another basic problem with type, particularly at the very high end of the graphic arts market. Here, art directors and designers will insist that they need access to over 18,000 different type faces in order to respond to the various needs of their clients. A fundamental problem with many of these type faces is that they have yet to be digitized. With this in mind it is difficult to see an easy solution in the near future to the font issue at the very high end of our industry.

### Color Calibration, Communication, and Control

As we move more into a world of distributed color production the graphic arts industry needs to have some form of color calibration, communication, and control within this digital environment.

Developmental work to provide standardized targets, methodologies, and a standardized color space to provide color calibration, communication and control is ongoing within both ANSI and ISO committees.

In addition, DTI has a program entitled "The 4Cs" which provides supplamental research and testing programs for digital equipment used in design and prepress.

### Data Compression and Communications

With the data density issue inherent to picture files used in design and prepress there is a great deal of interest in data compression developments.

Crosfield was an early pioneer in the research and development of data compression issues for print. Data compression techniques are also under development with the ISO/CCITT Joint Photographic Experts Group (JPEG), though this latter committee concerns itself with issues other than those specifically required by the graphic arts.

We are seeing the beginnings of a variety of data compression products for the printing and publishing industry. However, DTI has conducted a number of independent tests on data compression algorithms and would caution the graphic arts industry in its use of this technique. It is our opinion that, promises aside, there are still substantial technical problems involved with using data compression for printing and publishing -- particularly at the high end of this market.

While data compression has been one way to approach the problem of how to handle the data density required by print, the development of broad bandwidth networks is another possible solution.

In Japan we are seeing a tremendous amount of activity on the part of the government to promote and install fiber optic links. This activity is being supported by many of Japan's larger printers who are looking to these networks to provide linkage between production facilities in suburban locations and those located in the higher rent areas of Tokyo.

The implementation and use of satellites and T-1 links has become more common in the U.S.A., in part due to GTE's "Prepress Express" which responds to the particular requirements of the graphic arts, both in terms of flexibility and price.

## Digital Data Exchange Standards (DDES)

The continued development of digital data exchange standards (DDES) for the graphic arts industry will play an even more important role as the graphic arts moves more into electronically integrated publishing. This actiivty, which began in 1985, has successfully completed its first generation of standards development.

In the future we will see system architectures designed around these standards, which will provide more continuity and more flexibility to the EIP evolution.

While there remain serious technical challenges it would appear that if the graphic arts industry continues along a sensible line of development that it could quite possibly accomplish true EIP within this decade.

It will need to of course, if it wishes to capitalize on the growth of color which DTI is predicting will double within the next five year.