

# Printing and the Internet

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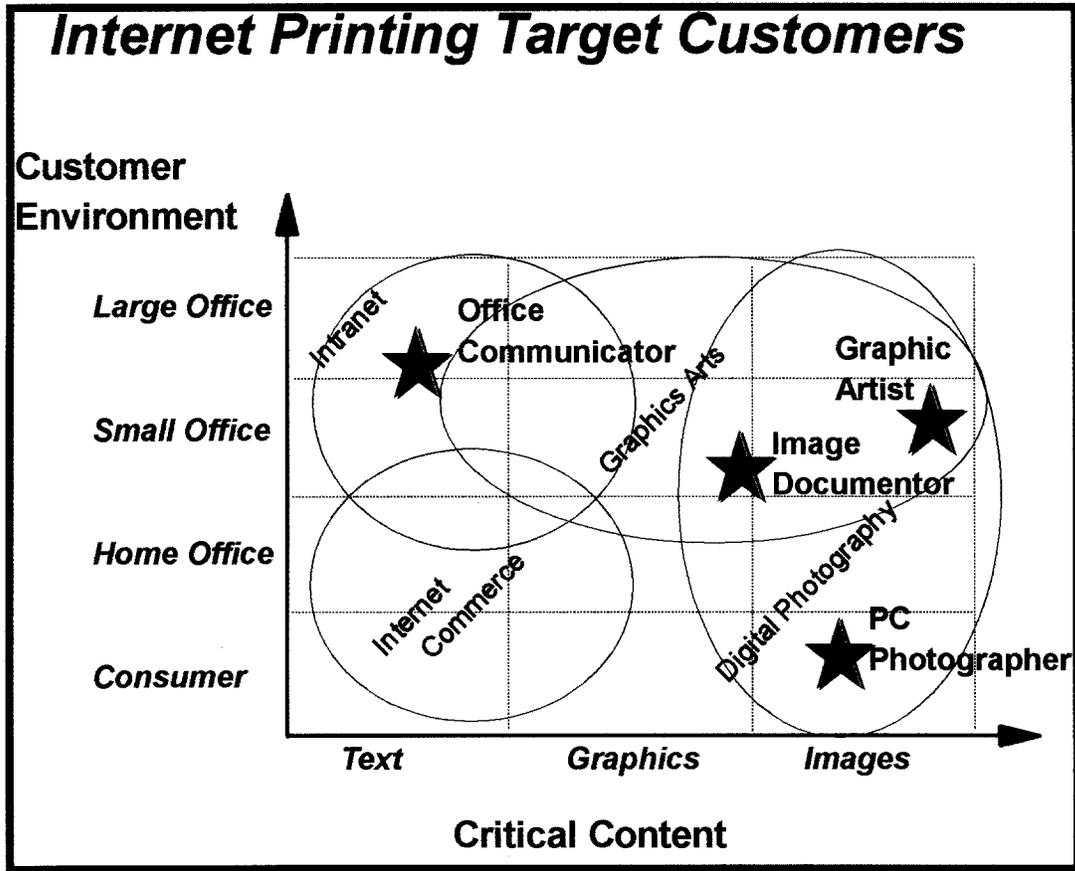
When I attended a World Wide Web technology conference in San Jose last year and introduced myself as being from HP, and from the Inkjet Printer Group in particular, the question I repeatedly heard was “Why are you here, this show is about the Web, not printing.” The Web implies sound, video, surfing, fun,... but not printing. One speaker at another event went so far as to describe printing as “the roadkill on the information superhighway.” The paperless society is coming, and its point man is the World Wide Web. So much for the experts. We decided to ask customers. In focus group we asked customers about their experience with printing on the Web. The answer we got was:

“Oh, it’s fine, no problem. Except now that you mention it, the colors aren’t even close, and all the images are blurry, and you cant format the pages or print just what you want, and the images spill over from one page to the next, and there is too little control of fonts and page layout. You know,... it’s really awful. Can you guys fix that?”

The answer is yes, we as an industry can fix that. And when it is fixed, printing will play a vital role in business and commerce on the web. Let’s examine what needs to be fixed, and how we are doing as an industry to improve the situation for our customers.

Any engineering or technology discussion must begin with “The Marketing Question: Who is the Customer and what do they need?” In our consideration of printing on the Internet, this is a critical question, since the user needs and necessary elements of the total solution vary widely across the market segments. In the diagram above, I offer one such arbitrary segmentation model.

On that diagram are identified several key target customers who have differing printing needs. The key target customers that I picked for this discussion were:



CUSTOMER	CHARACTERISTICS
Business Communicator	Text/fact oriented Little investment in pleasing appearance Info consumed by business communicators Printing mainly on monocolour laser printers Intranet
Graphic Artist	Highly trained page designers Heavy investment in processing power and color Historically Mac and Postscript based Lead time savings justifies investment
Image Documentor	Documentation via images enables solutions Insurance, Real Estate, Appraisal Documentation Imaging Product info and Portfolios
Consumer Photographer	Emerging market, low awareness Large files, low bandwidth access Potentially huge market

A key industry trend that spans all these customer environments is the emerging capability of the information infrastructure to support distribute-and-print as an alternative to the traditional print-and-distribute means of getting printed material in the hands of its intended customer. The implications here are enormous both for the producers of the contents and for the computer printing industry. Of the billions of pounds of paper that get printed every year, mostly in the traditional broadcast printing paradigm, only a few per cent are produced on the computer printer. Over 97% are produced in various "plate-printing" processes in the form of newspapers, catalogues, magazines and the like. If the traditional printing segment slides to only 94% of that total, the amount printed on computer printers will *double*, and our industry will experience significant growth. The technical enablers of this revolution are now starting to be commercialized, and the benefit to the customer is becoming visible, so the question is no longer "if" this transition will occur, but only when and how widespread the distribute-and-print model will become.

The printing can be further defined as being "over" or "from" the Internet.

Printing *over* the Internet moves printable data from a source device to a target printing device via the Internet. Examples would be from the Mac workstation of a graphic artist to a distant service bureau proofing printer, or perhaps from a network scanner in an office to a network printer down the hall. Both of these examples utilize a "push" model of printing.

Printing *from* the Internet implies print or image files that reside somewhere on a server and the user "pulls" that data to a target printer, either in a local or remote location.

Technology and solutions on the World Wide Web evolve at a frenetic pace. It has been said that time passes more quickly on the Internet. Web years are like dog years: They pass at a rate of about 7 Web years to a human year. Given this acceleration, this paper, written 3 months prior to the conference cannot deal with the latest solutions that will be introduced prior to conference time; the conference presentation will deal with these late breaking announcements. In the brief space available here, consider one ex-

ample of immense interest to vendors seeking to open the customer Internet printing environment.

Each of the target customer segments identified above can produce its own Pareto Chart of the most frequently encountered problems with Internet printing in their market segment. To select one such example from that list, customers in the Home Consumer segments report "fuzzy" or "blurry" images as the number 1 Pareto problem on their output printed *from* the World Wide Web. This results from printing on a high resolution printer the images designed for a 72 dot-per-inch monitor screen display.

One new technology, as of the submission date of this paper, which can contribute to the solution of this customer complaint was announced at COMDEX, June 1996: the FlashPix file format. This new image format definition stores JPEG compressed images along with subsampled copies of the image, all in the same file. Each subsampling is 1/4 the size of the previous level, all the way down to a small thumbnail. Since the pyramid levels are independent of each other, there is little computation burden, such as would be required to assemble an image from its compressed residuals. All resolution levels are tiled into 64 × 64 pixel tiles that can be addressed independently. Each level and even each individual tile can be JPEG compressed independently and to different compression ratios. These features have several positive effects for Internet based imaging models, and for printing in particular. From a single file on a server, servers can serve web pages with images for display at 72 dpi, and retransmit whatever higher resolution copies of that image are required to provide maximum quality printing on whatever printer that page may be directed to for printing. Server loading can be minimized to retrieving tiles if that is the goal of the particular server environment; decompression and image manipulation can be distributed to the client. Several other features of the file format lend themselves to the development of profitable businesses which rely on printing.

FlashPix will be provided to the industry as an open specification, free for anyone to use without license requirements, fees, or royalties. The specification is copyrighted and owned by Eastman Kodak, having been designed in

collaboration among Kodak, Hewlett-Packard, Microsoft, and Live Picture Incorporated. The format is defined in the specification available from Kodak as well as in a set of test images and procedures, called the Interoperability test suite, intended to establish reliable interoperability across all applications and platforms which support this standard. More information should be available by conference time and from the Kodak web site.

In the recent past, printing from the Internet and World Wide Web has meant the occasional printing of information that was primarily intended for display. But as the

Internet matures, and web content transitions from entertainment centric to include more commercial usage, printing and design of Web content with the intention that it will be printed, will become more persuasive. Key technologies which will enable high quality printing, and which facilitate the development of profitable business models utilizing printing over and from the Internet are coming to market at an increasing rate. Those which are positioned as low cost, open standards will become pervasive.

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