Opportunity or disaster?

Brian Gaines

At a time of deepening recession, new opportunities are sometimes essential to survival. But opportunities for whom and for what? One man's opportunity may be a second man's problem, or a third man's disaster.

In the printing industry, some changes in technology that have provided major opportunities for equipment suppliers have been seen as major sources of problems by customers, and potential disasters by employees. Also, the 'opportunities' of new technology arise only in small part because old problems have been solved. Many arise through the new problems that the progress creates, problems never advertised as a significant feature of that 'progress'. Other opportunities arise in entirely unexpected ways as social patterns change to adapt to new technologies.

No one is in a position to predict accurately the impact of digital technology on the pre-press business. It is bad to be too early and suffer the growing pains of technology that may even be by-passed before it becomes effective. It is also bad to be too late and lose a market that no longer requires obsolescent technology.

Projections of 15 years ago that newspapers were threatened by the growth of domestic electronic communications have proved absurd in retrospect. Yet it would be unsafe to assume that it was more than the timing that was incorrect. A good rule of thumb is that at the point when it is generally believed that such predictions are wrong the predicted phenomena take place. Is there yet any erosion in the sales of the *Radio Times* because of the availability of programme information through Ceefax? It is probably imperceptible as yet. We are still below the take-off point on the curve of domestic electronic communications. What we see currently across the world in terms of videotext, cable TV, low-cost facsimile, and electronic mail, are all experiments that will probably all prove to have it wrong in some way. They are precursors, however, of new information services that will surely some day impact our current industry.

New technologies offer two kinds of opportunity. One is the ability to achieve current objectives with different knowledge and the other to achieve different objectives with current knowledge. In the pre-press business we have new developments within the current framework and new developments that allow diversification outside. An example of the former might be a newspaper using electronic displays to make up a page, and of the latter a newspaper using its stored text as the basis of an electronic information retrieval service. This is not an absolute distinction because many opportunities involve aspects of both types of development.

Broadly the pre-press business has three stages: capturing information, processing it, and putting it into the form of an image usable on a printing press. Usually it is considered to begin after the information content has been specified, so that the prime task of information capture is to a form convenient to the equipment in use. The most common specifications currently are through: typed text with hand-written annotations as to image format; ink drawings drafted for photo-reproduction; and photographic images. The information capture techniques currently used are keyboards for text and cameras for drawings and pictures.

Many of the skills involved in the pre-press business are generally applicable to a variety of other forms of information dissemination. This industry is still the prime source of information capture in digital electronic form. It is clear that the newspaper will long remain the best way of getting a package of diverse information to a wide range of people in a rapidly available and easily used and transportable fashion. However, it does not form the basis of effective archiving and selective information dissemination and retrieval systems. The supply of such services is a

Graphic examples of the Canadian Telidon System

major new business opportunity that is a natural diversification of the current activities of some newspapers.

Book publishers also are aware of the value of many works in computer-compatible form. This is clearly so for reference works which have always deserved to be classified as 'databases'. It is also true of textbooks, now that computer-based educational systems are coming into routine use. Even routine literary works have added value in computer-compatible form since there is a substantial academic industry concerned with the computer-analysis of such works, and it expends much potentially avoidable effort in keyboarding them into computers.

The limitation of computer databases to textual material has restricted the electronic dissemination industry. However these restrictions are fast disappearing and the alternatives to paper and ink will become increasingly important during this decade. Thus the term 'pre-press' should eventually become an anachronism for an industry that will be increasingly concerned with information capture and processing it into the form of images usable on a wide range of information presentation technologies.

The main impact of digital electronics on keyboards so far has been slight — to replace mechanical with electrical linkages. This has enabled simplified keyboards to be used in some applications in which keys are electronically renamed. The main impact of electronics on text capture has yet to come. Optical character recognition (OCR) techniques already allow much typewritten material (without hand annotation) to be captured directly. However, OCR techniques assume that text has already been typed and hence keyboarded. Other systems are being developed that go back to the prime forms of the text, such as speech or handwriting. We already have primitive recognisers for individual characters carefully handwritten and for a small vocabulary of isolated words carefully spoken. Massive effort has been expended on these developments during the past 30 years to little avail and many despair of success; but it will occur and speech-driven typewriters will be common in the late 1980s.

However, these phenomena are most likely to take the process of text capture away from the pre-press business rather than allow it to integrate vertically down toward the prime source. The decreasing cost of all forms of text capture and editing systems has created a new market for word processing where equipment is primarily digital electronic and hence smaller and cheaper from year to year. Already small keyboards with displays and editing facilities are available that enable reporters and authors to capture text as they travel or work at remote locations or in their homes. Word processors are becoming routine equipment that will be used by all as an alternative to handwriting. The major market for the new techniques of handwriting and speech recognition is in the office and home. Thus we can increasingly expect text to be already captured in electronic form and the keyboarding aspect of the pre-press business itself to decline.

This direction of change clearly creates many problems, but it is also the source of opportunities. There are no standards for storage of text information on word processor discs. The printer who aims to accept a major amount of text captured in this way must either persuade his customers to adopt common standards or be prepared to accept text on a range of media in many different formats. The keyboarding may go but new specialist knowledge and skills will be required to cope with the range of modems, tapes, discs, file structures and so on that will be used for text transfer. There will be attempts at standardisation, but they will be too late and there will be a major commercial opportunity in being versatile in what can be accepted as captured text. That is one possible scenario. Perhaps, instead, the convention will become to use a (computer-typed) typescript as the main medium for communicating captured text and to enter it through an OCR machine. It is variables like this, and the possibilities of being first to guess right and get the timing right, that create commercial opportunities.

The state of image capture is different again. Workers in the computer industry have realised the significance of text processing and made major developments, but 'graphics' has been regarded as a specialist requirement, not yet part of the office equipment market. Attempts during the past four years to operate 'electronic journals' in which academic papers are written, refereed and published through remote terminals on a timesharing computer have failed largely because such systems can currently cope with text only, not diagrams, graphs and other pictorial material. However, again the pace of change is rapid. Today the cost of terminals capable of displaying line drawings as well as text is about the same as that of text alone terminals three years ago. The current generation of low-cost matrix printers for 'home' computers nearly all have a 'graphics' capability enabling line drawings to be printed using dots at 50 to 100 to the inch. Business graphics programs now in widespread use enable graphs, bar charts, pie charts, and so on, to be created from data supplied in a simple and natural way. We may expect the graphic capabilities of word-processors to become major features during the next few years.

In information processing the specialist professional skills necessary to the pre-press business become more significant. Anyone can type a manuscript but marking it up for style, typefaces and layout is the job of a specialist. Is this true? The evidence is not yet available. In the past, typesetting equipment has been specialist machinery not generally available and it has been sensible to leave its control in the hands of a few. Only recently have University Computing Centres begun to make phototypesetters available as general-purpose output devices. Only recently have low-cost printers become available that offer a range of typefaces and sizes. We have yet to see the effect of these developments in making typography of interest to the computer industry. However, already Donald Knuth's TEX language is being considered by the American Mathematical Association as a standard specification language for communicating displayed mathematical formulae. One of its features is the automatic layout of mathematics to conventional typographic standards.

There have also been major advances in the technology for processing pictorial material. Graphic computing techniques were developed very heavily by many firms in the 1970s with NASA funding and these are now becoming available in the printing industry. We can now have complete electronic colour pictorial systems that enable the graphic artist to work at an electronic easel and cut and paste, scale, mask, change colour and so on, in a composite image with great ease.

At the output unit, the trend toward digital electronics in typesetters and scanners has finally given back to us the flexibility of hand caligraphy but under computer control. If we look back to the invention of printing we can see this as freeing the user of the paper and ink medium from the restriction of producing only one copy at a time. However, the invention of movable type placed severe restrictions on the use of the medium although it made uniform legibility easy to achieve. Because Roman faces are basically geometric the restrictions in form of the type faces have been acceptable to most users. Completely different approaches have had to be taken to the reproduction of artwork. Still today the pre-press business comprises distinct divisions for typesetting and camera work with colour scanning being a separate activity in its own right.

Digital electronics has now given us the capability to remove the barriers between these divisions. A digital output unit on a phototypesetter or colour scanner represents an image as an array of minute dots (or 'pixels'). The characteristic of each dot is held in a corresponding array of numbers in digital form: the values meaning 'ink' or 'no-ink'. With over a million pixels in a square inch, the discrete nature of the image is not apparent to the eye and the digital numbers stored represent a continuous image. Any image whether type, line-art, half-tones or any mixture of these, can be generated, represented, processed and output in this form.

Thus we have the technology to process the complete pages of books, magazines and newspapers, to cope properly with the calligraphic scripts like Chinese and Urdu, and to adjust the form of a character within the typesetter to give the correct final image taking account of the paper and ink to be used later. We are able to manipulate arbitrary images of any form or combination of forms. The opportunities created by the availability of such general image settings are very wide. It will take much effort and imagination to exploit them fully.

That sounds like progress. However, we have to remember that the user of a printing system does not actually want control over every minute dot of ink on the page. He actually wants to set type, reproduce photographs and so on. Thus, most of our effort with the new technology is the struggle to make it behave like the old: to get computers to understand about type faces and typography, about line drawings and half-tone reproduction. In essence, we have to bring the new technology back under control of the user and, given its tremendous flexibility and capability to make up whole pages at a time, this is not easy. With much modern technology we have generated machines and are desperately trying to make them tools. In printing, automation creates uniformity where there is no necessity or desire for it and we lower standards by attempting to take on machines decisions that are better left to people.

A new Index of Typefaces

Richard Southall

The advent of photocomposition and dry-transfer lettering has let loose an unprecedented flood of new typefaces on the world of graphic design. But is the flood, expressed in terms of the number of type designs with new names appearing on