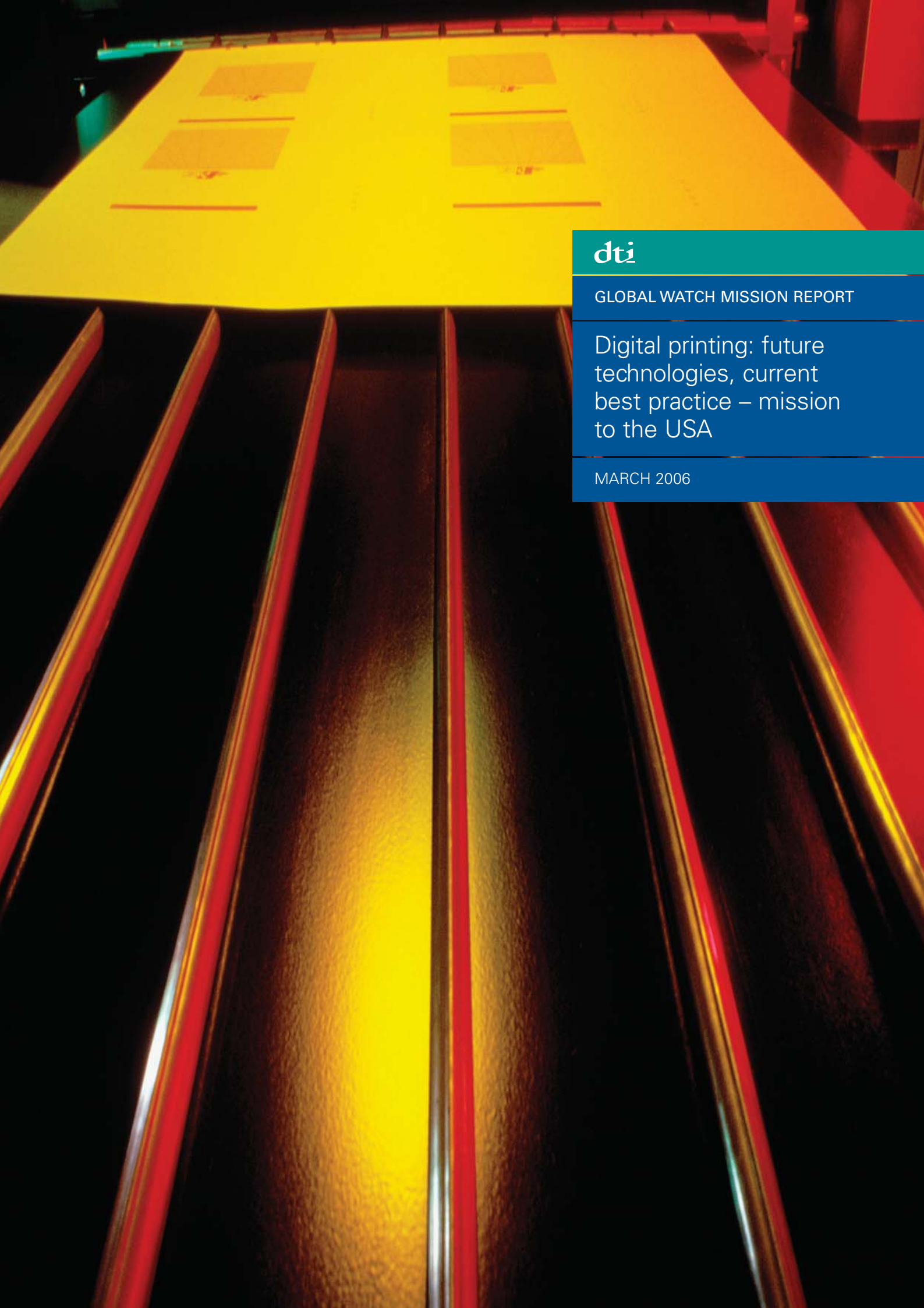

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GLOBAL WATCH MISSION REPORT

Digital printing: future technologies, current best practice – mission to the USA

MARCH 2006

Global Watch Missions

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Digital printing: future technologies, current best practice

– mission to the USA

REPORT OF A DTI GLOBAL WATCH MISSION

MARCH 2006

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Report printed by ProCo Print Ltd:

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FOREWORD AND ACKNOWLEDGMENTS

Mike Hopkins
Director of Membership, BPIF

The printing industry has and always will be an industry in a state of change. Ever since Gutenberg made his monumental step in the late 15th century, change – as they say – has been the only constant.

So why is digital printing different? Is it not just another way of putting intelligible marks on paper? Viewed at this level the answer is yes, but there is more to digital printing than meets the eye and it is the new opportunities that are opening up that, in our view, make the various digital printing techniques which are currently and potentially available the most exciting technological development since Gutenberg.

The British Printing Industries Federation (BPIF) has always strived to be able to bring to the industry the newest practical ideas to help keep the industry a vital part of the communications industry. We regard the DTI Global Watch Service as vital to this. Although the UK is regarded, quite rightly, as being in the forefront of printing technology applications we do not have the monopoly on good ideas! It is for that reason that we have used Global Watch Missions in the past to bring new ideas to the UK market, and it is precisely for those same reasons that we looked to the USA to bring us new ideas in digital printing. However, we did not expect to find a complete new 'Holy Grail', and alongside some new ideas we expected to find confirmation that the UK was already doing some great things in digital printing that we could quite rightly celebrate.

We thought carefully about the actual area to visit and settled on upper New York State because of the almost unique combination of printers, digital printing manufacturers and a world-renowned seat of learning focused on the printing industry. We wanted to see the impact of these three working in harmony for the benefit of the industry as a whole, and to learn any lessons for the UK.

BPIF maintains good international relationships and it is those that helped us to put together the programme of visits. We are particularly grateful to the Printing and Imaging Association of New York State (PIA of NYS) and its President Tim Freeman, who helped by suggesting companies we could visit and then approached the companies on our behalf.

We would also like to thank the DTI Global Watch Service, especially Farida Isroliwala, for support and advice in putting the proposal together.

Finally, I would like to personally acknowledge the contribution, support and good humour of my colleagues from the printing industry who took part in this mission. Only they will know of the time that they voluntarily gave up to prepare for, take part in and to contribute to the final report and dissemination. I think that they represented our industry very proudly and this report will fully testify to that assertion. I hope that you enjoy reading it and that it helps your business to prosper.

EXECUTIVE SUMMARY

A 2006 study by Cap Ventures noted that:

'The digital production color market will grow 20% a year through the end of the decade, creating radical shifts in revenue and page volume and transforming the face of the printing industry.'

With such projections and opportunities in mind, this mission was timely. As part of the DTI-funded mission, representatives from the UK printing industry visited the Rochester/Buffalo region of the USA. The area was chosen because of its cluster of technology providers (Kodak and Xerox) and the presence of a world-renowned academic institution, Rochester Institute of Technology (RIT) and a high number of leading digital print solution providers.

The DTI Global Watch Mission was coordinated and led by the British Printing Industries Federation (BPIF) and took place in March 2006. Its objectives were to seek out the best market-driven applications of digital print and engage with academics and technology manufacturers to understand future technology developments and applications.

Identifying new markets and products

Contrasting approaches were noted to identifying and pursuing new markets. For one, a main impetus for innovation came when a pharmaceutical company required variable data and numbering to be printed on drug information sheets. Others grow new markets from existing customers, focusing mainly on education and servicing new casinos with variable colour vouchers and direct mail advertising.

Elsewhere, companies are promoting short-run books and demographic-based marketing using variable colour. ColorCentric Corp – the subject of a case study in this report – has identified a new market for ultra short-run book printing and markets its products via value-added retailers (VARs) using specialist websites such as Lulu.com, Google and Yahoo.

Integration of the Internet into print technology

Some companies have made the Internet integral to their business and are using it to drive volume and applications, while others are struggling to understand how an Internet-integrated solution can work. There is a general understanding that the Internet can be a means of reducing the supply chain, allowing companies to create new business with new technology rather than focus on the migration of offset.

We found that print organisations in the USA are falling short of true integration of the Internet into print technology and that the concept of a 'printanet' is some way off. Web links and e-mail marketing are allowing businesses tighter control of their marketing, but the impetus is to drive volume, not exploit the available technology.

Direct mail and transactional print issues

One of the most interesting perspectives on the future development of digital print as a transactional vehicle was provided by Kodak NexPress. There is a future market for this as the cost per page reduces. Kodak is actively promoting using the business document itself as an advertising vehicle.

These are sometimes referred to as 'transpromo documents'. Echoing this, Xerox has been researching a colour machine that will print fit-for-print business documents at a reduced cost.

Niche markets and models of profitability

The prime example of a niche market is that for short-run book publishing, which ColorCentric is servicing successfully and which Kodak NexPress also identified as an emerging market. Lazer Inc has expanded into digital asset management and is now offering its services on a consultancy basis.

We doubt that a single ideal model of a profitable digital printer exists. In their own way, each of the organisations visited is following its own model effectively and successfully. Professor Frank Cost of RIT proposed that the way forward is to follow the basic model of producing shorter and shorter run lengths for more and more people.

Interaction with technology suppliers and universities

The focus in the USA, as evidenced by what we saw in Rochester and Buffalo, is more on technology advancement and partnerships with the printers than on volume/market development, whereas the UK is more focused on the end user.

There was much greater evidence of interaction with academic institutions and of a strong appreciation of its value to the industry. RIT is a key part of the area's infrastructure as well as a fabulously equipped facility. RIT has truly integrated itself into the print supplier network, for example by testing materials and inks. However, although deeply impressive, RIT's significance as a world learning facility does appear to diminish only 70 miles from its location. In some senses, its economic, social and cultural impact is quite localised.

Adoption of new technologies

Most of the organisations visited shared the view that, while it was once true that the big manufacturers drove new technology, this has completely changed and the market is now the prime driver in its adoption. As the market is buoyant and margins very profitable compared to traditional print, the cost of digital print is not seen as an issue in inhibiting wider adoption.

As both a stand-alone technology and as an integrated technology, digital print is very profitable in the USA at the moment. Even those dealing in small volumes see digital print as a profitable business model. Academic institutions such as RIT clearly have a major role in challenging the market to drive adoption of new technology but the onus is on all areas of the industry to maintain the drive by working in combination.

New developments/technologies

These were some of the specific developments highlighted by our hosts as having the greatest potential:

- Developments in inkjet technology will aid the take-up of 'transpromo' applications, combining transactional printing and commercial printing
- Near-line finishing using press technology offers the benefit of speed, smoother handling and no waste
- Micro-capable inks
- Greater colour accuracy linked to pricing will bring new ways of costing
- Auto-optimisation of images
- In-line ultraviolet (UV) coater currently under test
- Colour and gamut mapping will increase colour opportunities
- Incremental improvements in electrophotography technology to improve speed and quality

Beyond these specifics, our hosts identified areas where existing or new techniques (or a combination of both) are likely to have the most impact, including:

- Improved understanding among printers and clients of data, particularly with regard to tracking of responses
- Greater focus on distribution of products, packing and shipping
- Greater efficiency, speed and flexibility in book production
- New avenues in book production, eg high-value medical books
- Greater focus on improved image quality, productivity and reliability rather than speed or lower prices
- E-mail portals and web developments are set to be more and more important in purchasing decisions
- Short message service (SMS) messaging in combination with printed matter, SMS proofing and job tracking were high in the thoughts of the more advanced companies visited

If ink-jet can combine the quality of its large format with the speed of its small format (like Versamark) then it offers an outstanding business proposition. The speed and versatility would be very difficult to ignore and would allow pricing to be much closer to offset on larger runs.

Efficiency and workflow

The primary emphasis is on lean manufacturing as a means to increasing productivity. For Xerox, an integrated workflow allows the narrowing down of the supply chain and consequently a reduction in costs and time. FreeFlow is an integrated workflow solution that combines with management information system (MIS) and cross platform to fully integrate all aspects of production, both offset and digital.

The mission team's view is that having one workflow to suit all platforms will be central to increasing both presses and clicks. We also foresee it moving into the MIS market, as in FreeFlow and SMART Board, by linking into current MIS systems to analyse business needs. This will enable digital technology to become the backbone of commercial printers rather than an add-on production capability.

Portable document format (PDF) is seen as the most important way of working. There is a lack of understanding of, or inclination towards adopting job definition format (JDF) technology.

Digital sales people – a separate breed?

The mission team gained no real sense that digital sales people possess or require any different characteristics to those selling conventional print, beyond the technical competence and knowledge to understand data and information technology (IT) issues.

There was general agreement that sales people do need to adopt a certain digital mindset, focused on selling the value of the solution to the customer rather than the cost per copy. Solution sales encourage goodwill, repeat business, customer retention and word-of-mouth referral.

RIT is also an ongoing source of training in specific skills – both technology- and sales-based – for companies and relies upon them for approximately two thirds of its training revenue. Otherwise, the main sources for training of sales staff are suppliers, which offer essential product training and case studies, and trade associations which offer specific digital print training.

Trade associations

Promoting the interests of the graphic communications industry in this corner of the

USA is the Printing and Imaging Association of New York State (PIA of NYS). Membership also covers the Printing Industries of America (PIA) and the Graphic Arts Technical Foundation (GATF) and access to the Graphic Arts Information Network (GAIN). PIA/GATF and its affiliates deliver services that enhance the growth, efficiency and profitability of the industry through advocacy, education, research and technical information.

An example of the PIA/GATF effort in promoting the digital print industry is the Digital Printing Council (DPC), established in January 2006 and including Adobe, Canon, EFI, Hewlett Packard, Kodak and Xerox among its sponsors. PIA/GATF has declared 2006 'the year of digital print'. DPC initiatives for the year include the Marketing 4 Digital (M4D) educational outreach programme.

Education levels and recruitment

With regard to recruitment and skill levels, the organisations visited in Rochester and Buffalo had a similar profile to their UK counterparts. Within the more production-based companies, the majority of employees are below degree level. Within the more prepress and Internet-business based companies, a high proportion of employees have a higher education background. In some companies, up to 35% of the workforce have degrees.

We noted significant differences among graphic arts companies in terms of recruitment criteria, educational background of employees and interaction with academic establishments such as RIT. The main reason is the nature of the demand of companies for highly science- and technology-based input. There appeared to be a higher percentage of graduate employees within the companies visited than in the UK.

Lessons for the UK print industry

The UK digital printing industry needs to be more aware of the existence of knowledge and expertise among several academic establishments and more proactive in approaching them regarding collaboration. At the moment there is no field (apart from UV technology) in which the UK print industry could claim to be leading the world.

UK government also needs to recognise that the printing industry is under major pressure to improve its competitiveness and maintain its international position. Relevant government departments need to consider funding initiatives through BPIF and the universities which would be aimed at improving that competitiveness. To date, the UK's national government has done little in this regard, although regional government has been more proactive.

Conclusions and recommendations

The mission team found many learning points and make the following observations:

- The most creative use of the web we saw was by ColorCentric. Its model of printing books on demand enables books to be kept in print at no investment cost, with huge cost advantages for academic/medical publishers with niche markets.

- Whilst digital asset management is not a new technology, its commercial application is a promising new field, offering a total data and prepress solution to clients and consultancy services to users of digital print technology.

- The market for data-driven variable colour printing for direct mail marketing is growing. There is a need for improved understanding of data among printers and clients, particularly regarding tracking of responses.

- There is potential for growing litho business out of the colour digital business. Mercury Print Productions' litho sales have increased as a result of digital because of its ability to offer a total solution.

- Strong opinion was voiced among our hosts that combining technologies – ink-jet, offset, digital, online – is the future.

- We anticipate new developments in ink technology and colour accuracy with special inks. This will not only develop the offering from the manufacturers but will allow specific applications such as packaging to move to digital.

- The onus is on all areas of the industry to maintain the drive to adopt new technology by working in combination.

- 'Transpromo' documentation – ie using transactional documents to carry promotional messages – is a major growth area.

- The casino market is massive in Rochester, and has the potential to be a part of digital business in the UK should 'super casinos' take off.

- One of the strongest messages to come through was the value of lean workflow and production, both as a cost saver and as a means of reducing the supply chain and speeding up the operation.

- Lean manufacturing and internal procedure streamlining is seen as an essential part of maintaining margin. Those organisations which are really exploiting digital have an automated online presence, workflows, front ends and finishing.

- No organisation can build a business around off-the-shelf software. Bespoke systems are the key to success as long as they are placed at the heart of the business.

- In the PDF v JDF debate, the former is winning. A common view is that PDF works perfectly, so why change?

- Sharing of information, opinion and technology within the UK industry is an area for improvement and/or development.

- Compared to the USA, where companies actively sponsor research, the UK print industry does not do enough to exploit academic resources for software development.

- The UK printing industry should be more aware of the existence of knowledge/expertise in academic establishments and more proactive in collaborating with them.

- UK academic establishments need to work more closely with BPIF to bring more in-depth technical knowledge and expertise to the industry – eg by encouraging print professionals to lecture/advise on academic courses, as at RIT. Joint initiatives between BPIF and universities are likely to be most effective.

- Industry and academia should be sharing their experience, expertise and requirements – for example, for testing and research. The US tradition of internships for students has no real parallel in the UK.

- The UK print industry should be looking to attract a wider spread of graduates – especially from the sciences – to complement those entering the industry via established vocational routes.

1 MISSION OBJECTIVES AND CONTEXT

1.1 Background to the mission
1.2 Aims and objectives
1.3 Mission focus, scope and itinerary
1.4 Mission delegates

'Once you understand the true nature of the new medium of print, you begin to realise that the possibilities for future business opportunities are nearly boundless. The only necessary condition in each case is the need or desire for some kind of material communication product.'

(Frank Cost, *The New Medium of Print,* RIT Cary Graphic Arts Press, Rochester, NY, 2005)

1.1 Background to the mission

Predicting the future can be a dangerous pastime in any field of commerce or industry. Alexander Graham Bell, inventor of the telephone, wondered if he would live to see the day when there would be 'a telephone in every town'. In 1943, IBM Chairman Thomas Watson famously remarked that 'I think there is a world market for maybe five computers'. As recently as 1981, Microsoft Chairman Bill Gates opined that '640 K ought to be enough for anybody'.

The problem with not keeping up with future technology is the obvious one of missing opportunities. For the printing industry in the UK, this is an ongoing concern heightened by the speed and multifaceted nature of technological change over the past decade. The experience of the digital print industry in the USA in pioneering and applying new technology has always been instructive, and exploring this experience was one of several aspects of two previous Global Watch Missions to California, in 1998 and 2003.

A sense of where the US digital print industry is going can be gained from a study by Cap Ventures in 2006, entitled *The Evolving US Digital Color-On-Demand Printing Opportunity.* The study noted that:

'The digital production color market will grow 20% a year through the end of the decade, creating radical shifts in revenue and page volume and transforming the face of the printing industry.'

This is an impressive and challenging projection with obvious implications for the global market in digital print and for UK printing companies in particular.

With such projections and opportunities in mind, DTI funded a mission of representatives from the UK printing industry to visit a number of their counterparts on the east coast of the USA – specifically, in the Rochester and Buffalo areas. Global Watch Missions form a key part of DTI's commitment to helping British businesses identify, access and transfer knowledge and technology developments from around the world. The mission was coordinated and led by BPIF, the trade association for the UK printing industry, and took place during 20-24 March 2006.

1.2 Aims and objectives

The specific objectives of the mission were as follows:

- To seek out the very best market-driven applications of digital printing technology
- To engage with academics and technology manufacturers to understand future technology developments and applications

Having investigated how the US printing industry is using current technology, together with the current state of academic and technological research, the mission team would then disseminate its findings via a report and seminar, with a view to:

- Assisting the UK printing industry in growing the market for profitable print as a communications medium, by bringing to it new market opportunity ideas incorporating the use of digital printing technology
- Helping printing companies improve their profitability by exposing them to the best in current practice from their peers in the USA and future technology developments from US industry's leading companies and research universities
- Highlighting current best practice and technological developments by means of case studies of companies which are working in the 'real world'

Within these parameters, the main themes that the mission team sought to investigate were:

- The role of printers in emerging technologies
- The role of manufacturing best practice in digital print
- Whether cost reduction or market development drives adoption of new technologies
- The creation, extension and development of new markets for products and services
- The role of the Internet in the above
- Whether printers generalise or specialise in the services they offer
- How the digital message is marketed
- The availability, provision and role of education and training in the US printing industry
- The role of the trade association in productivity improvement, training and digital market development

1.3 Mission focus, scope and itinerary

The focus of the *Learning by Seeing*[1] mission in 2003 was the printing industry in California at a time of economic downturn exacerbated by the dot-com failure. For the 2006 mission, mounted at a time of relative economic buoyancy, the focus was exclusively the digital printing industry in the USA.

The reason for this particular focus is that the printing industry is mature in its technologies, with many of them offering little or no market growth. Digital printing, which first made an impact in 1993, is one of the few areas of the printing industry in which the development of the technology has the potential to develop new markets and so allow printers to grow turnover and profits.

Recently published research by Cap Ventures bears this out. It shows that demand for digital printing – and especially colour digital printing – will show a startling growth in the UK of 12% compound annual growth rate (CAGR), from €4.8 billion (~£3.3 billion) to €8.5 billion (~£5.9 billion). The value of colour retail sales of digital print is set to increase dramatically from just over €1.5 billion (~£1.0 billion) in 2003 to over €5 billion (~£3.4 billion) in 2008.

In the USA the print industry is enjoying a period of relative buoyancy after the difficulties of the late 1990s and early 2000s. The industry as a whole appears to be getting leaner and smarter: although turnovers have decreased, the numbers employed are also down significantly – from 97,732 in New York State in 2000 to 79,589 in 2004.

As well as focusing exclusively on digital printing, the mission team chose to narrow its investigations to the Rochester and Buffalo areas of New York State. The area was

1 *Learning by seeing revisited – the second BPIF mission to the printing industry in California, September 2003,* DTI Global Watch Mission Report, URN 04/541, 64 pages, published March 2004: www.globalwatchservice.com/missions

chosen because of its unique cluster of technology providers (Kodak and Xerox) and the presence of a world-renowned academic institution, Rochester Institute of Technology (RIT), as well as a high number of leading digital print solution providers.

The mission itinerary included visits to the research laboratories of Xerox and Kodak NexPress, and to RIT, as well as a number of companies identified by the Printing and Imaging Association of New York State (PIA of NYS) as being committed to using digital print as part of the future development of their businesses.

1.4 Mission delegates

The mission team comprised the following members:

- **Mike Hopkins**
  Director of Membership
  BPIF

- **Jon Bailey**
  Digital Services Director
  ProCo Print Ltd

- **Dr Long Lin**
  Deputy Head of Department
  Department of Colour Chemistry
  University of Leeds

- **Richard Knowles**
  Chief Executive
  Buckingham Colour Group

- **Scotch Kirkpatrick**
  Managing Director
  Datagraphic Ltd

- **Tim Browning**
  Group Director, Digital Systems
  HenDi Group

- **Geoff Thould**
  Managing Director
  Cyclic Digital Print Ltd

Further information about the mission members and their organisations is provided in Appendix A.

Exhibit 1.1 *Mission team outside hotel in Buffalo, NY; L to R: Richard Knowles, Jon Bailey, Dr Long Lin, Tim Browning, Mike Hopkins, Scotch Kirkpatrick, Geoff Thould*

2 NEW MARKETS FOR PRODUCTS AND SERVICES

Richard Knowles, Scotch Kirkpatrick

2.1 Identifying new markets and products
2.2 Role of the Internet
2.3 Direct mail and transactional print issues
2.4 Customers for digital print
2.5 Models of profitability

One of the objectives of the mission was to draw lessons from the experience of digital print companies in Rochester and Buffalo in identifying and exploiting new markets for their products and services. We were interested in investigating what part, and to what degree, the printer, customers and suppliers play in prompting or leading product/service innovation, and the nature and scale of any interplay with academic institutions.

We also sought any evidence of whether direct mail is migrating towards shorter digitally produced solutions, together with a clear understanding of how the role of the Internet is changing among the organisations visited. Is the Internet now an integral part of workflow or does it still have a primary sales/marketing or communication function?

Other areas of focus included defining who the principal customers for digital print are – buyers, end users or marketers – and the related question of whether our hosts were in the business of offering solutions from a variety of processes or were primarily digital specialists. The latter prompts the question of whether a model of a profitable digital printer exists and, if so, what are the essential characteristics of such a business model? Would the priority be to focus totally on digital print, or to offer digital services among a range of solutions – in other words, to specialise or generalise?

2.1 Identifying new markets and products

Contrasting approaches were noted to identifying and pursuing new markets, often depending on the history and background of the organisation visited and the depth or range of its existing portfolio of services.

In the case of Cohber Press, for example, its markets had originally been developed by working closely with Kodak NexPress. The main impetus for innovation came when one of its major clients, a pharmaceutical company, required variable data and numbering to be printed on drug information sheets for testing. Once the technology was in place, the company then worked with existing clients to develop colour-variable and short-run print on demand. Of Cohber's $19 million (~£11 million) turnover, $5 million (~£2.8 million) is digital, with 60% of that being variable data.

At Kodak itself, the policy is to work in partnership with end users, existing customers and potential customers to identify new markets and products for digital print. The company – which offers a complete estimating and order management service through to billing – has business development specialists who visit potential end users with their partners, and print media specialists who meet with brand managers and other marketing staff to spread the message about the benefits of variable colour digital print. More broadly, Kodak has a strategy to help users of its NexPress equipment to develop new markets.

Like Cohber, Mercury Print Productions has its roots in traditional print, and identifies

and grows new markets from existing customers, focusing mainly on education and casinos. Its digital sales are growing and are expected to reach $10 million (~£5.6 million) in 2006 (out of total sales of $25 million (~£14 million)) and $15 million (~£8.3 million) in 2007. Currently its largest market for digital print is in personalised books for schools and universities, but it has also responded to the establishment of new casinos in the Rochester area by servicing them with variable colour vouchers and direct-mail advertising.
An indication of how Mercury's priorities may be changing is that the company is relocating its digital print division to new 70,000 ft^2 (~6,500 m^2) premises to operate independently from the traditional litho business.

To smooth its own expansion into the growing digital marketplace, the Boncraft Printing Group – which comprises a commercial litho printer, a direct mail company and a specialist greeting card printer in addition to its digital division – has adopted something of a lateral strategy. Not only has the group recently acquired a Xerox 8000 colour digital press, it has appointed a former Xerox executive to support and train its sales force.

The company identifies its markets by training its sales people to research their existing customers and spot new product and service requirements.

Of particular note is that Boncraft is promoting short-run books and direct-mail marketing ideas such as demographic-based marketing – ie mailing in colour to specific sections of the community with relevant products and services, using variable colour within the run.

Like Boncraft, the Buffalo-based Zenger Group has a portfolio of related services including photography; electronic digital prepress; small, medium and large offset printing; poster prints; digital print on demand; and transactional print and mailing. It is a Xerox Premier partner and works exclusively with Xerox to develop its products and services. As with Mercury, there are tangible signs of company investment in and growth of its digital wing – indeed, the company credits its recent growth of 20 to 30% a year to the growth in its digital print operations.

Interestingly, Zenger also describes digital print as being the catalyst for creating additional litho sales. This growth in traditional business is to a large degree due to the group's work with a major partner – Los Angeles-based RR Donnelley. Specialising in the financial services market, Zenger produces personalised financial documents using variable colour or black personalisation overprinted on preprinted litho shells.

If Cohber, Boncraft and Mercury are traditional print organisations which have developed their capabilities in digital print, ColorCentric Corp is an example of a comparative newcomer (founded in 2003) with a very precise digital specialisation. Having identified a completely new market for people who wish to publish their own books – such as photo books, fiction or academic books – ColorCentric's core offer is ultra short-run book printing. President and CEO John Lacagnina explained that, given that only 50,000 of the 500,000 manuscripts submitted to publishers for appraisal every year are actually accepted, his approach was 'give me the losers!' The ColorCentric model enables books to be kept in print at no investment cost, which has obvious advantages for academic or medical publishers with niche markets. There is also potential for personalised photo books.
The company believes that the best way to market its products is via value-added retailers (VARs) using specialist websites such as Lulu.com, Google and Yahoo.

A very different kind of specialisation is offered by Lazer Digital Services, in the form of digital asset management (DAM). Working for major clients including Fisher Price and Sarah Lee, Lazer's studio provides a complete package from photography to web presentation of digital imaging artwork; its service includes the creation of programs and artwork for variable data imaging to be used by digital printers.

Lazer was originally a prepress company but has since moved more 'upstream' to offer a total data and prepress solution to end users, packaging companies and advertising agencies. Describing itself as a graphic communications provider, Lazer specialises in digital imaging, design and mechanical layout, electronic prepress, catalogue and packaging.

Another perspective on the identification of new markets was offered to the team by Oser Press, in many ways a commercial printer of the old school. Oser is a high-quality full-service commercial printer in Rochester whose portfolio includes four-colour process printing, complete bindery, warehouse and distribution. The company focuses on providing quality and service in the short- and mid-range multicolour market.

Of all the companies visited during the mission, Oser is the newest to the digital print market, having only entered the marketplace in January 2006 with the purchase of a Xerox 7000 digital press. The company's principal customer is RIT, with which it has a print management contract. An online print order system is operative, and many of the products ordered online are being converted to short-run digital print. Oser has planned an Open House day to which many of its litho customers will be invited, to promote the concept of colour digital and variable colour.

On the general issue of new markets, we were given food for thought by RIT itself in the form of Professor Frank Cost and Patricia Sorce, who is Administrative Chair of RIT's School of Print Media. The former gave us an insight into on-demand digital printing of books, sold to users via Internet sites such as Lulu.com and manufactured by companies such as ColorCentric. The market has been boosted by the launch by Xerox of the iGen3 and the black-only Nuvera series, which provide near-litho quality of print acceptable by both discerning print producers and the public at large.

Photo books, too, have become a large and growing market, thanks to the development of software such as Qoop Middleware which facilitates their online preparation and ordering.[2]

2.2 Role of the Internet

We found that some companies have made the Internet integral to their business and are using it to drive volume and applications, while others still fail to see its value or potential. A major surprise was that Zenger Group does not have an online presence for integrated print-on-demand solutions – and that the company believes that there is no demand for it among its customer base. This was in spite of Steve Zenger's comment that 'the Internet has made print the most relevant media'. Boncraft Group has an appreciation that Internet integration is crucial to the success of a digital supplier but it too has no online ordering facilities as yet.

Management at Mercury Print Productions is clearly struggling to understand how an Internet integrated solution can work – a common problem within 'printers' in both the USA and the UK – while Lazer Inc is using the web to make its product accessible.

2 Susan Kuchinskas, *Flickr to Add Print to Photo Service,* 15 June 2005: www.internetnews.com/ec-news/article.php/3512866

That said, it is generally agreed that the USA remains ahead of the UK in general in its understanding of the power of the web, but more importantly an understanding of how to exploit it.

We found most evidence of a more creative use of the web on the part of digital print specialists as opposed to print generalists (ie those companies offering digital print as part of a wider portfolio). ColorCentric is a prime mover here. Not only has the company identified a new market – for self-published books on short print runs – it has found a novel way of marketing its products via VARs using specialist websites. The company reports that over 90% of sales are generated from these sites. Customers upload publishing data and pictures to the web and use the tools available on the sites to create the required books. Once set up, the books can then be ordered on the web by anyone who logs on. Data from the order is downloaded automatically to ColorCentric, which produces the books using Xerox iGen3 digital presses using a number of standard templates. ColorCentric's example shows that the Internet can really drive personalisation within book publishing. Further discussion of ColorCentric's products and marketing strategy can be found in the case study in Chapter 7.

Cohber Press uses the Internet to generate and respond to enquiries. This approach, and the imaginative strategy of ColorCentric, is in contrast to that of Mercury, which does no marketing via the Internet beyond maintaining a web presence.

There is a general understanding that the Internet can be a means of reducing the supply chain, like eBay. Precisely because it will allow companies to create new business with new technology rather than focus on the migration of offset, this reduction may well prove to be the secret of Internet-led success. This point is discussed further in Section 3.4.

2.3 Direct mail and transactional print issues

Digital printing has revolutionised the direct mail industry in recent years, allowing far more sophisticated use of personalisation and variable text than ever before. As part of our investigations, we wanted to find out whether there was evidence of migration of direct mail to shorter run digitally printed solutions.

Cohber's use of the Internet to fulfil requests from students for digitally printed prospectuses is mentioned above. Zenger is providing transactional and direct mail services using variable colour, and the success of its direct mail campaigns has fuelled further business for short-run variable colour.

One of the most interesting perspectives on the future development of digital print as a transactional vehicle was provided by Kodak NexPress, whose managers believe it to be a large potential market that is slowly taking off. They reported that the main problem has been to convince the end user's marketing departments. Kodak is using its influence to spread the message by 'back selling' to these areas, but one of the key factors will be the acceptance by marketing departments of the quality of the ink-jet colour produced on the high-speed Versamark printers. There is definitely a future market for this as the cost per page reduces. Cost is seen as a major deterrent to longer run personalised work, and Kodak's Versamark ink-jet press aims to address this by producing acceptable 'fit for purpose' colour at fast machine speeds relatively cheaply.

Kodak's research laboratories are actively working on reduced cost per page and on achieving increased speed and improved quality to lower cost. In addition, Kodak is working on combining ink-jet and laser technology on one device to produce high-quality colour for the marketing piece with ink-jet personalisation or black personalisation

with ink-jet variable colour for different messages or versions of stationery. Kodak is also actively promoting using the business document itself – a statement, for example – as an advertising vehicle. These are sometimes referred to as 'transpromo' documents.

However, it should be said that the prime focus of Kodak's 150-strong laboratory staff is technical – specifically on improving the quality, speed and size of the image – and not on researching the market for digital colour print.

We also gained some insight into variable colour imaging and its direct-mail application from our visit to RIT, whose School of Print Media offers courses in all aspects of print, and in particular digital technology. Our host at RIT, Professor Frank Cost, pointed out that, due to the increased computer power, it is now possible to RIP (raster image process) colour graphics at the speed of most colour digital presses, and that the market for full-colour variable direct mail marketing is being further fuelled by case studies of highly successful targeted marketing campaigns using variable colour images.

The view from RIT on the future growth of data-driven variable-colour printing for direct-mail marketing is overwhelmingly positive, and the School of Print Media's Administrative Chair, Patricia Sorce, has written a book[3] on the subject which offers a comprehensive view of the world of personalised communications as they relate to print.

Our hosts at Xerox had some illuminating points to offer regarding the transactional print market, acknowledging that they had been researching the possibility of introducing a colour machine that will print fit-for-print business documents at a reduced cost, suitable for the transactional print market. This has the potential to revolutionise a depressed business forms market by creating intelligent billing documents containing variable marketing messages at an affordable cost. This is clearly a development to watch. Xerox also reported getting returns on its own digital direct mail of an impressive 15% or more.

2.4 Customers for digital print

Digital print customers fall principally into one of four categories, though there is some overlap:

- Existing customers whose short-run litho work can be converted to digital colour
- Customers in new and emerging niche markets such as book publishing and on-demand print
- Direct marketing customers (eg advertising agencies and marketing companies) requiring personalised colour direct-mail using variable data
- Customers requiring printing of transactional documents which may incorporate direct-mail advertising

As noted earlier in this chapter, some printing organisations visited by the mission team had only moved into digital print in response to customer demand for particular facilities; others have been more proactive in seeking out and exploiting new marketing opportunities and indeed whole new sectors of the market.

Some observations can be made at this point. The prime example of a niche market is that for short-run book publishing, which ColorCentric is servicing successfully and which Kodak NexPress also identified as an emerging market. The former has around 10 VAR customers that it refers to as 'application-specific providers' (ASPs) who in turn have thousands of consumer and business customers that order print-on-demand books via the Internet using the

3 Patricia Sorce, *Data-Driven Print: Strategy and Implementation,* RIT Cary Graphic Arts Press, 2006, ISBN 1-933360-06-2: http://print.rit.edu/sorce/index.php

VARs' sites. ColorCentric produces books 'behind the scenes', so the end user has no idea where the products are printed.

ColorCentric creates a physical end product by providing a service to customers which, for all its technological and marketing ingenuity, is essentially an extension of the traditional print industry model. Lazer Digital Services, by contrast, offers a total data and prepress solution to its clients – who it identifies as packaging companies and advertising agencies. As mentioned in Section 2.1, Lazer has expanded into DAM and is now offering its services on a consultancy basis to create solutions for users of digital print technology.

Finally, what part do print buyers play as customers for digital print? Cohber – which only sells direct and does not work with print brokers or print management companies – told us that 'print buyers have no loyalty and buy on price'. However, by operating within a niche market (mainly casinos and the education sector), the company offers its customers a great deal of added value that makes price alone less of an issue. The company handles and cleans customers' data and undertakes targeted mailshots such as personalised university prospectuses that highlight a prospect's special interests or subjects.

2.5 Models of profitability

A number of different business models have already been referred to in this chapter. One of the mission team's points of enquiry was whether there exists a single model of a profitable digital printer; additionally, we sought opinion among the organisations we visited about what would be the essential characteristics of such a business model. For example, would it be one focusing totally on digital print, on offering digital among a range of solutions, or one based on finding niche markets within the digital spectrum?

There is no straightforward answer – and the digital print industry is no different to any other industry in this. In their own way, each of the organisations visited is following its own model effectively and successfully.

Mercury's model is to combine expertise in litho with digital colour and apply to it its capabilities in using customer data intelligently to create variable colour solutions. Printed products are often a combination of litho and digital, and we have noted how Mercury's litho sales have increased as a result of digital because of its ability to offer a total solution.

Zenger appears to combine a number of essential characteristics, which it expounded as follows:

- Marketing and design capabilities
- Understanding of data and data issues in all their forms
- Ability to develop database programs in-house
- Expertise to clean and manipulate customers' data
- Ability to create data preparation and print programs in-house
- Expertise to undertake database mining
- Access to a reliable supplier of litho base stock used for digital production (ie its own group company)
- Flexible workforce
- One large customer prepared to adopt the new technology of variable colour in a major way to act as a catalyst and demonstrator for other customers
- Good working relationship with a digital printer manufacturer (Xerox) to provide latest expertise and up-to-date equipment
- Innovative management with the vision to 'get it'

Xerox's role as a manufacturer and provider of equipment gives its own business model a particular slant. Its strategy is not just about selling boxes to printers but involves expanding the market by engaging with

'demand generators' (such as marketers and publishers), 'demand specifiers' (such as designers and agencies) and 'demand fulfillers' (corporate). Xerox has also designed its own 'profit accelerator' kit to help printers build the right expertise in digital.

Another aspect of the Xerox model is customer support and support for training and education. Xerox produces a suite of tools to aid business development including profit accelerator, sales tools and so on, while support for the industry as a whole includes marketing support, service and workflow integration. On training, it works closely with RIT: there is a clear belief that collaboration with the industry's education facilities is essential to the success of the industry. Xerox personnel also stressed the corporation's intention of focusing resources on scientific research and development (R&D) through RIT and the University Leeds in the UK.

Xerox is a well-established multimillion-dollar global corporation, so how far its business model can be regarded as applicable to the everyday digital print company is open to question. In his presentation to us on the future of digital, Professor Frank Cost of RIT made it clear that, in his perception, the way forward is to follow the basic model of producing shorter and shorter run lengths for more and more people. He is a huge advocate of ColorCentric's business model, which is considered separately in a case study in Chapter 7.

3 ROLE OF PRINTERS IN EMERGING TECHNOLOGIES

Jon Bailey, Tim Browning, Geoff Thould

3.1 Interaction with technology suppliers
3.2 Interaction with universities and research sources
3.3 Cluster theory in practice?
3.4 Integration of the Internet into print technology
3.5 New developments
3.6 Observations

The theme of this chapter complements that of the previous one, but has a slightly different perspective. Whereas the focus in Chapter 2 was on products and services and the marketing of same, here the spotlight is on the technologies themselves and how print organisations in Rochester and Buffalo are applying them. In the case of the Internet, for example, we have seen how print companies use their web presence as a marketing or communications tool, but to what degree the Internet is being integrated into printers' technology solutions is of perhaps greater relevance in the long term.

The mission team members were particularly concerned with finding out how printers in the Rochester and Buffalo areas interact with suppliers of technology and with universities and research bodies. Related to this, does the concentration of suppliers, universities and printers in this relatively small area encourage cooperation?

Another key part of the team's brief was to consider the technologies themselves and note and disseminate the latest developments, specifically in ink technology, hybrid printing technologies, electronic paper, SMS, small-format ink-jet, ink/toner technology, finishing options and what can be defined as unique digital print solutions.

3.1 Interaction with technology suppliers

In our discussions with digital print companies and organisations in Rochester and Buffalo, there was a general acceptance that collaboration between printers, suppliers and other relevant parties is a good idea. However, on a practical level, there is still a lack of willingness and even a level of suspicion that prevents the parties from working together. Among the printers we talked to, we noted a particular underlying mistrust of suppliers' methods and motives. 'Suppliers still say buy our presses and we will get you work. Why? Shouldn't we be past this?' was one comment we heard. Much of the mistrust appears to be driven by the physical proximity of the companies concerned.

Against this, our hosts at Xerox emphasised that the role of the supplier in driving the market is central to the corporation's plans. As a senior Xerox manager put it to us, 'Increasing the clicks is the way forward, not just selling boxes'. To this end, the Xerox model includes working closely with marketing managers to improve awareness, mounting customer events, giving special project managers responsibility to work with enterprises, and providing 'how to' support as specialists in digital marketing applications.

Although most of the organisations visited did not seem to focus greatly on input from manufacturers and their roles in market development, it was apparent from our discussions that Xerox has had a marked contribution to the way that the printing service providers (PSPs) sell their services. As if to underline this, we eventually established that a phrase that we heard from

several quarters during our visit – 'Do you get it?' – had its origin in Xerox sales development.

Zenger Group reported that it opens its doors to suppliers in conjunction with new business and quoted examples of forming strategic local partnerships. The company sees networking as a great way to share ideas, while founder David Zenger has had close involvement with peer groups such as the Printing Executive Network (PEN). However, its managers also believe strongly that Zenger has established a head start in digital innovation; understandably, it is looking to make the gap bigger. The company therefore freely admits to being slightly more 'selfish' in its approach at the present time.

All our hosts agreed that educating the marketplace is important to their own success and essential to the success of the industry. Boncraft intends to hold seminars, training days and offer case studies to clients as part of that process, and the company seems to have a real involvement in peer groups and sharing information, though not necessarily within the local area. It is particularly open regarding discussions and comparisons with its peers, including such topics as reps' salaries, MIS and even profit and loss.

Kodak NexPress reported that it focuses very heavily on partnerships with both PSPs and end clients, and that collaborations with other suppliers is key to developing workflow. People should want to buy a press because of its virtues, not because it happens to fit in with current machines.

A general conclusion is that the focus in the USA, as evidenced by what we saw in Rochester and Buffalo, is more on technology advancement and partnerships with the printers than on volume/market development, whereas the UK is more focused on the end user.

3.2 Interaction with universities and research sources

If the degree of interaction with technology suppliers among the organisations we visited seemed mixed, there was much greater evidence of interaction with academic institutions and of a strong appreciation of its value to the industry. This was equally true of a company like Lazer Inc, which regards itself as more than a print organisation alone, as of organisations that remain primarily print based. All this has much to do with the presence/proximity of RIT, and its importance as a training provider, a research establishment and a source of potential employees.

RIT plays a major part in the community of Rochester and has a close relationship with print organisations in the city. Indeed, it is a key part of the area's infrastructure as well as a fabulously equipped and well-run facility. Many of the staff at Lazer Inc attended RIT, are still in close touch with its lecturers, teach at the institute on a part-time basis and tend to recruit from within it. Kodak NexPress is currently working with RIT on stock development for the market, while the Xerox business model involves working closely with RIT to promote the value of digital solutions and how to design for digital print.

RIT itself maintains a long-term strategic focus on the state of the digital print industry. There is palpable excitement surrounding digital print and teaching its technologies. RIT's numerous overseas projects mean that its staff are continually working with suppliers worldwide, and the institute is actively trying to develop the global market through courses in the technology, sales, marketing and application of digital print.

RIT has truly integrated itself into the print supplier network, for example by testing materials and inks. From discussions with RIT management it is clear that this has been driven by a desire to relate theory to practical

experience. This involves not just sending students on six-month placements but on actually building the cause in an industry-focused way – eg applications, case studies, ink testing. Just as important, RIT's curriculum includes modules on cost structures and business needs.

Some caveats regarding the presence of RIT and the role of academic institutions were expressed by the Zenger and Boncraft Groups – which are both based at Buffalo, some 70 miles from Rochester. At Zenger there is an opinion that, although students demand higher salaries when graduating from RIT, they cannot be put straight into a production or 'live' role without further training. It is therefore easier and less costly to recruit from within the industry or to train internally. Opinion at Boncraft is that RIT's location puts Rochester companies at a distinct advantage, and that Buffalo, technologically speaking, is always two to three years behind its near neighbour. Without this reliance on recruitment from RIT, Boncraft has always trained internally or has promoted staff from within.

The geographical factor is significant. Although deeply impressive, RIT's significance as a world learning facility does appear to diminish only 70 miles from its location. In some senses, its economic, social and cultural impact is quite localised. Away from Rochester, migration of staff from company to company is seen as a potential source of problems, while recruiting from RIT is apparently not considered as a way of countering it.

3.3 Cluster theory in practice?

Does the presence of print organisations and RIT in Rochester represent Michael E Porter's 'cluster theory' in practice? Porter's theory[4] relates to local industrial agglomeration in the form of geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries and associated institutions which compete but also cooperate. Companies work together to identify common concerns and needs, to increase the general competitiveness of the region.

The essence of a cluster is that the value of the whole exceeds the sum of its parts, and that there is a critical mass of competitive success in a particular field, in one locality. Porter suggested that, to grow, clusters must innovate, improve productivity, improve access to employees and suppliers and information, exploit complementarities of service or manufacture, generate new businesses and engage locally. Regional groupings or 'clusters' of industry-specific businesses, supporting industries and organisations act as a catalyst for the creation of an innovative environment.

It is clear that, if a cluster of this kind does exist in this part of the USA, it is highly localised to Rochester itself and does not include Buffalo. But, as mentioned in Section 3.1, the actual level of interaction seems limited. Rochester's economic environment may actually be too close and tight – too competitive in fact – to allow genuine cooperation and complementarity. In addition, as one of the managers at Lazer Inc suggested, the market may have advanced to a level where the need to educate clients in emerging technologies is less.

3.4 Integration of the Internet into print technology

The observations recorded in Section 2.2 also apply here, while Chapter 4 considers the role of the Internet in manufacturing and the concept of 'web to print' in particular.

4 See Porter M E, *Clusters and the new economics of competition,* Harvard Business Review, 76(6):77-90 (Nov-Dec 1998): www.isc.hbs.edu/econ-clusters.htm

Although Frank Cost of RIT made the shrewd comment that 'the Internet is a giant engine for aggregating content', the evidence we found is that print organisations in the USA (if those visited are typical) are falling short of true integration of the Internet into print technology and that the concept of a 'printanet' is some way off. Our hosts at Cohber Press commented that the Internet is largely used to drive the business but is not really automated: orders received via the web still need to be put out manually on the press. Web links and e-mail marketing are allowing consumers to become more brand aware and allowing businesses tighter control of their marketing, but the impetus is to drive volume, not exploit the available technology.

Our RIT hosts made two key observations on this subject. First, e-commerce solutions rarely extend beyond showing marketing collateral: no-one is using the Internet fully through to distribution or trading. Second, putting material onto the Internet enables the *reduction* of data to allow surfing and quick interaction, while the production and extraction of data from the net into print allows the *expansion* of information, creating more information and hence a longer interaction period. As Frank Cost of RIT put it, 'people surf the web but deep-sea dive into a book'. In other words, putting information on the web allows quick access to a mass of information so everything is reduced to allow us to surf and scan. When you then extract that information into a published piece like a book, that information is massively expanded to become a very in-depth wealth of information, so you spend a lot of time in it – hence, deep-sea dive!

As suggested in Chapter 2, a prime benefit of the Internet is that it reduces the supply chain. John Lacagnina at ColorCentric even ventured that he was not interested in printing as such but more in creating a shorter supply chain – an example of what he called 'disruptive technology'. By focusing on reducing the supply chain, it is possible to create a new business genuinely based on digital technology, not migration.

3.5 New developments

Inevitably, there was some reluctance on the part of the organisations visited to discuss particular technologies. Xerox, for example, stressed the qualities of improved speed, quality and reliability but would not commit itself more specifically. However, these were some of the specific developments highlighted by our hosts as having the greatest potential:

- Ink-jet technology will aid the take-up of 'transpromo' applications, which are set to combine transactional printing and commercial printing (Kodak NexPress)
- Near-line finishing using press technology offers the benefit of speed, smoother handling and no waste (NexPress)
- Micro-capable inks (NexPress)
- A B2 cut sheet digital device (NexPress)
- Greater colour accuracy linked to pricing will bring new ways of costing (NexPress)
- JDF standard is pending (ColorCentric)
- Auto-optimisation of images (ColorCentric)
- In-line UV coater currently under test (ColorCentric)
- Three-dimensional (3D) soft proofing (Xerox)
- Incremental improvements in electrophotography technology to improve speed and quality (Zenger)

Cohber Press identified ink-jet technology as 'the next big thing' and Versamark as just the start, a view echoed by Zenger, and it was interesting, but not surprising, to note some coolness towards ink-jet on the part of Xerox. Kodak NexPress suggested that high-speed ink-jet will improve over the next five years but will take 10 to 15 years to really rival offset quality – a view echoed by Zenger, which felt that ink-jet would compete favourably with electrophotography in about a decade.

Beyond these specifics, our hosts identified areas where existing or new techniques (or a combination of both) are likely to have the most impact, including:

1 Improved understanding among printers and clients of data, particularly with regard to the tracking of responses (Zenger/Xerox)
2 Combining technologies – ink-jet, offset, digital, online (Kodak NexPress)
3 Greater focus on distribution of products, packing and shipping (ColorCentric/RIT)
4 Greater efficiency, speed and flexibility in book production (RIT)
5 New avenues in book production, eg high-value medical books (Xerox)
6 Greater focus on improved image quality, productivity and reliability rather than speed or lower prices (RIT)

3.6 Observations

Even though most of our hosts stated that there is still a lot of life in electronic print technology, we were surprised how few 'new and exciting' developments were highlighted in relation to press technology. This may be due to the general belief that it is the market that is driving new technology, not the manufacturers as previously.

Clearly, e-mail portals and web developments are set to be more and more important in purchasing decisions. Likewise, SMS messaging in combination with printed matter, and SMS proofing and job tracking are high in the thoughts of the more advanced companies we visited.

Workflow is absolutely key to future thinking. There seems to be a consensus that the amalgamation of all technologies is the way forward, in which case one workflow system to suit all platforms is going to be central in the sales strategy to increase both presses and clicks in the marketplace.

Finishing developments are also high profile at the moment. Most see these as a way of extending the offering, and PSPs believe it to be a great way to add value. Xerox has made finishing link into vertical markets by focusing on in-line. One very interesting idea that emerged from NexPress was a near-line finishing kit using press technology, which would allow excellent paper handling, speed matching and flexibility.

We expect a great deal of new development work on ink technology and colour accuracy with special inks (including metallic, magnetic, security inks). This will not only develop the offering from the manufacturers but will allow specific applications such as packaging to move to digital.

Book publishing is seen as a major growth application. Those who have moved into it (eg ColorCentric) seem to be growing at the fastest rate. It may be only a matter of time before it enjoys similar growth in the UK.

'Transpromo' is the other application on many lips, meaning the combination of transactional work with promotional pieces to add value. Xerox believes that transactional printers will need to start learning about colour and marketing and that commercial printers will enjoy a head start as they already know the direct-mail world.

The casino market is massive in Rochester, and all the digital companies spoke of it as a big part of their digital business. This is something the UK should start to understand with the advent of 'super casinos' on our shores.

There is a lot of discussion regarding ink-jet developments. If ink-jet can combine the quality of its large format with the speed of its small format (like Versamark) then it offers an outstanding business proposition. The speed and versatility would be very difficult to ignore and would allow pricing to be much closer to

offset on larger runs. However, none of the manufacturers seem to be giving any hints that this is the way forward. This may be because each would prefer to be the first to introduce it, or that they are simply trying to ensure the life of electronic print, which is still relatively young.

Hybrid systems combining the above may arrive first. The US experience seems to suggest that various combinations of technologies is a way forward. We have the one 'solution', we are starting to get the 'one workflow', so the next development may be the 'one output device'. Combining offset with ink-jet (Versamark) has arrived; perhaps offset with a digital capability for long personalised runs may be next. Is there also potential for a combination of ink-jet and electrophotography?

Finally, distribution, tracking and data issues are also high on the agenda as companies realise that it is not only finishing that adds value to the printed page but the integrity of the products when they reach the end user.

Exhibit 3.1 *Mission team outside Kodak NexPress; L to R: Geoff Thould, Tim Browning, Scotch Kirkpatrick, Jon Bailey, Dr Long Lin, Richard Knowles; Mike Hopkins is behind the camera*

4 ROLE OF MANUFACTURING BEST PRACTICE

Jon Bailey, Tim Browning, Geoff Thould

4.1 Efficiency and workflow
4.2 Finishing issues
4.3 Software solutions – bespoke or off-the-shelf?
4.4 Adoption of new technologies
4.5 Observations on new technology adoption

An important element of the mission team's investigations was to look closely at the role of manufacturing within the digital print industry in Rochester and Buffalo – particularly with a view to identifying best practice and assessing the implementation and value of workflow solutions. In this chapter we present our observations and a number of key conclusions. Some of the issues have already been touched upon in earlier chapters – most obviously, the adoption of new technologies – but the focus here is specifically on the manufacturing process and on the reality or otherwise of 'web-to-print'.

4.1 Efficiency and workflow

Efficiency in manufacturing is clearly a fundamental concern of, and motivator for, all the organisations that the mission team visited. As one of the management team at Mercury Print Productions put it, the primary emphasis is on lean manufacturing as a means to increasing productivity – indeed, as Jeff Quartley of Mercury commented, the company is 'trying to shift into a manufacturing mindset, not printing'. Cost savings, not necessarily customer requirements, are the main driver here. For RIT, 'lean manufacturing' means focusing on producing more with less staff, though our host from Cohber Press also emphasised integration of processes as being vital: he suggested that one very important factor in the success of a digital production house is having mailing facilities on site.

Integration was a keyword that we heard on many occasions, usually in connection with workflow. For Xerox, an integrated workflow allows the narrowing down of the supply chain and consequently a reduction in costs and time. Xerox informed us that the newest addition to developments focusing on workflow is FreeFlow, an integrated workflow solution that combines with MIS and cross platform to fully integrate all aspects of production, both offset and digital. What is different about FreeFlow is that it also focuses on business aspects, including costing and distribution.

Our hosts at Kodak NexPress suggested that the market is now demanding a single workflow solution to suit all platforms – MIS, digital, litho and online – and that the advent of JDF will allow this to become a reality. Cohber Press also echoed this view but pointed out that, while its staff are actively preparing for JDF, not all departments can cope with it yet – finishing, for example, is well behind. PDF workflow remains excellent for proofing of static work and best for artwork/job creation.

ColorCentric ventured that workflow is key to the success of the company, and that a properly integrated workflow – one solution and one output device for one product – is a working reality here. ColorCentric does of course perceive itself as an Internet company rather than a printer, and the net is more central to its business than it is to any of the other organisations visited. On the issue of PDF v JDF, company opinion is that, while

JDF has great potential, global understanding and standardisation of JDF technology is essential if is to supersede PDF.

Like ColorCentric, Zenger Group believes that the market drives efficiency and workflow, yet it does not have an Internet approach as such. With a main management team drawn from strong IT backgrounds, it focuses heavily on software solutions. For its static workflow, the company has invested in a system called Nexus which is designed to complement all aspects of static work including offset, digital and direct mail. It links into the MIS system to allow complete control. For variable work, Zenger has just implemented XMPie but has found that it struggled to cope with a 17,000 personalised colour run.

Boncraft Group is in the process of setting up a specific digital workflow. The company currently uses Prynergy but it wants digital to have a different workflow initially so that it can retain more control over costs. For Boncraft, PDF workflow for static work remains the preferred route and there are no plans for implementing JDF or full automation.

In summary, it is fair to say that workflow is absolutely key to everyone's future thinking and is being driven very much by the manufacturers. In each group of companies, there seems to be a consensus that the amalgamation of all technologies is the way forward. The mission team's view is that having one workflow to suit all platforms will be central in the sales strategy to increase both presses and clicks in the marketplace. More than this, we can also see it moving into the MIS market, as in FreeFlow and SMART Board, by linking into current MIS systems to analyse business needs and developing further to be an MIS, too. This will mean that digital technology will become the backbone of commercial printers rather than an add-on production capability.

Workflow does not seem to be customer-driven. It is application-driven to an extent, particularly for the innovators in specific applications such as ColorCentric, but then these applications are driven by the PSP. The other workflow solutions seem to be linked to the need for cost reduction to improve margins and to aid the commercial printers to work with their ever increasing portfolio of machines and services. Manufacturing improvements, however, all seem to be driven by cost, not by the market.

The need to focus on reducing the supply chain is linked totally with workflow, lean manufacturing and automation issues. With an automated online presence, a company's offering goes from local to global!

Lean manufacturing and internal procedure streamlining is seen as an essential part of maintaining margin. As an industry, we must become less intensive, with automation the key. Those organisations which are really exploiting digital have an automated online presence, workflows, front ends and finishing – up to 80% automated processes in the case of ColorCentric.

PDF is seen as the most important way of working. There is a lack of understanding of, or inclination towards adopting JDF technology. An RIT professor summed this up well when he commented on our constant desire to adapt already very effective technology – 'It's PDF until we die!' The view from RIT is that PDF works perfectly, so why change? Too many are focusing on finding a 'big' worldwide solution, such as JDF, rather than focusing on the small solution that will work for the required application.

Web-to-print offers the global solution and will increase a company's business massively. Web-to-print is a reality but needs proper focus if it is to work. It cannot be simply 'expected' to work and add value.

To reiterate a point made earlier, web-to-print solutions allow us to fully exploit current technology. It is a reality, but only to those who realise this point.

4.2 Finishing issues

Our pointed question to all our hosts – 'Is finishing a pain in the neck or a chance to make money?' – produced a lively response. The Cohber Press view is that finishing can genuinely add value and that it only causes a problem on short-run work. Boncraft, too, described finishing as a real added-value product and referred to its recent opening of a full in-house bindery service. ColorCentric contradicted this, suggesting that no-one in the USA has as yet put an emphasis on finishing as an added-value service with which they can differentiate themselves from the competition.

RIT's catalogue business model places a particular importance on in-line finishing. For Xerox, finishing is far from being a source of pain but is a major part of the corporation's improvement plans. For Zenger, finishing needs to be near-line as it deals in multiple products and so requires the flexibility; it also highlighted hand finishing as an area that is continuing to grow. As a company with a lot of applications, Mercury wants near-line finishing as part of its digital offering rather than in-line finishing, due to issues of capacity and flexibility. It is noticeable that Mercury put more emphasis than others on finishing quality.

It appears that finishing is not really a primary business concern among the companies we visited. Rather, it is an afterthought. It is clear that in-line finishing is best by far for specialised applications; near-line for commercial applications. It is likely that finishing will play a key role in the development of digital technology, with more and more people – suppliers, education facilities, end users – throughout the chain realising its importance.

4.3 Software solutions – bespoke or off-the-shelf?

The issue of the merits of bespoke over off-the-shelf software solutions is a perennial one. We canvassed our hosts for their opinions and experience. Cohber Press reported that its online system is bespoke to allow most flexibility, but that their MIS is off-the-shelf and has limitations. The issue for Kodak NexPress is that, although many software solutions are available, none offer everything, so the bespoke route is most appropriate. It detects a trend in decreasing the number of these systems to a small, elite group.

Lazer Inc uses bespoke software systems throughout, seeing them as 'the backbone of the company', and a massive amount of time and resources has been put into their implementation. Oser Press paid what it described as a lot of money for a bespoke system, having found nothing appropriate that was available off-the-shelf. This was also true of Zenger Group, whose workflow systems are all off-the-shelf purchases – which is surprising given the IT background of its managers. They confessed to undertaking some 'tweaking' internally to suit company needs.

ColorCentric and Mercury again offer a valuable comparison. ColorCentric managers insisted that bespoke solutions are needed to ensure that production is truly automated, and that off-the-shelf packages do not give the degree of flexibility they demand. Because Mercury focuses on manufacturing, all its software is purchased off-the-shelf. ColorCentric argues that bespoke systems offer more integration, and it puts a lot of resources into IT in-house to get software solutions off the ground. RIT staff agreed that software must be bespoke if it is to be truly integrated: a company must have an IT department integrated into its digital print solution, and its personnel must be experts in its digital interface.

Our conclusion is that any off-the-shelf software will only play a minor role in a business: no organisation can build a business around it. Bespoke systems are the key to success but companies must place them at the heart of the business. Having said this, there is also a move from a multiplicity of off-the-shelf systems towards an elite set of off-the-shelf software that can do a lot more and so offer more flexibility.

A lot of the discussion regarding software seems to revolve around cost: bespoke systems will always appear expensive to those companies which don't have an application to pay for it.

4.4 Adoption of new technologies

The mission team sought answers to three specific questions related to new technology:

- What drives the adoption of new technologies – cost reduction or market development?
- Is the cost of technology impeding wider adoption?
- Does the relative lack of profitability of markets inhibit the adoption of new technology?

Many of the organisations visited could speak from direct experience of what had prompted them to adopt new technologies in the past. Cohber Press moved into digital print in response to market pressures. Boncraft Group entered the direct-mail field in response to a client's requirements (see Chapter 2) and went digital for the same reason. While this may seem a perfect example of the market driving technology adoption, the company also reported that some of its technology purchases – specifically, black and white lasering devices – were made to meet client needs but are now sitting idle.

Boncraft suggested that client retention is also an important driver of new technology adoption: adding new services or capabilities adds value and limits competition. Cost has been an issue in adoption but Boncraft's policy is that the company needs to move on to ensure that it stays up with the market leaders.

Cost reduction is an important motivator behind new technology adoption, which is why Cohber Press prices jobs on a 'percentage of response' basis, as initial costs can scare clients away. However, opinion at Zenger Group is that cost does not particularly impede wider adoption and that lack of customer knowledge or education in the possibilities of the technology – especially in relation to data – may also be an inhibiting factor. Where the technology leads to clear technical improvements, the market is welcoming. This is especially the case with something like colour accuracy, improvements to which have in part been a response to rising customer expectations.

Our hosts at RIT doubted the role of cost in driving the market: the beauty of digital application is that its benefits far outweigh the costs. They also pointed out that challenging the market in itself helps to drive technology, as well as countering the lack of knowledge and understanding of the benefits of digital which remain barriers to adoption.

Xerox has the advantage of a global perspective on this issue: it gets different responses from each European country as to what drives the market and the technology. While agreeing that perceived high cost has been a factor in the slow uptake of new technology, Xerox's stance is that the market is indeed driving the technology, especially in book publishing. An excellent example of this is the packaging market: the need for greater protection and security against counterfeiting medical supplies was the catalyst for the introduction of UV coatings on iGens and

gloss mark technology. The comment from Tony Federino of Xerox that 'we like to learn from our customers' is apposite here.

4.5 Observations on new technology adoption

Most of the organisations visited shared the view that, while it was once true that the big manufacturers drove new technology, this has now completely changed and the market is now the prime driver in its adoption. From a PSP perspective, however, this is not always a good thing. A business has to be really careful when investing in expensive technology for customers if it is not truly in the customers' long-term plans. Boncraft's experience of machines sitting empty is salutary. This highlights the issue of companies moving into digital print because they feel they have to. Most of the key players to whom the mission team spoke, including suppliers and particularly the industry associations, have been very specific in regarding digital as part of a commercial company's portfolio to embrace all technologies, not as a solution to save a company.

It can only be a good thing if all parties think that they are responsible for driving technology, as this will ensure that no-one is relying on other parts of the chain to do it for them.

That new technology can also drive old technology is proved by the example of Mercury increasing litho volumes among its clients. Offset volumes grow when companies go digital.

As the market is buoyant and margins very profitable compared to traditional print, the cost of digital print is not seen as an issue in inhibiting wider adoption. The issue of press technology remains, however. Looking at the industry, many want to go digital, and see the need for doing so, but it does require a very big financial investment. There seems to be a need to go into digital on a large scale – iGen, HP, NexPress – but Xerox do offer more cost-efficient press alternatives, so some are investing in this technology first. Will this work against the bigger, cheaper clicks and better quality machines?

As both a standalone technology and as an integrated technology, digital print is very profitable in the USA at the moment. Even those dealing in small volumes see digital print as a profitable business model. Academic institutions such as RIT clearly have a major role in challenging the market to drive adoption of new technology, but the onus is on all areas of the industry to maintain the drive by working in combination, including: manufacturers; PSPs who are passionate about digital; partners, clients and end users who have had application problems solved; and the education facilities who question and develop both the theory and practice of digital print application and implementation. The digital print industry is one of the few industries where all aspects of the chain combine to drive the market, drive technology and drive adoption.

Exhibit 4.1 *Inside an iGen3 at Xerox Corp*

5 SELLING AND PROMOTING THE DIGITAL MESSAGE

Richard Knowles, Scotch Kirkpatrick, Mike Hopkins

5.1 Digital sales people – a separate breed?
5.2 Rewarding digital sales people
5.3 Training digital sales staff
5.4 Trade associations – a promoting role
5.5 Opinions about the PIA

As a relatively new technology with a growing number of applications, digital print has key advantages over conventional print which are becoming progressively better appreciated within the marketplace. A recurring theme of the mission team's discussions with print organisations in Rochester and Buffalo was the promotion of the digital message, both in the broad sense of communicating the benefits of digital printing to a wider market and in the more specific, everyday sense of selling digital products and services – in other words, are there aspects of selling digital print that the UK industry can learn from its US counterpart? Cohber Press, for example, uses free mailings to demonstrate the effectiveness of personalisation to its customers – and gets a 10% response.

This chapter summarises our findings on both counts. On sales issues, we sought to find out how the sales teams at our host organisations operate – whether, for example, they sell both conventional and digital print; whether the priority is to sell the value of the solution to the customer rather than simply cost per copy; whether selling digital print requires a different approach from that of selling conventional print; how digital sales people are rewarded; and who trains them.

On the wider issue of promoting the digital message, a particular area of interest was the role of the main local trade association, the Printing and Imaging Association of New York State (PIA of NYS), in the development of the digital market. How does that role fit with its other objectives such as productivity improvement and training – and, most importantly, how do the print organisations we visited perceive their regional PIA's effectiveness and value?

5.1 Digital sales people – a separate breed?

The organisations we visited all handle their own sales via in-house teams, with only two selling via traditional resellers of print such as brokers or print management companies. However, a large amount of digital print sales to the consumer is now generated by VARs such as Lulu.com, that market digital products via the Internet.

We gained no real sense that digital sales people possess or require any different characteristics to those selling conventional print, beyond the technical competence and knowledge to understand data and IT issues. As Jeff Quartley at Mercury Print Productions suggested, 'technical knowledge makes you trusted by the customer'. His view was that the ideal sales person should be able to sell across both disciplines, as one feeds off the other and it is essential to understand both printing processes.

Boncraft Group reported good sales for variable digital colour and that its sales people are promoting the new service enthusiastically. Sales personnel are encouraged to sell the advantages of digital printing as a concept rather than print as just a commodity.

Steve Zenger at Zenger Group referred to the company's reliance on an 'integrated sales approach', ie combining digital and conventional and favouring one over the other only as the most appropriate solution to a particular requirement. However, Zenger does not have a dedicated sales force as such: the company is run by six brothers who each have a hand in sales. The majority of sales are handled by the managers and internal staff who have a good technical understanding of digital print and have the ability to offer unique and effective solutions to customer requirements.

John Lacagnina at ColorCentric disputed that sales people could sell both offset and digital. As he put it, 'offset and digital are not the same just because they share the word printing… a sales person cannot sell both offset and digital as they will always revert to selling volume'. Opinion at Cohber Press – whose ratio of 16 sales staff and 12 sales support staff to a total personnel of 139 was fairly typical of the organisations visited – was that digital sales require younger people. Although Cohber's sales people sell across the range of products, it was apparent that the younger generation of sales personnel are gravitating towards digital print while the experienced, older sales people (generally over 50) retain a focus on traditional litho products.

But if digital sales people require expertise in additional areas – which is not dependent on age – do they also require a 'solution sale' approach? The answer that came through was 'Yes, but then a solution sale approach would give an advantage in any sales situation'. There was general agreement that sales people do need to adopt a certain digital mindset, focused on selling the value of the solution to the customer rather than the cost per copy (which is normally much higher anyway). This echoes Jeff Quartley's point about trust in the printer's knowledge – or, as Steve Zenger described it, the confidence the customer has that 'we will find a way to do anything – we have a lot of smart people'.

'Solution sale' is a form of consultancy, though none of the companies portrays itself as a consultancy as such or charges for consultancy services. The point is that solution sales encourage not only goodwill but repeat business, customer retention and word-of-mouth referral, which is why Steve Zenger was able to assert that his company has 'no official sales force. We have 700 customers, *that's* the sales force'.

5.2 Rewarding digital sales people

The norm in the print industry in the USA is for sales people to be paid a basic salary with a commission based on a percentage of 'added value'. Examples of salary packages include:

- Cohber Press: between $60,000 (~£33,000) and $100,000 (~£56,000) with commission of around 6% and a lot of incentives; basic pay is cut if the employee does not reach sales targets
- Lazer Digital Services: a 'large' basic + commission, usually after a probationary period of one to two years
- Boncraft Group: packages linked to value added on turnover

'Added value' is a concept almost sacred to the US sales milieu and has a double meaning. On the one hand it refers not just to how a sales person performs in terms of target orders but to what they bring to the company in terms of fostering customer relationships through solution provision. On the other, it refers to the sales person's ability to add value for the customer by providing solutions – for example, by stressing the full capabilities of the equipment available and its benefits to the customer rather than selling variable data printing simply as a commodity. Steve Zenger was blunt on this matter:

'Doing stuff that doesn't add value for the customer will get you fired.'

5.3 Training digital sales staff

The importance of RIT as a supplier of highly skilled and well trained recruits to the digital print industry in and around Rochester (and to a lesser extent Buffalo) has been commented on at several points in this report, and the institute's role in maintaining and improving skill levels via training is explored in Chapter 6. But is there as much emphasis on training selling skills as on training in technology?

Most but not all of the companies visited recruit from RIT. Around 35% of the current workforce at Lazer Inc are former RIT students, while RIT graduates have a strong presence in many of the companies' management teams. ColorCentric's John Lacagnina is a prime example.

Jeff Quartley at Mercury told us that his company takes three or four 'co-op' students from RIT each year to work in production or project work. He had just hired two RIT graduates – one of whom was a former co-op student – to start as customer service representatives (CSRs) and then use their technical background in digital sales.

RIT is also an ongoing source of training in specific skills – both technology- and sales-based – for companies in the locality and relies upon them for approximately two thirds of its training revenue. Otherwise, the main sources for training of sales staff are the suppliers of equipment and technology themselves, who offer essential product training and case studies, and trade associations such as the PIA, Xplor and DMIA, which offer specific digital print training.

Having acquired a Xerox 8000 colour digital press, Boncraft Group appointed a former Xerox executive in September 2005 to assist and train its sales force.

Not surprisingly, many of the organisations we visited stated that the most common form of training was regular on-the-job training and everyday learning from direct working experience.

5.4 Trade associations – a promoting role

Promoting the interests of the graphic communications industry as a whole in this corner of the USA is the Printing and Imaging Association of New York State. PIA of NYS is a non-profit making trade association covering upstate New York and northwestern Pennsylvania. As its website[5] states, it is 'in the business of promoting programs, services and an environment which helps its members operate profitably.' It currently has 275 member companies.

Membership of PIA of NYS includes membership of Printing Industries of America (PIA) and the Graphic Arts Technical Foundation (GATF) and access to the Graphic Arts Information Network (GAIN). Collectively, these organisations comprise the world's largest association representing the graphic communications industry. Serving the interests of more than 12,000 member companies, PIA/GATF and its affiliates deliver products and services that enhance the growth, efficiency and profitability of their members and the industry through advocacy, education, research and technical information.

A key focus of their collective activities is training and development. A quick glance through their events calendar for 2006 gives a sense of the range of such services offered that are of relevance to the digital print industry. Topics include:

5 www.printnys.org

- Orientation to the graphic arts for sales and customer service representatives
- UV printing for sheetfed offset 'to reduce the learning curve when implementing hybrid technology'
- Implementing colour management
- Advanced PDF for print and beyond to enable streamlining of workflow
- Mission possible: seminars for creatives and printers
- Package printing for the commercial printer
- Supervising print production
- Implementing a JDF workflow

An example of the PIA/GATF effort in promoting the digital print industry is the Digital Printing Council (DPC), established in January 2006 and including Adobe, Canon, EFI, Hewlett Packard, Kodak and Xerox among its sponsors. The function of the DPC is to provide members and the printing industry as a whole with informative tools and publications that are designed to help firms be more productive, efficient and generate more sales with new digital technologies. It focuses on building research and awareness about digital and personalised printing to enhance members' knowledge about its applications.

Most of this information comes in the form of publications, newsletters and other printed products. The DPC also makes available an online archive of materials for access by the public and by members. As part of their membership, members receive Designing4Digital, a multimedia customer education package series.

PIA/GATF has declared 2006 'the year of digital print'. DPC initiatives for the year include the Marketing 4 Digital (M4D) educational outreach programme, which is described as 'a unique and extensive research project giving digital and conventional printers the information and insight they need to sell their services to 24 specific vertical market segments'.[6] The first seminar in this series was presented in San Francisco by Frank Romano, Professor Emeritus of RIT.

To paraphrase the same press release, M4D will provide companies and their sales staff with the tools they need to understand the requirements of current and potential customers in over 24 vertical segments, which include advertising agencies, the healthcare sector, casinos, the hospitality industry, insurance and real estate.

In addition to M4D, DPC research studies include 'The Future of Direct Mail', 'Compensating Your Digital Team', and 'Compensation, Incentives, and Bonus Plans: Design, Implementation and Evaluation'. Further information about M4D can be found at DPC's website.[7]

5.5 Opinions about the PIA

All but one of the mission team's host organisations is a member of PIA of NYS; each has a different take on the benefits of membership, which include privileged pricing. PIA has a national deal with Xerox which gives members an excellent price on the latter's products and kicks back to the association at both national and local level. Though our host at Cohber Press thought that a slightly better price could be achieved by printers acting individually, they felt they should be supporting their own organisation. Similarly, our host at Lazer Inc explained that becoming a member of the PIA is a statement – a means of showing that your company is part of the wider industry.

Steve Zenger of Zenger Group also mentioned price benefits. The company

6 DPC press release, 20 February 2006

7 www.digitalprintingcouncil.com

bought its iGen3 through a PIA deal, even though it might have been slightly cheaper elsewhere. Zenger also quoted the PIA's insurance programmes, its ability to lobby on behalf of the industry, its guidance regarding human resources and health and safety, and its role as a vehicle for sharing information as being prime reasons for membership.

However, Zenger was even more enthusiastic about the Printing Executive Network (PEN) of which his company is a member. This is a group of eleven like-minded companies from all over the USA that enjoy a full and frank exchange of information right down to profit and loss. They visit each other's businesses and share constructive criticism. This 'very valuable' vehicle is not PIA-organised.

Xerox is prominent in the PIA nationally and sponsors DPC initiatives. RIT is also active in the PIA both nationally and locally, and welcomes the M4D initiative for putting the focus on what the client needs – stepping inside 'the client's shoes' – rather than press technology.

Finally, it is slightly paradoxical that Lazer Inc, which is not primarily a printing company, wishes to associate with the PIA and other printer bodies while the owners of ColorCentric – which pitches itself primarily as an Internet company yet is in the business of printing one of the industry's most traditional products, books – do not feel that the PIA is the right organisation for them. For all the capacity of digital to blur the boundaries between the worlds of print, IT and the Internet, it is surprising that perhaps the most innovative company we visited chooses to stand apart from the rest of the industry.

6 EDUCATION AND TRAINING

Dr Long Lin

6.1 Rochester Institute of Technology
6.2 RIT as a centre of research
6.3 RIT and new thinking
6.4 Education levels and recruitment
6.5 Lessons for the UK

It goes without saying that focused, high-quality education and training is fundamental to the future of any industry – and particularly to the future of an industry such as digital print, where innovation and change are reliant not simply on the imparting and exchange of knowledge but on a constant process of R&D of new products and applications.

One of the contributions to the growth of the Rochester/Buffalo region as a printing hub has been the presence in Rochester of one of the country's outstanding vocational colleges, Rochester Institute of Technology (RIT). Over the years, RIT has fostered the talents of several important figures within the American print industry including Tom Curley, President and CEO of Associated Press and Daniel Carp, former Chairman of Eastman Kodak.

RIT has developed close relationships with many of the principal print and print-related organisations at local, national and international level. It continues to be the main source of recruitment for the graphic arts industries, both in or around Rochester and much further afield.

The mission team chose to visit RIT because of its reputation as a centre of knowledge and expertise, and because of its record of successful collaboration with the industry itself. Although the UK does have some counterparts to RIT, notably the University of Leeds and the University of Arts, London, the scale and nature of collaboration between Britain's academic establishment and its printing industry is clearly not comparable. Our objective was to look closely at RIT's philosophy and methods with a view to assessing how much the UK can learn from them.

More broadly, we were concerned with exploring:

- The profile of training and education in the workforce of the region's print industry
- Interaction with educational establishments in terms of R&D, recruitment and training
- The importance of training and interaction with academic establishments as perceived by the industry

6.1 Rochester Institute of Technology

RIT was founded in 1829 as a private higher education institute, the Rochester Athenaeum, and merged with the Mechanics Institute in 1891 to become the Rochester Athenaeum and Mechanics Institute. It became the Rochester Institute of Technology in 1944 and moved to its present site, just outside the city limits in Henrietta, New York State, in 1968.

Today, RIT has over 15,000 students across eight colleges and disciplines including engineering, business and computing. The college also runs three schools in Europe – in Prague (Czech Republic), Dubrovnik (Croatia) and Kosovo. RIT has an annual budget of $423 million (~£235 million; 2005-06 figures).

RIT's Chester Carlson Center for Imaging Science was founded in 1986 and began its first doctoral programme in imaging science

three years later. It houses six schools including the School of Print Media and offers professional courses in areas such as photography, film, animation, design, fine arts and crafts. The School of Print Media currently has 250 undergraduates and five postgraduate students. The School also runs web-based teaching programmes which have proved particularly attractive to international students.

The School follows an undergraduate and postgraduate curriculum that is highly relevant and tailored to the graphic arts industry, with which it retains strong local and national links. Experts working within the graphic arts industry (often RIT graduates themselves) give regular lectures at RIT.

Internship is an integral part of many of the courses, cementing the links between the School and industry and providing companies with excellent opportunities to recruit new employees. For the student, internship offers an opportunity for hands-on learning – and to become familiar, comfortable and confident with their chosen career direction.

RIT also runs Industry Education Programs (IEPs) for companies which are designed to enhance production skills and keep personnel up to speed with the latest technologies. IEPs provide workforce training in traditional and digital technologies using college facilities. They can be customised to suit a company's specific needs and run on campus or at company sites.

Short training programmes (mostly run over three days) include Colour Control for the Production Pressroom, Workflows for Print, and Digital Colour and Variable Data Printing.

6.2 RIT as a centre of research

In addition to its educational provision, RIT is unique within the region in that it also engages in a significant level of research activities – again in collaboration with the print industry. These activities are themed around two areas – business models, market trends and logistics relevant to graphic arts, and imaging science and technology (S&T).

The focus of its research activities in this regard is the Printing Industry Center, which is funded by the Alfred P Sloan Foundation. Established in 2001 to become one of 22 Sloan Industry Centers across the USA, the Printing Industry Center is the joint responsibility of the School of Print Media and RIT's College of Business. It follows the Sloan tradition of applying a broad multidisciplinary approach to industry research.

With a mission to study 'major business environment influences in the printing industry precipitated by new technologies and societal changes'[8], the Center addresses the concerns of the printing industry through educational outreach and research initiatives. The Center acts as a forum for printing companies and associations 'to access a neutral platform for the dissemination of knowledge that can be trusted by the industry, to share ideas, and to build the partnerships needed to sustain growth and profitability in a rapidly changing market.'

In addition to the Sloan funding, the Center receives a considerable amount of financial support from the graphic arts industries, including Xerox, Kodak and HP. It is, however, now self-sustainable thanks to the income generated through services provided to the industry. Those services include:

- Evaluation of printing consumables
- Product development
- Product audits
- Troubleshooting
- Printing process measurement and control

8 www.rit.edu/~spms/research.html

The Center has also established itself as the certified centre for print media evaluation for both HP Indigo and Kodak NexPress.

The Center houses a highly impressive range of printing presses, both conventional (eg GOSS Sunday 2000 Web Press; Heidelberg Speedmaster 74 Sheetfed Press; Mark Andy LP3000 Flexographic Press) and digital systems (eg Kodak NexPress 2100; Xerox DCP/50D and HP Indigo 1000, w2000, 3050 and 5000). The Center also has an enviable collection of print and media test instruments including Image Pro Plus Image Analyser; KDY Image Analyser; and Datacolor SF00 Plus Colorimeter.

6.3 RIT and new thinking

Every member of the mission team was deeply impressed by RIT's facilities, by its close association with the wider graphic arts industry, by the relevance of its education and training programmes to the needs of the industry, and by its global outlook – its web-based educational programmes have enabled the institute to attract a wider audience and enhance its international reputation. Its establishment of the Printing Industry Center has strengthened its industrial collaboration significantly.

RIT is also important in another respect – as a centre of challenge to traditional perceptions about the graphic communications industry and how print media will develop and change. It is clearly part of the RIT culture not just to deliver programmes and services but to provide new thinking. This is exemplified by Professor Frank Cost, Associate Dean of the College of Imaging Arts and Sciences at RIT, who gave a talk to the mission team on the importance of book publishing in the Internet age.

Cost's book, *The New Medium of Print,* published by RIT, is an introduction to the world of print that takes as its starting point not the technology of print but how people use print and why. Going against conventional perception, he concludes that the emergence of the Internet, far from reducing the number of books printed, has actively promoted book publication. As he explains, 60% of all books currently published are not sold when traditional print methods are used. With the advent of books on demand through digital print, all books are sold. To demonstrate the power of an 'Internet-driven print service', Cost has created a number of instant books that are available from Lulu.com.[9]

6.4 Education levels and recruitment

The mission found that, with regard to recruitment and skill levels, the digital print organisations visited in Rochester and Buffalo had a similar profile to their UK counterparts.

Within the more production-based companies, the majority of employees are of relatively low educational background – ie below degree level. Recruitment of employees is usually based on skill and capability, and a higher degree in a relevant subject is not essential. While they are expected to work in a highly efficient fashion, employees are not generally expected to engage in proactive or innovative thinking. The general feeling is that most employees are not highly paid. Basic training for the employees is provided by the press manufacturers.

Within the more prepress and Internet-business based companies, a high proportion of employees have a higher education background. In some companies, up to 35% of the workforce are educated to degree level. As mentioned earlier, a large proportion of graduate employees had been

9 http://people.lulu.com/users/index.php?fHomepage=84641

trained by RIT, and many companies retain close links with RIT in both training and R&D projects – for example, ColorCentric and Lazer Inc. Some companies had been established and run by RIT graduates; some have staff teaching at RIT on a part-time basis as what are called 'Adjunct Professors'. Pat Sorce at RIT told us that Adjunct Professors play a key role in keeping the teaching fresh and up to date.

We witnessed examples of employees demonstrating strong working knowledge gained through training. It was obvious that staff operating the digital presses at RIT's Printing Industry Center had a much deeper understanding of the mechanisms of imaging, of the photo drum, of toner transfer and toner fusing, whereas press operators at a digital printing company failed to explain the specifications of an anilox cylinder (for the varnishing unit).

Kodak NexPress has a particularly impressive R&D team that handles very advanced projects continuously at huge expense. Most employees at the R&D centre are graduates and postgraduates from high-calibre universities, including RIT science graduates who work on imaging research.

Interaction between print companies and RIT decreases dramatically outside the Rochester area. Proximity is clearly a factor. The inclination of companies based in Rochester to recruit RIT graduates at a higher level of salary than they would receive in Buffalo makes recruitment of highly qualified people even more difficult for smaller companies in the latter city.

To summarise, the mission team noted that there are significant differences among graphic arts companies in terms of recruitment criteria, profile of educational background of employees, and interaction with academic establishments such as RIT. The main reason is the nature of the demand of companies for highly science- and technology-based input. Generally speaking, however, there appeared to be a higher percentage of graduate employees within the companies under study than would be the case with their UK counterparts.

We also noted a preference for investing in a trained employee rather than training a new employee. Employee training generally takes the internal route and apprentice programmes were rare among the companies we visited.

6.5 Lessons for the UK

Until recently, the UK had few universities which were well established in education and training of relevance to the graphic arts industries or which carried out relevant research. The reasons are mainly historical and rooted in the UK educational system. Historically, universities have tended to regard teaching in printing S&T as a deviation from the traditional, more fundamental sciences, while carrying out high-standard R&D activities in imaging science and printing S&T. Colleges tended not to engage in R&D, while still providing highly relevant training for graphic arts industries.

It is pleasing to see that this situation has changed significantly in recent years. Examples include the Department of Colour and Polymer Chemistry (at the University of Leeds) offering a part-time graphic arts course, whilst carrying out high-standard R&D directly relevant to printing and print-related industries and a communications BSc programme, and the London College of Communication (University of Arts, London) establishing the Materials and the Arts Research Centre, whilst providing reputable education/training in graphic arts. More such activities would help to improve the competitiveness of UK graphic arts industries still further.

Also, until recently there have been few academic-based research centres which specialise in servicing graphic-arts industries. A Digital Print Centre of Industrial Collaboration at the University of Leeds and a Materials and the Arts Research Centre at the University of Arts, London, have now been set up. However, we are certainly falling far behind our American cousins. The UK Government should be committing more resources to supporting such centres in order to help UK graphic-arts industries improve their competitiveness in what is a challenging international environment.

We conclude this section with a number of observations/recommendations:

First, the UK printing industry, and particularly the digital printing industry, needs to be more aware of the existence of knowledge and expertise among several academic establishments, and more proactive in approaching them regarding collaboration. The danger at the moment is that there is no field (apart from UV technology) in which the UK printing industry could claim to be leading the world. This puts the UK printing industry in a weaker position than its US counterpart.

Second, the UK academic establishments such as the University of Leeds and University of Arts, London, need to work more closely with the trade organisations, such as BPIF, to bring more in-depth technical knowledge and expertise to the printing industry. Joint initiatives between BPIF and universities are likely to be more effective than either working alone. The universities and BPIF need to seek, on a joint basis, the most effective approach to helping the printing industry.

Finally, UK government needs to recognise that the printing industry is under major pressure to improve its competitiveness rapidly in order to maintain its international position. As such, various relevant government departments need to consider seriously funding initiatives, through BPIF and the universities, which would be aimed at improving that competitiveness. To date, the UK's national government has done little in this regard, although regional government has been more proactive. Much more needs to be done before it is too late for the industry.

Exhibit 6.1 *Mission team at RIT; L to R: Tim Browning (front), Jon Bailey (back), Scotch Kirkpatrick, Dr Long Lin, Geoff Thould, Richard Knowles, Pat Sorce (RIT)*

7 'ELIMINATING THE GATEKEEPER': COLORCENTRIC – A CASE STUDY

7.1 History, background and scale of operation
7.2 Business rationale
7.3 Conclusions

A recurring theme of the mission team's visit to the Rochester/Buffalo region was the application of digital print technology to one of the oldest and most traditional of printing activities – the creation of books. One of our hosts, Professor Frank Cost of RIT, gives an inspired exposition of the future of books in the digital age in his book *The New Medium of Print,* arguing that digitisation gives unprecedented new opportunities for short run (or even single copy) publishing and that 'amateur' publishing may well represent the emergence of a new mass market.

In this case study we look briefly at the example of Rochester-based ColorCentric Corp, which has enjoyed 300% growth year on year since launching in 2002. Although its product offer is not restricted to self-publishing, ColorCentric has identified a completely new market for personalised books – whether works of fiction, academic texts or even commemorative photo books or yearbooks. The company has also pioneered the technique of marketing its products via value-added retailers or resellers (VARs) – officially known as application-specific providers (ASPs) – using specialist Internet sites.

7.1 History, background and scale of operation

ColorCentric was founded in September 2002 by John Lacagnina, whose first company, Entire Inc, developed the first PostScript front-end RIPs for Xerox high-speed mainframe printers. He subsequently started Electronic Demand Publishing Inc, which specialised in document manufacturing for large software and computer companies, and sold the company in 1997. One of the original pioneers of colour printing on demand, he launched ColorCentric – 'from scratch, with a vision and deep pockets' – because of the potential he saw in the Xerox iGen3 digital press and the potential he saw in the colour book publishing and marketing communication markets.

The company won its first orders in early 2003 and had over 130 customers by the end of the year. It now employs 50 staff, with salaries accounting for 10% of turnover. Between 600 and 2,000 orders are processed each day.

Publishing accounts for nearly two thirds of annual revenue, while 35% comes from marketing communications printing. John Lacagnina is a believer in lean manufacturing: the whole business premise is set up on automation with online finishing and bespoke software adding controls to incoming files, while the printers/finishers are set up as self-contained cells so that the operation is scaleable and repeatable in another location.

The company currently has three iGen3s with several Docutech 180s. To support its short-run business, it has a PDF workflow that integrates billing and financial information with print-queue management and automates production from the web to paper and electronic output. The system integrates proprietary Cobra software and several modules from the Xerox FreeFlow digital workflow collection, along with e-commerce and e-procurement systems from Four51.

ColorCentric continues to enjoy a strong and fruitful relationship with Xerox, on whose behalf it regularly tests new products. Frank Steenburgh of Xerox is on the ColorCentric board.

7.2 Business rationale

Company strategy is to market directly via the web and through print brokers and partners who sell digital full-colour printing to small offset-based businesses. Lacagnina defines the key benefit of ColorCentric services (aside from cost reduction) as 'getting our clients' personalised message to market faster'. On the book publishing side, ColorCentric customers are mainly small to medium-sized publishers of children's books or coffee-table books seeking incremental revenue, to whom the company delivers quality, flexibility and affordability on short print runs.

ColorCentric has a matrix of products and applications which is shown in Exhibit 7.1.

PRODUCTS	APPLICATIONS
Photo products	
Albums	Real estate
Postcards	Travel logs
Calendars	Year books
	Weddings
Collateral	
Business cards	Corporate communications
Sales literature	B2B marketing
Label cards	Individual collateral
Mag cards	
Publishing	
Manuals	Training
Trade	Self-publishing
	Universities

Exhibit 7.1 *Matrix of products and applications used by ColorCentric Corp*

Lacagnina's view is that the long-term potential of on-demand digital printing in book publishing is in short-run printing for niche markets such as university publishing houses and also in self-publishing. Historically, the book industry has been hamstrung by large companies whose publishing policies and economies of scale make it virtually impossible for an individual to publish their work. Around half a million manuscripts are submitted to publishers annually, of which only 50,000 will be accepted and eventually reach the bookstalls. This leaves a huge gap of frustrated would-be authors who, until the advent of digital print, would incur enormous cost in publishing their books themselves.

ColorCentric's business model is based on ultra short-run capability, with the additional benefit to a small publisher that a book such as an academic work – whose sales will be small but steady and which will be in continuing demand among student readers – can be kept in print at no investment cost. Just as important, the speed with which a book is physically produced is drastically increased when printed digitally. It can also be continually updated at minimal cost to reflect new academic or scientific research, so the cumbersome process of producing second or revised editions is sidestepped.

As John Lacagnina describes it, his priority is to create a shorter supply chain. ColorCentric increases profitability and lowers end-user costs by bypassing several steps in the supply chain to sell direct to customers. Lacagnina calls this 'disruptive technology', in the sense that it destroys the traditional continuum. In his view, 'The mainstream publishing process is controlled by a handful of publishing Goliaths. It's burdened with tremendous waste, inefficiencies and unnecessary costs. We have eliminated the gatekeepers and put the power in the hands of the creator.'

ColorCentric's business is currently 90% Internet-driven, its key partner since September 2004 being Lulu.com, a website that effectively gives everyone the power to get published. Authors and publishers upload their book text to the site, set their own royalty and sell the book via the site, either in electronic form or as a paperback, in colour or black and white. When an order is placed, the required digital files are downloaded direct to ColorCentric in Rochester for printing on its iGen presses using a number of standard templates. The resulting perfect-bound paperbacks are high-quality items that can cost as little as $6 a title and are printed and shipped to the customer within 48 hours. Over 13,000 book titles are currently available via Lulu.com. ColorCentric's other ASP partners include Qoop.com, Sharedbook.com and RIT Open Book.

As of February 2006, ColorCentric's strategic partners also include Kirtas Technologies, whose automatic book-scanning/information-capture technology is the only automatic nondestructive digitisation process that uses high-resolution cameras. The partnership will enable publishers to digitise out-of-print or backlisted books and make them available to the public on a short-run or single-copy basis. Not the least of the technology's benefits is that publishers will be able to create and draw upon a convenient digital repository rather than store books in a space-consuming and cost-heavy warehouse.

7.3 Conclusions

ColorCentric has an approach that is visionary on so many levels. Its pursuit of a perceived gap in the market and its challenge to the traditional publishing model – with all that that implies for lead times, investment, the author-publisher relationship, even the very basis of advance/royalties remuneration – make it a classic example of a company which is not only using new technology to genuinely expand the marketplace but is rethinking the process of delivery. Its approach is also knitted tightly to the Internet in a way that pushes the boundaries, particularly regarding its relationships with VARs.

As explored elsewhere in this report, however, workflow is key to the success of this company, and a commitment to automation and lean manufacturing is what enables it to make profits. Its development of its own bespoke software to control the entire production and fulfilment process is also exemplary here, making lean manufacturing possible to a degree that would probably not be mirrored if off-the-shelf solutions were implemented.

ColorCentric brings clients closer to the manufacturing process by integrating technology, and it matches benefits such as cost and time reduction to genuinely innovative products and services. That is a very powerful combination.

The last word should go to John Lacagnina himself, using a baseball analogy:

'I believe in hitting singles, and that's how we've built our business. We prove what we can do, and it usually leads to more work – and to the occasional grand slam.'

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Internet issues
8.2 Data issues
8.3 Technology issues
8.4 New markets and applications
8.5 Workflow systems and software issues
8.6 Sales and promotion issues
8.7 Role of academia

The mission delegates visited Rochester and Buffalo during a period of relative economic buoyancy. Those members of the team who took part in the 2003 Global Watch Mission to the printing industry in California noticed a marked difference in atmosphere and a shift from what had then been a prevalent concern with business survival to a palpable sense of confidence – albeit one tempered by a continuing concern for keeping costs down and for pursuing greater efficiency and 'lean manufacturing' wherever possible.

Turnover and employment statistics for the period 2000-2004 show that the print industry in New York State has become leaner and smarter, with a reduction in turnover of around 20% tempered by a reduction in employment levels from 97,732 to 79,589 as the industry moved more and more towards automation and new technology.[10]

One of the major points of interest in seeing at first hand how industries in other countries operate is of course to assess how far ahead (or indeed behind) they are in technology and practices in comparison with their UK counterparts. Overall, while the mission found many learning points and are able to make the observations and recommendations recorded below, we found little that was wholly new or unexpected during the visit in terms of new technologies, nor any real sense that the US perspective on digital print – albeit only an east coast one – is necessarily more advanced than in the UK.

Rather, we were left with an impression of a succession of well run, well organised and aware organisations succeeding through good practices and a solid sense of where the market is heading. One point of surprise was finding differences in approach and technological adoption between companies in Rochester and Buffalo, in spite of there being only 70 miles between the two cities. Rochester companies clearly benefit from the presence on their doorstep of RIT as a centre of education, training and research and a source of high-calibre recruits.

In some ways, the mix of companies in Rochester and Buffalo – some well established, some relative newcomers, a number of big hitters – is similar to the UK, but where the USA most differs is in terms of the much bigger volumes with which the industry deals.

The smaller scale in the UK may account for the relatively slow rate of Internet adoption and application of digital print when compared to the US experience. We sense some holding back in the UK, whereas a number of the companies we visited – notably ColorCentric – have made real strides forward in using the Internet to reduce the supply chain and in applying automation.

Regarding models of profitability, we echo

10 www.printnys.org

RIT Professor Frank Cost's championing of the way forward as 'producing shorter and shorter run lengths for more and more people.' This seems a particularly apposite summary of what the digital print industry is about, and an encapsulation of its number one benefit. The remainder of our conclusions and observations revolve around particular issues and themes. We particularly stress the importance of our recommendations regarding collaboration between the print industry and higher education in Section 8.7.

8.1 Internet issues

- Some companies have made the Internet integral to their business and are using it to drive volume and applications, while others still fail to see its value or potential. Web links and e-mail marketing are allowing consumers to become more brand aware and giving businesses tighter control of their marketing, but the impetus is to drive volume, not exploit the available technology.

- Perhaps the most creative use of the web we encountered was by ColorCentric, which has identified a new market for self-published books on short print runs, and markets its products via VARs using specialist websites. ColorCentric's example shows how the Internet can really drive personalisation within book publishing.

- As ColorCentric demonstrates, the Internet can also be a means of reducing the supply chain. By focusing on reducing the supply chain, it is possible to create a new business genuinely based on digital technology, not migration.

8.2 Data issues

- Digital asset management (DAM) offers a total data and prepress solution to clients such as packaging companies and advertising agencies, and consultancy services to users of digital print technology.

- The market for data-driven variable-colour printing for direct-mail marketing is growing. Increased computer power makes it possible to RIP colour graphics at the speed of most colour digital presses.

- The ideal digital printer should appreciate data issues. There is a need for improved understanding among printers and clients of data, particularly with regard to the tracking of responses.

8.3 Technology issues

- Even though most of our hosts stated that there is still a lot of life in electronic print technology, we were surprised how few 'new and exciting' developments were highlighted in relation to press technology. This may be due to the general belief that it is the market that is driving new technology, not the manufacturers as previously.

- There is potential for growing litho business out of the colour digital business. Mercury Print Productions' litho sales have increased as a result of digital because of its ability to offer a total solution.

- Strong opinion was voiced among our hosts that combining technologies – ink-jet, offset, digital, online – is the future.

- We anticipate new development work on ink technology and colour accuracy with special inks (including metallic, magnetic, security inks). This will not only develop the offering from the manufacturers but will allow specific applications such as packaging to move to digital.

- The onus is on all areas of the industry to maintain the drive to adopt new technology by working in combination. The digital print industry is one of the few industries where all aspects of the chain combine to drive the market, drive technology and drive adoption.

8.4 New markets and applications

- Print-on-demand and self-publishing: the ColorCentric model or printing books on demand enables books to be kept in print at no investment cost. This makes self-publishing economic for the author or small company and has huge cost advantages for academic or medical publishers with niche markets.

- 'Transpromo' documentation – ie using transactional documents to carry promotional messages – is clearly a growth area for colour print. Xerox is currently researching a colour machine that will print fit-for-print business documents at a reduced cost, suitable for the transactional print market.

- The casino market is massive in Rochester, and has the potential to be a part of digital business in the UK should 'super casinos' take off.

8.5 Workflow systems and software issues

- One of the strongest messages to come through was the value of lean workflow and production, both as a cost saver and as a means of reducing the supply chain and speeding up the operation. There is a consensus that amalgamation of all technologies is the way forward, in which case one workflow system to suit all platforms is going to be central to the sales strategy.

- Xerox informed us that the newest addition to developments focusing on workflow is FreeFlow, an integrated workflow solution that combines with MIS and cross platform to fully integrate all aspects of production, both offset and digital. What is different about FreeFlow is that it also focuses on business aspects, including costing and distribution.

- Lean manufacturing and internal procedure streamlining is seen as an essential part of maintaining margin. As an industry, we must become less intensive, with automation the key. Those organisations which are really exploiting digital have an automated online presence, workflows, front ends and finishing – up to 80% automated processes in the case of ColorCentric.

- No organisation can build a business around off-the-shelf software. Bespoke systems are the key to success as long as they are placed at the heart of the business.

- In the PDF v JDF debate, the former is winning. There is a lack of understanding of, or inclination towards adopting JDF technology. A common view is that PDF works perfectly, so why change?

8.6 Sales and promotion issues

- The UK printing industry needs to become more customer-focused and proactive in addressing the needs of clients. If there is a better way to achieve a solution, the customer needs to be told it.

- Sharing of information, opinion and technology within the UK industry is an area for improvement and/or development. There is no real UK equivalent to the peer group network described to us by Steve Zenger, which operates independently of the US trade association, the PIA.

- We gained no real sense that digital sales people possess or require any different characteristics to those selling conventional print, beyond the technical competence and knowledge to understand data and IT issues. However, sales people need to adopt a certain digital mindset, focused on selling the value of the solution to the customer rather than the cost per copy.

8.7 Role of academia

- Compared to the USA, where companies actively sponsor research, the UK print industry does not do enough to exploit resources for software development in academia. The investment would not be enormous.

- The UK printing industry should be more aware of the existence of knowledge and expertise in academic establishments and more proactive in collaborating with them. At the moment there is no field (apart from UV technology) in which the UK printing industry could claim to be leading the world. This puts the UK printing industry in a weaker position than its US counterpart.

- UK academic establishments need to work more closely with BPIF to bring more in-depth technical knowledge and expertise to the printing industry – for example, by encouraging print professionals to lecture or advise on academic courses, as is the case at RIT. Joint initiatives between BPIF and universities are likely to be most effective.

- In particular, the industry and academic institutions should be sharing their experience, expertise and requirements. There is untapped scope within British universities, for example, for testing and research. The US tradition of giving internships to students – as a means of encouraging talent into particular industries and giving potential recruits a working taste of the industry – has no real parallel in the UK. Internship would be an obvious point of collaboration between the UK print industry and higher education.

- More generally, the UK print industry should be looking to attract a wider spread of graduates – especially from the sciences – to complement those entering the industry via established vocational routes. RIT, for example, has a tradition of sending physicists and chemists into the US print industry.

- UK government needs to recognise that the printing industry is under major pressure to improve its competitiveness in order to maintain its international position. The relevant government departments need to consider funding initiatives through BPIF and the universities aimed at improving that competitiveness. To date, the UK's national government has done little in this regard, although regional government has been more proactive.

Appendix A

MISSION TEAM

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Digital Services Director

ProCo Print Ltd
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jon.bailey@procoprint.co.uk

ProCo is a full-service company specialising in digital print, litho print and direct mail. Founded 14 years ago, the company now has 96 employees with a turnover of £7.2 million.

ProCo has just completed an investment programme of £3.2 million in new digital technology and B2 litho presses in a 52,000 ft^2 factory. It recently launched its own web platform for print ordering and fulfilment looking at dynamic databasing.

Dr Long Lin
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The Department of Colour and Polymer Chemistry is generally recognised as the world's leading department in colour and colour application S&T. The department has maintained extensive links with printing and printing-related industries. It hosts the Digital Printing Centre of Industrial Collaboration – a recognition of its excellent track record in collaboration with the digital printing industry. The department has access to over 40 world-leading academics.

Richard Knowles
Chief Executive

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Buckingham Colour Group is a full-service group of companies encompassing traditional print and design, marketing and communications. Established in 1976, the Group now has 80 employees and a turnover of £7 million.

Scotch Kirkpatrick
Managing Director

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Datagraphic is an APACS accredited security printer that provides a one-stop transactional printing service for the printing, personalisation, fulfilment and mailing of secure documents such as cheques, payslips, invoices, statements, dividend warrants and share certificates.

During the last five years, Datagraphic has transformed itself from a manufacturer of litho-produced sprocket-fed business forms and cheques to a specialist digital security print and mailing company. The company has 57 employees and a turnover of £3.75 million.

Tim Browning
Group Director, Digital Systems

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The HenDi Group employs 120 people and is one of the largest printers in the City of London. The group specialises in financial research printing and uses equipment ranging from eight-colour B1 to two-colour Risos. In 2006 the company replaced Xerox 2060s with three 3050 HP Indigo seven-colour presses and Xerox DocuTech 6180s with four Xerox Nuvera 120C/Ps, making them the largest digital printer in central London.

In 25 years in digital printing spent mostly on the production side, Tim Browning has also been an active member of Xerox electronic printer user groups, serving on the committee as an ordinary member and for four years as chairman.

Geoff Thould
Managing Director

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Cyclic is a digital printing company based on the edge of the English Lake District, servicing the UK and Benelux countries with high-quality print solutions based on digital technologies. Its main customer base is graphic design companies.

Cyclic offers full design, prepress, digital and waterless printing, plus full in-house print finishing. Founded in January 2000, the company now employs nine staff in a 180 m^2 factory unit.

Mike Hopkins
Director of Membership

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BPIF is the premier trade association for the printing industry in Britain with 2,500 members. It has a turnover of £7 million and employs 85 staff in six locations around the country.

In addition to representing the industry to government, BPIF provides direct services in human resources, health and safety, training and technical and is committed to bringing to members opportunities for market and business growth.

BPIF acted as coordinator for this DTI Global Watch Mission.

Appendix B

HOST ORGANISATIONS

Boncraft Printing Group
4222 S Taylor Road
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USA

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www.boncraft.com
info@boncraft.com

Boncraft is a multi-award-winning $12 million (~£6.7 million) group of companies comprising a commercial litho and digital printer, a direct-mail company and a specialist greeting-card printer. It has 65 employees.

The company was founded in 1952 by James A Bubar and Chester Sasinowski and moved into sublimation printing in 1974, providing services to the sports industry. Boncraft became a full-service commercial printer in 1985 with the acquisition of Akiyama Press; in 2000 it bought up the Holling Printing Group.

Boncraft's nerve centre is a 20,000 ft^2 (~1,900 m^2) facility at Orchard Park. The company recently acquired a Xerox 8000 colour digital press.

Exhibit B.1 *Mission team at Boncraft Printing Group; L to R: Richard Knowles, Scotch Kirkpatrick, two Boncraft personnel including Tim Bubar at far right*

Cohber Press Inc

PO Box 93100
Rochester
NY 14692
USA

T +1 585 475 9100
F +1 585 475 9406
www.cohber.com
moreinfo@cohber.com

Cohber Press is a $19 million (~£11 million) company, founded in 1931 by Samuel Cohen and Howard Webber and now based in West Henrietta. Built in 1991, its 36,000 ft^2 (~3,300 m^2) high-tech centre is adjacent to the Rochester Institute of Technology (RIT) campus. Some $5 million (~£2.8 million) of its current turnover is in digital print and ~$3.5 million (£1.9 million) of that is in variable digital print.

From basic collateral and marketing support to customer relationship management (CRM) and strategically driven direct marketing campaigns, Cohber gives clients and agencies a single source for integrated strategy, production and analytical capabilities. Employing 135 staff, it is a full-service printing and communications company whose main markets are the pharmaceutical industry, casinos and the higher education sector.

Exhibit B.2 *Mission team at Cohber Press Inc; L to R: Richard Knowles, Geoff Thould, Jon Bailey, Scotch Kirkpatrick, Bill Bachman (Cohber)*

ColorCentric Corp

100 Carlson Road
Rochester
NY 14610
USA

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F +1 585 288 1671
www.colorcentriccorp.com
info@colorcentriccorp.com

Founded in 2002, ColorCentric has grown rapidly into a world-class digital full-colour printing organisation specialising in direct mail, short-run books (self-publishing), marketing communications and web-based custom-print applications.

See the case study in Chapter 7 for further information.

Exhibit B.3 *Outside ColorCentric Corp*

Kodak NexPress

NexPress Solutions Inc
2600 Manitou Road
Rochester
NY 14653
USA

T +1 585 726 1824
F +1 585 253 5525
www.nexpress.com
PR@nexpress.com

Since 2000, NexPress Solutions has helped transform the graphic arts industry by introducing award-winning digital presses and streamlined workflows that add more value to the printed page and generate greater profit for businesses.

NexPress is now part of Kodak's Graphic Communications Group.

Exhibit B.4 *Mission team at Kodak NexPress*

Lazer Digital Services

70 Bermar Park
Rochester
NY 14624
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F +1 585 247 9647
www.lazerinc.com

Established in 1981, Lazer Digital Services is part of Lazer Inc and specialises in digital imaging, design and mechanical layout, electronic prepress, catalogue and packaging development and digital asset management (DAM). It has a $6.5 million (~£3.6 million) turnover and 53 employees.

In January 2006, Lazer upgraded its graphics platform to Artwork Systems' Nexus comprehensive high-end workflow solution for label and packaging environments.

Exhibit B.5 *Mission team at Lazer Inc; L to R, facing camera: Scotch Kirkpatrick, Dr Long Lin, Richard Knowles; Gary Stafford (Lazer) is at far right*

Mercury Print Productions Inc

50 Holleder Parkway
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USA

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www.mercuryprint.com
mail@mercuryprint.com

Valerie Mannix founded Mercury in 1969 and operated from her basement with a $400 (~£220) printing press. Mercury now occupies a custom-designed state-of-the-art facility with over 70,000 ft^2 (~6,500 m^2) of climate-controlled space.

It is a full-service $25 million (~£14 million) turnover company, half of which is digital-based.

Exhibit B.6 *Outside Mercury Print Productions Inc*

Oser Press

1239 University Avenue
Rochester
NY 14607
USA

T +1 585 442 5621
F +1 585 442 7052
www.oserpress.com
info@oserpress.com

Oser Press is a full-service $2.5 million (~£1.4 million) commercial printer offering four-color process printing, complete bindery, warehousing and distribution.

The company has significant prepress and bindery capabilities, warehousing and distribution facilities, and top-rated Heidelberg and Miller multicolour printing presses. Duplicator presses and copiers are also utilised in production.

Oser entered the digital print market in January 2006 with the purchase of a Xerox 7000.

Exhibit B.7 *Mission team at Oser Press; L to R: Geoff Thould, Tim Browning, Scotch Kirkpatrick, Oser employee, Seth Oser (President, Oser Press)*

Rochester Institute of Technology (RIT)

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www.rit.edu

RIT has over 15,000 students attending eight colleges, including the Chester Carlson Center for Imaging Science housing the School of Print Media and five other schools. The latter has 250 undergraduates and five postgraduate students and follows an undergraduate and postgraduate curriculum tailored to the graphic arts industry. Internship cements the links between the School and industry, while Industry Education Programs (IEPs) are designed to enhance production skills and keep personnel at print and media companies up to speed with the latest technologies.

The focus of its research activities with regard to print is the Printing Industry Center, established in 2001. The Center addresses the concerns of the printing industry through educational outreach and research initiatives.

RIT has a number of students available to work for printing companies in the UK on a short-term contract basis. Contact Patricia Sorce via the RIT website for details.

Exhibit B.8 *Mission team at RIT; L to R: Geoff Thould, operator (RIT), Dr Long Lin, Tim Browning, Richard Knowles*

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Xerox Corp is a $15.7 billion (~£8.7 billion) technology and services company that helps businesses deploy smart document-management strategies. Its stated aim is to 'lead with innovative technologies, products and solutions that customers can depend upon to improve business results' (Xerox website). Its Rochester site is a 2 km^2 facility called the Gill Hatch Center.

Digital systems offered by Xerox include colour and black-and-white printing and publishing systems, digital presses, multifunction devices, laser and solid-ink network printers, copiers and fax machines.

Xerox's services expertise includes helping businesses develop online document archives, analysing how employees can most efficiently share documents and knowledge in the office, operating in-house print shops or mailrooms, and building web-based processes for personalisation of direct mail. Xerox also offers associated software, support and supplies such as toner, paper and ink.

Xerox has over 61,000 employees worldwide, including over 35,600 in the USA.

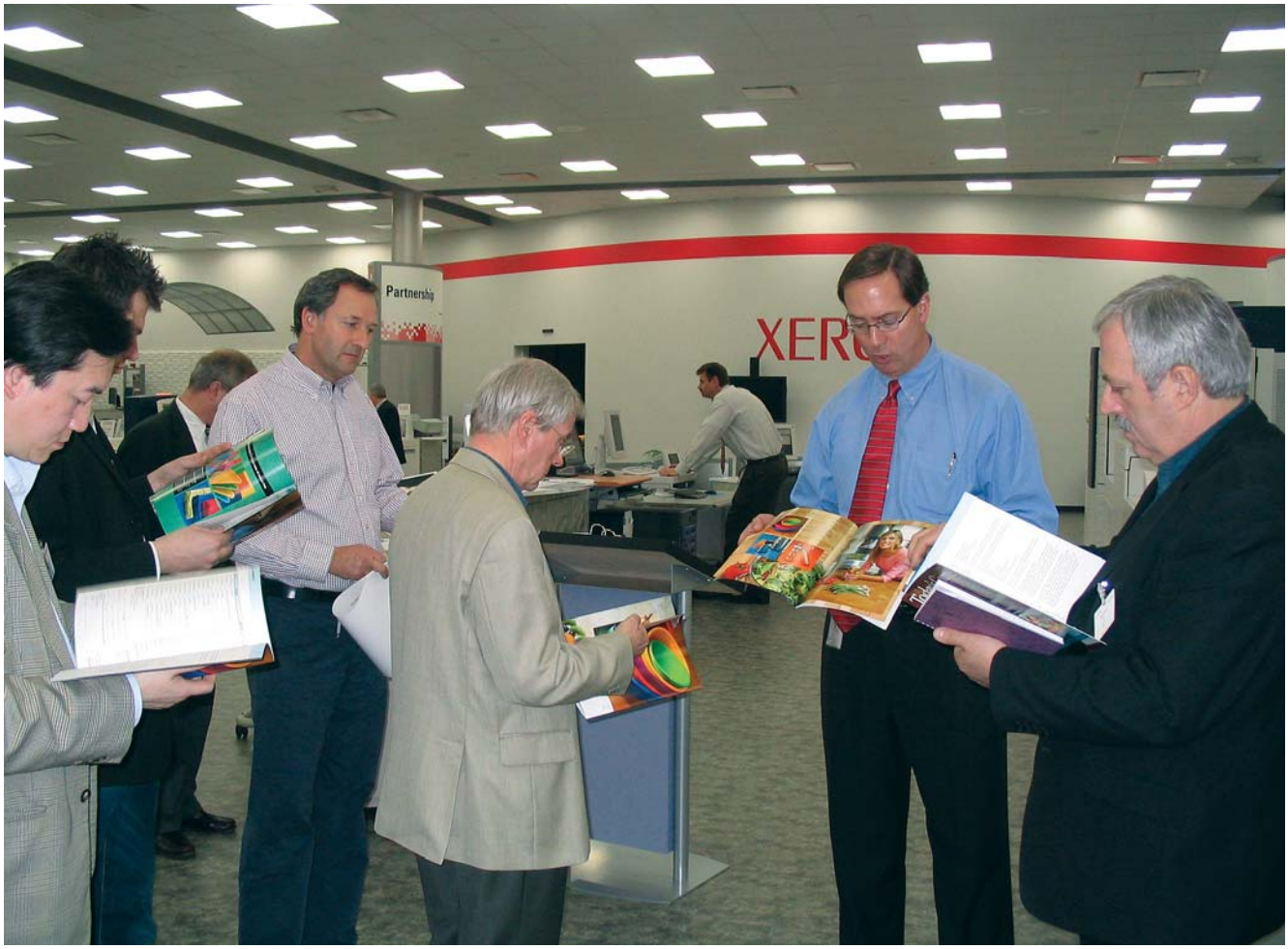

Exhibit B.9 *Mission team at Xerox Corp; L to R: Dr Long Lin, Richard Knowles, Tim Browning, Xerox manager, Geoff Thould*

Zenger Group

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Owned and managed by six brothers, the Zenger Group is a $10 million (~£5.6 million) group of companies including ImageCore, Anderson & Wahl Photography, Downtown Graphics and Printing, Partners' Press and Ulrich Mail, one of the oldest full-service mail houses in the region.

Zenger is a Xerox Premier partner and works exclusively with Xerox to develop its products and services. The group reported growth at 20-30% a year on the back of increasing demand for digital print.

Appendix C

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B.9	60	Mission team at Xerox Corp; L to R: Dr Long Lin, Richard Knowles, Tim Browning, Xerox manager, Geoff Thould

Appendix D

GLOSSARY

~	approximately
≈	approximately equal to
<	less than
%	per cent
€	euro (£1 ≈ €1.45, Apr 06)
£	pound sterling
$	US dollar (£1 ≈ $1.8, Apr 06)
3D	three-dimensional
APACS	Association for Payment Clearing Services (UK)
ASP	application-specific provider
B2B	business-to-business
BPIF	British Printing Industries Federation (UK)
BSc	Bachelor of Science
CAGR	compound annual growth rate
CEO	Chief Executive Officer
Corp	Corporation
CRM	customer relationship management
CSR	customer service representative
DAM	digital asset management
DMIA	Document Management Industries Association (USA)
DPC	Digital Printing Council (USA)
DTI	Department of Trade and Industry (UK)
F	fax
ft	foot = 0.3048 m
ft^2	square foot = 0.0929 m^2
GAIN	Graphic Arts Information Network (USA)
GATF	Graphic Arts Technical Foundation (USA)
HP	Hewlett-Packard (USA)
IEP	Industry Education Program (RIT)
Inc	Incorporated (company)
IT	information technology
JDF	job definition format
km	kilometre = 1,000 m
km^2	square kilometre
L	left
m	metre
m^2	square metre
M4D	Marketing 4 Digital (programme, DPC)
MIS	management information system(s)
NY	New York (state, USA)
PDF	portable document format
PEN	Printing Executive Network (USA)
PIA	Printing Industries of America (USA)
PIA of NYS	Printing and Imaging Association of New York State Inc (USA)
PO	Post Office
PSP	printing service provider
R	right
R&D	research and development
RIP	raster image process
RIT	Rochester Institute of Technology (NY, USA)
S&T	science and technology
SMS	short message service
T	telephone
UK	United Kingdom
US(A)	United States (of America)
UV	ultraviolet
v	versus
VAR	value-added retailer

Other DTI products that help UK businesses acquire and exploit new technologies

Grant for Research and Development – is available through the nine English Regional Development Agencies. The Grant for Research and Development provides funds for individuals and SMEs to research and develop technologically innovative products and processes. The grant is only available in England (the Devolved Administrations have their own initiatives).
www.dti.gov.uk/r-d/

The Small Firms Loan Guarantee – is a UK-wide, Government-backed scheme that provides guarantees on loans for start-ups and young businesses with viable business propositions.
www.dti.gov.uk/sflg/pdfs/sflg_booklet.pdf

Knowledge Transfer Partnerships – enable private and public sector research organisations to apply their research knowledge to important business problems. Specific technology transfer projects are managed, over a period of one to three years, in partnership with a university, college or research organisation that has expertise relevant to your business.
www.ktponline.org.uk/

Knowledge Transfer Networks – aim to improve the UK's innovation performance through a single national over-arching network in a specific field of technology or business application. A KTN aims to encourage active participation of all networks currently operating in the field and to establish connections with networks in other fields that have common interest.
www.dti.gov.uk/ktn/

Collaborative Research and Development – helps industry and research communities work together on R&D projects in strategically important areas of science, engineering and technology, from which successful new products, processes and services can emerge.
www.dti.gov.uk/crd/

Access to Best Business Practice – is available through the Business Link network. This initiative aims to ensure UK business has access to best business practice information for improved performance.
www.dti.gov.uk/bestpractice/

Support to Implement Best Business Practice – offers practical, tailored support for small and medium-sized businesses to implement best practice business improvements.
www.dti.gov.uk/implementbestpractice/

Finance to Encourage Investment in Selected Areas of England – is designed to support businesses looking at the possibility of investing in a designated Assisted Area but needing financial help to realise their plans, normally in the form of a grant or occasionally a loan.
www.dti.gov.uk/regionalinvestment/

The DTI Global Watch Service provides support dedicated to helping UK businesses improve their competitiveness by identifying and accessing innovative technologies and practices from overseas.

Global Watch Information
Global Watch Online – a unique internet-enabled service delivering immediate and innovative support to UK companies in the form of fast-breaking worldwide business and technology information. The website provides unique coverage of UK, European and international research plus business initiatives, collaborative programmes and funding sources.
Visit: www.globalwatchservice.com

Global Watch magazine – distributed free with a circulation of over 50,000, this monthly magazine features news of overseas groundbreaking technology, innovation and management best practice to UK companies and business intermediaries.
Contact:
subscriptions@globalwatchservice.com

UKWatch magazine – a quarterly magazine, published jointly by science and technology groups of the UK Government. Highlighting UK innovation and promoting inward investment opportunities into the UK, the publication is available free of charge to UK and overseas subscribers.
Contact:
subscriptions@ukwatchonline.com

Global Watch Missions – enabling teams of UK experts to investigate innovation and its implementation at first hand. The technology focused missions allow UK sectors and individual organisations to gain international insights to guide their own strategies for success.
Contact:
missions@globalwatchservice.com

Global Watch Technology Partnering – providing free, flexible and direct assistance from international technology specialists to raise awareness of, and provide access to, technology and collaborative opportunities overseas. Delivered to UK companies by a network of 23 International Technology Promoters, with some 8,000 current contacts, providing support ranging from information and referrals to more in-depth assistance with licensing arrangements and technology transfer.
Contact: itp@globalwatchservice.com

For further information on the Global Watch Service please visit
www.globalwatchservice.com

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