

# Stop the presses! Roll out the e-papers

The e-writing is on the wall for traditional newsprint as developments in electronic ink start appearing in commercial devices. But the old methods still have some advantages, writes Julian Perkin

Newspapers are driven by technology, from news gathering to typesetting and printing, yet the product you are holding and reading now appears to defy the digital age. At root, physical newspapers are, as they have always been, ink on lightweight paper.

But the day may finally be dawning when the very newspaper you hold in your hand goes digital. After years of development, a new technology – known variously as “e-paper” or “digital paper” containing “electronic ink” (e-ink) – is set to change all that.

Last week, Philips, the Dutch electronics company, announced the world’s first commercial application of an e-paper display module, which it is supplying to Sony for use in a new “e-book” device due to go on sale in Japan late next month. With a resolution of 170 pixels per inch, the displays will be comparable to the most widely read material on the planet – newsprint. Batteries, which are required only when new pages are received, can be small and last for months.

It is the most significant move yet towards the commercialisation of these technologies. Peter Kurstjens, business development manager for the commercialisation of e-ink displays at Philips, says displays will go into mass production very shortly. Philips will supply OEMs (original equipment manufacturers) and is intending to supply major consumer electronics and computer manufacturers, as well as Sony.

The announcement last week breathes new life into a debate that has been simmering for years: is a genuine revolution in the offering, newspaper executives and readers want to know, or is e-paper just another example of gadgetry promising to change the world but failing to deliver?

There seems little doubt that e-paper has the potential to be an important development, widely

adopted by newspaper publishers. It combines many of the qualities of printed paper with the tremendous advantages of electronic media – the ability to deliver new editions instantly and without the need physically to print copies and transport them over great distances to thousands of retail outlets and millions of breakfast tables – a daily miracle in logistics.

Instead, the content of tomorrow’s newspaper could be received electronically and the image on the page formed by instructing thousands of tiny electrically charged ink capsules buried within the thin, plasticised, paper-like sheet to shift so that each point on the page appears light or dark faithfully representing the whole newspaper page. The paper will effectively be printed in your hands.

Like paper, e-paper is lightweight and portable, and easy to read because it can be large format with high-resolution text and good contrast between the text and its background. It can be read in natural reflected light rather than back-lit like current electronic displays. Once the image of the page is formed, it stays in place. So it won’t need to be switched on to read, which is why can be so small and longlasting.

The technology is also becoming more viable for readers. Earlier attempts made no serious impact on printed newspapers because they were not sufficiently like paper and lacked paper’s considerable qualities. Few people would carry a laptop computer simply to read the newspaper; the screens on PDAs (personal digital assistants) and mobile phones are too small for reading an entire newspaper; and e-books haven’t taken off because they are heavy. All these devices

have back-lit LCD screens that are hard to read for any length of time.

E-paper, by contrast, will be very light and much akin to reading print. When a version arrives on the market that can be rolled up into a tube when not in use, it will be far more practical for carrying around than any other device to date.

A further advantage for e-paper is the roll-call of big names, apart from Philips, behind the various e-paper and e-ink technologies. The trail blazers in the development of e-paper were Xerox and Massachusetts Institute of Technology’s Media Lab. Xerox developed the concept it called Gyricon over 20 years ago at its Palo Alto Research Center (Parc) in California and left the research on the shelf until competition arrived in the late 1990s when MIT’s solution arrived. A company called E Ink was set up to commercialise MIT’s prototype. E Ink has teamed up with Philips since 2001, and its technology is being used in the displays being supplied to Sony.

Earlier this year, Philips announced a breakthrough in rollable prototypes of the displays by replacing the glass “backplane” with a plastic one and also employing state-of-the-art plastic electronics. Philips has set up a unit called Polymer Vision to prove the feasibility of volume pro-

duction. Mr Kurstjens sets expectations realistically here, stating that the commercialisation of rollable e-paper screens is still several years away.

IBM and SiPix in the US, Fujitsu in Japan, Siemens in Germany and N-Tera in Ireland are all working on rival technologies. Harald Ritter, an expert in the field from Ifra, the international newspaper and media publishing organisation, says all are working with the same goal, based on the concept of fluid crystals.

So e-paper has the potential to make its mark. The more thorny question is whether it will be so successful that it will kill off printed newspapers altogether. This seems doubtful because paper still has some aces up its sleeve. But if e-paper takes off it may cut into the printed circulation sufficiently to change the dynamics of the newspaper industry.

What keeps paper unique, even from e-paper, is that printed newspapers can be bought on a whim and discarded with equal abandon. Any electronic contender has the inherent weakness that it requires a device that is bound to cost money. The one-off purchase may be fine, but it means that people will have to remember to take the device out with them, will not be able to buy one just for something to read when their train is delayed, and cannot throw it away or give it to a stranger when they are done with it. So reading on the move has to be planned and entails carrying the device around all day.

There may be room for a number of technologies to serve different needs – rollable, large-format, low-power, highly readable, paper-like screens for newspapers; more responsive screens that can remain rigid for PDAs, mobile phones and other consumer electronics products. Video applications are not out of the question but

power requirements will be much greater.

On the other hand, updateable shop signage, and public display boards can be rigid and, as with newspapers, power should be needed only to change the image. In place of laptop computers, we may expect to see tiny portable computers for computing on the move with detachable screens that can be rolled up and yet change fast enough to show moving pictures ideally in colour.

All these challenges are being pursued and, given the pace of development, even the most ambitious solutions may not be many years away.

An important first step was taken last year when Ifra ran trials in Scandinavia involving Philips and 14 major Swedish newspapers including Aftonbladet and Göteborgs-Posten. The aim was to see how newspaper content would look when mocked up on a Philips prototype device.

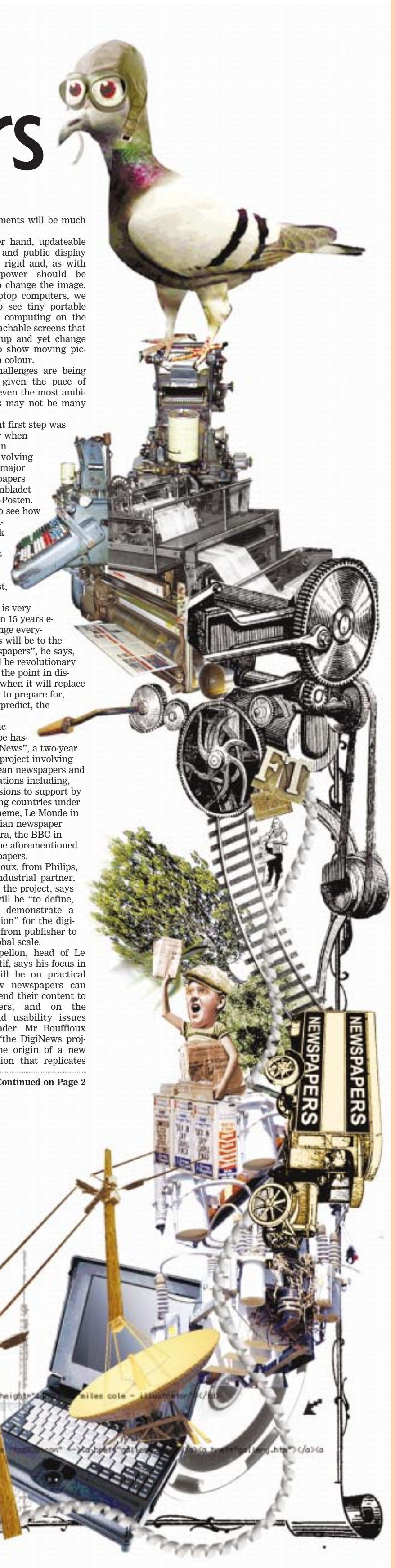
Stig Nordqvist, who led the E-reader project, is very upbeat. “Within 15 years e-paper will change everything. And this will be to the benefit of newspapers”, he says, adding: “It will be revolutionary but I don’t see the point in discussing if and when it will replace print. We need to prepare for, rather than to predict, the future.”

The futuristic prospect may be hastened by “DigiNews”, a two-year pan-European project involving leading European newspapers and media organisations including, subject to decisions to support by the participating countries under the Eureka scheme, Le Monde in Paris, the Belgian newspaper group Concentra, the BBC in London, and the aforementioned Swedish newspapers.

Alain Bouffieux, from Philips, the lead industrial partner, who directs the project, says its objective will be “to define, architect and demonstrate a complete solution” for the digital newspaper from publisher to reader on a global scale.

Yann Chapellon, head of Le Monde Interactif, says his focus in the project will be on practical issues of how newspapers can package and send their content to e-paper readers, and on the ergonomic and usability issues facing the reader. Mr Bouffieux foresees that “the DigiNews project may be the origin of a new killer application that replicates

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Illustration: Miles Cole

## FT-IT REVIEW

## Backing many horses to outrun hackers



CHRIS NUTTALL  
THE VIEW FROM HERE

Time for a Gamblers Anonymous-type confession. My name is Chris Nuttall and I have 15 online betting accounts.

Actually, that's probably not correct. The truth is I have no idea how many accounts I have. But that is mainly due to neglect rather than some rabid addiction. Honest.

What happens is that, twice a year – during the Cheltenham National Hunt festival in March and Royal Ascot's flat extravaganza in June – I go berserk.

These are the finest equine events on earth of their kind and pose the ultimate challenge for punters – finding the best of the best in big fields packed with previous winners.

A vital part of any bid to stay ahead of the bookmaker is seeking out the best price for your fancied horse. This has been made easy with the wonders of the web and odds comparison sites such as oddschecker.com.

But scanning the list of bookies offering odds on a race and clicking on the best price results in

a log-in screen coming up and the need to register as an account holder. Sooner or later, this means you have more funds salted away in various accounts than Enron, and, if your only serious betting is biannual, there is a tendency to forget which accounts you have, how much is in them and what was the amusing-at-the-time *nom de plume* you used to log-in.

At this year's Cheltenham, choosing which account to click on was made a little harder by the variable of several bookmakers coming under attack from distributed denial of service (DDoS) attacks.

William Hill and the betting exchange Betdaq were hit on the eve of Cheltenham and Totalbet was down for most of the three-day meeting. Totalbet sheepishly sent me an e-mail last week expressing "our unreserved apologies for events that were out of our control" and insisted it would not bow to the demands of the extortionists who had brought down their servers.

The company also suggested picking up the telephone to bet, some old-fangled technology I thought was disappearing along with tic-tac men.

But are online betting firms really helpless in the face of gangs of eastern European blackmailers marshalling hundreds of hacked "zombie" computers against them to blitz their servers with bogus

requests? Totalbet tells me they took a 900 megabit hit – an awful lot of bandwidth to occupy when most companies view an STM-1 connection, at 155 megabits per second, to their internet service provider as more than adequate for their needs.

However, there is one bandwidth solution to DDoS staring bookies in the face, with the model not a million miles away from me – holding multiple accounts with them.

Currently, most online betting sites are ramping up their bandwidth and their hardware to cope with the escalating strength of DDoS attacks and, as well as widening their own pipes, they are working with their ISPs to form a first line of defence at the data centres.

But, having more than one ISP would help as well – so that services can be switched on to a second pipe if the first comes under attack. The DDoS gangs are likely to be wise to this already though, and a more sophisticated solution may soon be needed.

I visited the Soho offices of Internap this month, which provides intelligent routing of internet traffic through private network access points (P-Naps). This means it has a box between its customers and six different internet carriers in London. The software inside is constantly monitoring the different networks

and routing its clients on to those with the best capacity and quality of service available.

This sounds a useful service in normal times and probably a vital one for any customer suffering a DDoS attack. Internap has one of the leading bookmakers as a client and, while it has been targeted by the extortionists, its site has never gone down. Any attack via one carrier has led to the P-Nap immediately detecting the deterioration in service and switching to another, insulating the bookmaker from its effects. Internap can also easily boost the bandwidth requirements of the customer from an STM-1 to a gigabit or more if needed.

Of course, this raises the stakes and the DDoS gangs could increase the power of their attacks, in what is becoming something of an arms race. But betting on multiple bandwidth accounts represents the best policy for now.

Datacoms companies basically make their money by buying wholesale and selling at retail prices. They also know that most of the companies they supply use only a small part of the bandwidth they think they need, and they can safely overbook their inventory by a factor of four or five.

Interestingly, DDoS gangs make the same assumption – business and home PC users on broadband can easily tolerate any parasitic piggybacking on their bandwidth

as they have enough headroom not to notice any particular deterioration in the service.

Marcus Ranum, the inventor of the proxy firewall and now senior scientist at tech security specialist TruSecure, told me that users' attitudes came as something of a surprise to him.

"I'm used to talking to CTOs [chief technology officers] and CIOs [chief information officers], but when I talked to my sister-in-law it was a huge reality check for me.

"Home users don't really care even if someone's using their machines to send spam – their attitude is: 'It doesn't hurt me, I still have lots of bandwidth.'"

Mr Ranum believes DDoS is becoming a heavyweight slugging contest of bandwidth – "As long as you can get more resources than the other guy then you are going to exhaust them."

He does not see a technical resolution nor a legal one, with the hackers outside the well-regulated jurisdictions. But fighting fire with fire might work – if the gangs unwittingly take on their opposite numbers in the US.

"I would like to see them trying this in Las Vegas and watch what happens!" he says. Who would win? Who knows? – but I am checking out the online betting exchanges to see what the best odds are.

## IN THIS ISSUE

## SERVICES FOR SMEs 4-6

After a chilly patch, small- and medium-sized businesses are starting to spend again, including investing in IT. Mid-sized companies, in particular, are interested in technology that had been the preserve of the larger enterprise. Not surprisingly, there is no shortage of vendors keen to sell more to smaller companies.

## INDIAN IT SECTOR 7

As offshore outsourcing and its impact on jobs takes centre stage in the US election campaign, Indian IT companies are on the acquisition trail and recruiting staff for the predicted growth and expansion at home and abroad.

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Why Asia is the hottest spot for Wireless Lans, by analysts at BWCS.

## ON THE WEB

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## OUR NEXT ISSUE

The next FT-IT is published on April 14, and the main theme is telecoms billing and customer care. Unglamorous it may be, but this rapidly evolving area will play a critical role in next generation telecoms services, be they wireless, wireline or cable.

## EDITORIAL

This review is published every two weeks.

Editor Andrew Baxter

Deputy editor Annie Counsell

Cover illustration Miles Cole

For details of forthcoming issues of the FT-IT Review, see the FT-IT website.

## Editorial synopsis:

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## FINANCIAL TIMES

Number One Southwark Bridge, London SE1 9HL

## IN THE CIO'S CHAIR: Hamid Akhavan of T-Mobile

## Why synchronising systems is tough call

The seamless integration of a plethora of complex operations across several countries is providing a challenging priority

Consolidating the systems that we have is definitely my biggest priority at the minute, as it will be for any CIO of a large company that has grown by acquisition. These things can take years, and when you have an organisation that is spread over five countries and has partial investments in four or five more, you can see that it's a significant undertaking.

We have interests and operations in the UK, the Netherlands, Germany, Austria and the Czech Republic, and other places. Each of those has complex systems that must work together, and that must be the first priority. Adding robustness and scalability to those systems is the next priority, and trying to ensure that all of that is being done with an

eye on efficiency and costs.

I would say that one of the most important things for any CIO is getting an acceptance of change within the organisation. That's often not easy. It's not just about changing software, or hardware – it's about changing minds, mindsets, and people's ways of working, that may have built up over years.

It's now possible to piece systems together from logical components. We can now do that with off-the-shelf software. This is a significant issue, because in house legacy systems have to be unbundled before we can move to off-the-shelf products, which is a big job.

Funding and financing these requirements continues to be a big part of what I do – you always get less funding than you need, so we can't do all the systems at once, and we have to prioritise what is most important for the business. You have to make the business case.

If you look at our business, you see that we have about 10 different billing systems around Europe. We have about seven or eight different enterprise reporting systems. We have about seven or eight customer care systems, five roaming systems and seven or eight business intelligence systems. Each of these systems is used in a different way, and when you change them you need to retrain the people who use them.

Employees are such an important part of the change

process. To change to a single system, you have to work out a common process, work out the common substance, and select a system, perhaps not even one of the systems that you already have. You might want to select a new one, it might be better. Then you have to do the cut over to the new system. It's a very long route, and it can take several years – especially in the case of billing systems.

But these are problems that are common to most companies that have grown as a result of acquisitions. The customisation of each system tends to be vast. Bringing them together is the task in hand, which will bring benefits in the longer term.

Billing is definitely the most complex of the systems that we have to consolidate. That will easily take four or five years. Not only is it extremely complex, it's also a mission critical system that you can't take down

## BIOGRAPHY

**Personal, education:** Born in July 1961, Teheran. Graduated from CalTech with a Bachelor of Science degree in electrical engineering and computer science. Received Master's degree from MIT in the same fields.

**Career:** Joined Nasa as telecoms engineer in 1987. From 1989 to 1997, worked at Bellcore, Bell Atlantic and Primoco PCS; then became CTO of Teligent, joining T-Mobile in 2001.



while you're consolidating different technologies together. You can't freeze it while you play with it. You have to operate on it on the fly, while it's in action. Billing is like the backbone of the entire system of any mobile operator. In contrast, systems that are easier or more similar, like say customer care systems, can take maybe half that time to consolidate, or less.

You just have to look at how billing works to see what an issue it is. You operate many different tariffs for different customer groups, and they can change to keep up with the industry. They are different across different countries. But because of roaming, you must at the same time be able to keep track of customers across different countries. And the ability to bill customers is of paramount importance to our business. We need to be

able to track each customer's phone usage at all times and send them the correct bill accordingly. There isn't room for error. It's something that you absolutely cannot get wrong.

I'm very interested in moving to real-time systems. I believe that's where our industry is going, and the technology is now there to allow this to happen. And it's important. Take for example a customer going over the border from the Netherlands to Germany. They want their phone to work just the same. But we have to co-ordinate the billing over two territories. What tariff should they be on when they cross the border? We need to be able to track that customer usage in a real-time fashion, to ensure they are billed at the correct tariff.

We need to be able to track customers in real time

in order to give them the best possible service. For example, a business customer using data services may have a different set of support issues to a [non-business] user. They need to be put through to the right agent in a call centre, who can deal with their particular problems. We can't expect all of our agents to be completely trained in every sort of issue. So real-time data processing will allow us to ensure they get the best service. Real-time tracking of usage will also help us to get the better of fraudsters, by identifying potential fraud much more quickly and checking it.

Scalability and robustness are such big issues. They are for everyone in a growing business. It means changing some older systems for newer systems. For example, we are using many systems that were built when forecasts for the number of users we would have were much lower.

We are using systems designed for hundreds of thousands of pre-paid phone customers when now they are coping with tens of millions. They are doing a superb job, but they will not be adequate for future growth. We need to scale these systems up, putting in new systems designed for the kind of usage we're experiencing, without impacting on the systems we have.

And, of course, all of this is without even considering the kind of disruptive technologies that are coming along, like 3G. That will cause billing options to increase in complexity. It won't be a question of a whole new customer base, but of people changing over. We have been thinking about this for a long time, and laying the foundations. We have to make sure we are ready.

Hamid Akhavan was talking to Fiona Harvey. There is more on telecoms billing in the next FT-IT on April 14.

## A pressing matter

How the different media compare

Quality	Printed paper	E-paper (when fully developed)	Existing electronic readers
Highly portable	✓	✓	Less so
Large format	✓	✓	✗
High resolution	✓	✓	Less so
High contrast	✓	✓	✗
Wide viewing angle	✓	✓	✗
Can be read in natural light	✓	✓	Difficult
Foldable	✓	Less so	✗
Flexible, rollable	✓	✓	✗
Not breakable	✓	✗	✗
Can be read without power	✓	Power needed to get updates	✗
Can turn pages without refresh buttons	✓	✗	✗
Can be purchased on a whim	✓	✗	✗
Discardable	✓	✗	✗
Doesn't much matter if you lose it	✓	✗	✗
Lendable	✓	✗	✗
Can be torn out	✓	✗	✗
Can be scribbled on	✓	✗	✗
Useful for domestic chores, DIY etc	✓	✗	✗
Saves trees	✗	✓	✓
Updateable	✗	✓	✓
Global reach	✗	✓	✓
Instant publishing	✗	✓	✓
Access to multiple sources	✗	✓	✓
Personalisable	✗	✓	✓
Searchable	✗	✓	✓

Compiled by Julian Perkin

## Roll out the digital newspapers

Continued from Page 1

the success story of GSM: [this will be] the digital newspaper."

If e-paper takes off as much as these experts predict, there will be huge ramifications for how newspaper production is organised. New investment in print plants, which is often recouped over 20 to 30 years, will need to take into consideration the potential for e-paper to displace print. This may hasten the industry's gradual movement towards new models of more distributed production and distribution.

Publishers will also need to consider how e-paper, like all electronically transmitted media, opens up their market to competition, lowering the barriers to entry. With e-paper, as with the internet, new would-be publishers need only to create and transmit an electronic file to reach readers who would also find it easy to switch publications. If large numbers of readers adopted e-paper, newspaper publishers would be even more reliant on their editorial quality, brand and reader loyalty than they are now.

E-paper offers an extra-

ordinary convergence between traditional print and new media. Yet newspapers still retain their advantages over e-paper. You can't use e-paper to line the canary's cage or wrap your fish and chips in it.

Julian Perkin is a technology consultant and freelance journalist. He was previously strategy for technology responsible at the Financial Times.

A separate article by Lisa Clifford, on digital newspaper kiosks, is published on the FT-IT website today.

## MAKING IT PAY: BERTELSMANN

## Doing it by the book delivers dividends



How organisations are getting more out of their IT assets

For Bertelsmann, the media group, sales through its book clubs are significant, amounting to €2.7bn globally in 2002. With this level of sales, the clubs need robust IT systems, so in 1984, those in Austria, Switzerland and Italy, formed the ICS CompetenceCenter and based it in Vienna. Later clubs in Hungary, the Czech Republic, Poland and French Canada also joined.

## The problem

Since the CompetenceCenter was formed, the book club software had been run on an

IBM mainframe, using many classic mainframe technologies including Cobol, a programming language that is optimised for business tasks, accounting and batch processing. This is important because the clubs produce thousands of invoices a month.

The book club software is a sophisticated enterprise resource planning (ERP) system that manages 3.5m customers and 100m account movements per year. It is also complicated because it has to be flexible enough for managers to tweak some 6,000 parameters depending on the special offers that are applicable to any one customer. It also has to be language independent.

The application worked well, but the mainframe was an expensive platform to maintain and lacked flexibility and scalability.

In 2001, Bertelsmann commenced a feasibility study to see whether the application could be moved to another system. There were several options. The most obvious

would have been to move from the old mainframe to a newer one. Yet, there would have been technical difficulties in the migration, pushing the price to between €3m and €3.6m.

Another option would have been reprogramming the entire software in Java and J2EE, a popular enterprise application framework. Not only would this have taken 15 man-years, but it would have meant scrapping the considerable investment of around €5m, in their legacy Cobol application.

## The solution

There was another option. This involved migrating the application to a totally different platform – a distributed environment running the Microsoft Windows operating system. The centralised mainframe in Vienna would be phased out and the application transferred to discrete servers in the offices of the various book club subsidiaries. Once impossible, new technology made it fea-

sible, in particular, Microsoft's .Net environment and new technology from Micro Focus, a firm that specialises in Cobol and has recently integrated Cobol into .Net so that legacy applications can run in new environments.

"For us it was interesting to see if it was feasible," says Günter Bodner, CIO of ICS CompetenceCenter, "but for the general management it was only about costs."

The team had to move 2,900 Cobol programs across. Data had to be transferred from storage systems specific to the mainframe to a Windows compatible version of IBM's DB2 database. Data also had to be transformed from mainframe specific types. In all, 2.5m lines of code and 250 data structures were moved.

Despite this solution being the most radical in terms of change of platform, it was the cheapest, costing only €1.2m. Total project time was 15 months with the handover very smooth and surprisingly easy, according to Mr Bodner.

## The benefits

Since the migration, Bertelsmann can now use cheaper hardware. Each subsidiary is using a Compaq single- or double-processor Intel server running Windows 2000. Another benefit is that, because there is no centralised server, networking costs are reduced and response times have improved – important as much business is carried out by call centre staff who need rapid access to information.

However, the main reason for the migration was cost savings and these have been achieved. The mainframe had cost around €924,000 a year. This has dropped to €680,000. Return on investment should be achieved in 15-18 months.

The next phase is to open up many of the Cobol applications as web services which should ensure the application serves the book clubs for many years yet.

Paul Talacko