New Technology Briefing

Chris Potts, now CEO of Citria, joined Mondex International in early 1995 as head of commercial development and marketing, and became deputy chief executive in 1996. He is responsible for the development, support and sale of products and services globally, covering Mondex e-cash, MULTOS, Loyalty and their supporting services. With a degree in physics and maths, Chris worked internationally in the oil exploration industry for three years before undertaking a PhD in geophysics at Cambridge, where he was also a post-doctoral researcher. He holds an MBA from Cranfield School of Management, winning the Booker McConnell Marketing Prize.

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Dr Chris Potts,
Chief Executive,
Citria,
Scriptor Court,
155-157 Farringdon Road,
London EC1R 3AD,
UK
Tel: +44 (0)20 7841 8800
Fax: +44 (0)20 7841 8844
E-mail: Chris.Potts@Citria.com

Smart cards

Chris Potts

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Abstract

The combination of the Internet, wireless communications devices and digital interactive television is rapidly changing the relationship between companies and their customers. In order to survive this revolution, companies must adapt to an economy that never sleeps by understanding their customers better than ever in order to provide the best service across an array of delivery channels. This paper examines how marketing professionals can leverage smart cards, and in particular electronic cash, to establish and/or maintain a strong brand and build and retain a customer base in the connected economy.

Introduction

Smart card technology has been around for more than two decades. And, unlike so many other technologies, smart card development actually originated in Europe. With the support of certain industries (eg banking and telecommunications), smart cards have enjoyed a much higher rate of acceptance and usage in Europe than in any other region in the world — including the USA. In 1997, Europe represented 70 per cent of global smart card market revenues. That share is expected to fall to 50 per cent by 2000 (though it will be a smaller share of a *much* larger overall market).

In spite of their having been around for a while, smart cards are a burgeoning technology on the verge of mass acceptance, thanks to the increasing mobility of people and the new rules for business dictated by the Internet.

Some estimates place the worldwide use of smart cards as growing at 38 per cent annually. In terms of units shipped, the global chip card market is going to reach four billion in 2002 (up from one billion units shipped in 1997). According to Gartner Group's Dataquest, revenues from this market will more than treble — from approximately US\$2bn in 1999 to US\$6.8bn in 2002. In fact, some estimates indicate that there are going to be as many smart cards on the planet as people by the year 2003.

Extending your brand

But how can a seemingly old technology help you as a marketer? At the heart of it you are responsible for retaining current customers and expanding your customer base. In order to achieve these goals, you need to improve your understanding of those customers continually. Smart cards are a tool that can help you attain this success. How? It's all about providing the customer services that help you to protect your brand.

Know your customers

Customers relate with your company, in psychological terms, as a brand. In today's evolving, multi-channel sales environment it is your responsibility to ensure that you can fulfil your company's brand promise to your customers any time, anywhere. Smart cards offer you that ability with one key application — electronic cash (e-cash). E-cash provides your customers with the means to spend whenever and however they see fit — a crucial competitive advantage in today's '24-by-7' economy. Also, if you combine e-cash with the more traditional smart card application of loyalty, you can obtain invaluable information about your customers — who they are, what they buy, when they buy, how they buy, etc — and also encourage repeat business.

The story to date

Smart Cards already hold 80 times as much information as a traditional magnetic stripe card

So what exactly is a smart card? Simply put, a smart card is a credit-card-size piece of plastic that carries an integrated circuit chip which is used to store information. In fact, the chip inside a smart card is capable of holding up to 80 times more information than can be encoded on to the magnetic stripe of a traditional credit or debit card.

The technology behind today's smart cards was originally developed in 1974. Much of the pioneering work took place in France, with further refinements and contributions from Germany and Japan. The industry foundered for nearly a decade, due in large part to the nascent semiconductor technology. With the advent of cheaper, more powerful chips in the mid-1980s, the smart card industry began to enjoy some success.

There are two types of chip residing inside smart cards: memory and microprocessor. Memory chips store data, in much the same way as a floppy disk for your PC. They are relatively inexpensive, but offer only medium capacity and security. Microprocessor chips offer much greater capacity and stronger inherent security, and can be thought of as a miniature PC — they possess the same functionality and can store not only data, but also applications. Using a specialised operating system, certain microprocessor chips can even run multiple applications.

There are two major categories of smart cards currently in use, regardless of the chip design. The type known as a 'contact' card requires insertion into a card reader before it is capable of uploading/downloading information. A 'contactless' card employs an internal wire coil to transmit and receive information at close range to the card reader. It is also possible to combine both technologies on to a single card.

How are smart cards currently used?

Smart cards have been employed in an array of settings, and are capable of running a variety of specialised applications. The following is a brief summary of the most common smart card uses from around the world.

- One of the earliest adopters of smart card technology was the banking industry. Millions and millions of smart cards have been issued in countries throughout the world for traditional debit and credit functions. Some 25 million of these cards have been issued in France

Smart Cards are already widely used and proven

- alone.¹ In the UK, there are plans to replace the 100 million magnetic stripe bank cards with smart cards over the next three years.
- Another major supporter of smart card technology is the telecommunications industry. There are hundreds of millions of memory chip cards in use in mobile telephones worldwide. Also, more than 100 countries around the world have replaced traditional coin-operated pay phones with those that accept smart cards. If you have ever tried to locate a regular coin-operated phone in Paris, you may realise the extent of this revolution.
 - Many countries put identity and/or medical records on to a smart card. The largest such system in the world is in Germany, where approximately 80 million national health cards have been issued. China, the most populous nation on the planet, announced recently the intention of issuing smart identity cards to all of its citizens.
 - Scores of university campuses around the world employ smart cards for everything from identifying students to allowing access to buildings, checking out library books, and spending money at campus retailers. There are five such universities in the UK alone, with a total of over 100,000 cards in use. Such 'closed' or 'captive' communities offer an ideal smart card audience because the infrastructure is limited to a specific geographic area.
 - Another major market for smart cards is on mass transit systems, where they can replace traditional plastic or paper passes. Unlike many of the aforementioned, these implementations generally involve contactless cards, to facilitate the rapid progress of patrons throughout the system. Some estimates place the growth rate in this sector at 70 per cent annually. London Transport is preparing to issue more than three million chip-based smart cards within the next few years.

The applications described above may or may not apply to your particular industry. But in addition to providing some historical context for smart cards, each scenario demonstrates the fact that major industries around the world are adopting this technology. Additionally, each of these scenarios demonstrates the fact that smart card projects offer convenience to the consumer, while centralising and simplifying information for the entity that issues and/or accepts them.

New channels for the 21st century

As such, a smart card unto itself is quite literally useless. It is only the services provided by the card that imbue the combination of plastic and silicon with any value. From this perspective, smart cards are not so much a technology as an enabler — they allow you to extend your customer services via new and exciting delivery channels, including the relatively new channel of the Internet.

Electronic cash and the connected economy

The new and exciting opportunities evolving from the Internet mean that there are new segments of the smart card industry that are striving to set standards — it's a whole new era for smart cards. For the purposes of this paper, attention is focused on the most promising smart card application for marketers in the digital age: e-cash.

**E-cash —
instant,
anonymous
and simple**

There are two major types of e-cash products today. The first type offers the essential qualities of cash — immediate payment, transferability, privacy and guarantee. Mondex International is an example of a company that offers this type of e-cash. The other type of e-cash acts like a debit mechanism, transferring the promise of payment with actual delivery of the value occurring after a clearing and settlement process (this delay is invisible to the consumer, but evident to the banks and merchants). These types of products are offered by a number of vendors and are in the process of standardising under a specification called the Common Electronic Purse Specification (CEPS). The major drawback with this model is the charge associated with the clearing and settlement process (which is small in value but adds up across thousands of transactions).

All e-cash applications run on the microprocessor style of smart card due to its inherent security strength and ability to process transactions. These applications also tend to be deployed on a contact card, to avoid the ‘accidental’ debiting of value that could potentially occur in a contactless setting. As such, value is loaded and discharged from the card by physically inserting it into an appropriate smart-card-enabled device.

How does it work?

How do consumers and/or merchants obtain their cards and readers?

The most obvious scenario involves a single company (such as your own) issuing its customers with smart cards that they can use only with your business. This has limited practicality from the perspective of consumer convenience, since it requires customers to carry an additional piece of plastic that is restricted in use to your particular company.

From your perspective, the proposition is costly since you assume the infrastructure as your own sunk cost (purchasing of cards, readers, etc).

Currently, the most cost-efficient scenario for issuing smart cards involves multiple merchants acting with a bank (or consortium of banks) to issue the cards and readers. The decision to issue smart cards can come in the form of a ‘push’ or a ‘pull’ model. In the ‘push’ variant, the banks decide to replace their traditional credit and/or debit cards with smart cards and issue appropriate card readers to merchants interested in participating in the programme (the card readers can either be free of charge or for rent, depending upon the banks). In the ‘pull’ variant, merchants apply pressure to a bank (or banks) to underwrite the scenario.

**The card issuer
will control the
customer
relationship**

With the system in place, consumers can load value on to their cards at a swipe slot at a participating bank’s ATM. In some instances they can also upload and download value via the Internet, which is achieved with a personal card reader that attaches to their PC at home (depending upon the particular scheme, this device can either be for sale or subsidised by the participating banks/merchants). The e-cash is accepted at any retailer that is participating in the smart card scheme (ie it is generalised), and payment will be downloaded to them at the point of sale with the smart card terminal. Using the PC terminal, consumers can

E-cash for the net and the shop

also spend their e-cash on the Internet at websites that choose to accept it in addition to traditional credit and debit cards. Consumers can also transfer e-cash value from person to person across the Internet — something that simply isn't possible with existing payment technologies.

The versatility of e-cash — for convenient use on the high street or on the Internet — is its most compelling value proposition in the connected economy.

The e-cash cow

In today's marketplace, your brand faces dissolution across an array of delivery channels, both new and old. Regardless of how customers are approaching your business — be it on the high street, via telephone or on the Internet — you have a responsibility to fulfil the promise of your brand to them at any time, anywhere.

Peter Georgescu, chairman and CEO of management consultancy Young & Rubicam, stated at a recent PriceWaterhouseCoopers conference on new technology that in the era of the Internet, 'commodities can be replaced at the drop of a dime . . . big brands will survive'. He further advised businesses: 'Know your customers. Worry about the relationship with your customer. Do customer relationship management. Create differentiation. Build a brand. Drive margin and get the profit.'²

In other words, in today's connected economy companies have to be prepared to go the extra mile to establish, retain and grow a customer base. The most valuable asset you have as a marketer is your brand — and now you're being asked to expose it to untold risks on the Internet.

There are two major inhibitors to making your brand available 24 hours a day, seven days a week. First there are the security concerns associated with a so-called 'open enterprise'. Second, there is the problem of making your services accessible and easy to use for consumers at all times. E-cash eliminates all of those barriers: it is as portable as a traditional credit card, and is also a proven method of conducting secure transactions (even across a public network such as the Internet). Smart cards are far more secure than the traditional credit and debit cards that fill the average person's wallet.

Shoppers spent an estimated US\$13bn online in 1998. According to various industry analysts, the overall market for e-commerce is predicted to be worth US\$1.4tn per year by 2004. Even so, Forrester Research estimates that 60 per cent of website visitors who start to fill out an online form never complete it. Those people might be potential buyers, and if companies are going to recognise that revenue, payment on the Net has to be easy. A smart card with e-cash offers secure, instant and, above all else, easy payment on the Internet.

Getting interactive

Perhaps the most exciting recent development for marketers in terms of content delivery to the home is digital interactive television (DTV). Specially tailored programming combined with Internet access and shopping presents an exciting new world for marketers.

E-cash gives security and opens up the whole e-commerce market

Digital TV is a crucial new channel

A recent study conducted by NOP Research Group found that, in the UK alone, the number of subscribers to DTV will more than double in the next year (from approximately two million to almost five million households). The same study also found that 57 per cent of those interested in signing up for DTV would prefer to pay to view, rather than be burdened with a monthly bill.³ These figures suggest that DTV is on the verge of mass-market acceptance and may well follow an adoption model similar to mobile phones.

This new medium is ideally suited to take advantage of e-cash, for reasons of both infrastructure and payment values. Firstly, in terms of infrastructure, smart cards are an ideal interface with digital TV set-top boxes. All new set-top boxes today contain a second smart card slot (in addition to the signal slot) that can be programmed by the signal provider to interface with a smart card, which could then upload and/or download value in the form of e-cash. This e-cash could be used for pay-per-view movies or sporting events, or to purchase goods or services offered via the Internet or a shopping channel, or to conduct bill payments or online banking — which brings up the element of payment values. In this model, we are talking about relatively low-value transactions. E-cash offers instantaneous value transfer — without the clearing and settlement costs associated with traditional credit and debit cards — which makes it the only economically viable payment mechanism for low-value transactions.

Smart cards provide an ideal gateway to digital TV services

One interesting opportunity for marketers to consider is the potential for smart cards to act as a retrieval and storage device for electronic coupons delivered over the television. Not only do you stop wastage, but you reduce costs and increase convenience for the consumer. Another opportunity is to use smart cards to change the whole pricing model. What's to stop digital television from adopting a smart-card-based, pay-as-you-go model similar to mobile telephones? Imagine the possibilities for marketers!

Another expanding potential for smart cards is with online gaming. As more and more gambling and gaming outfits take their operations 'offshore' and into the world of cyberspace, consumers need a convenient means of electronic payment. E-cash can provide the secure, instantaneous transfer of value — returning winnings to the gamblers in real time which will either encourage them to re-invest in more games or return for more action at a later date, because they know they won't have to wait for pay-outs.

Repeat business

Smart cards operating e-cash can also take advantage of one of marketing's older, more tested tools — loyalty programmes. Whether it's online or on the high street, you can strive to retain customers by offering incentives for them to return. With multi-application cards, it's even possible to combine a custom-built loyalty application with e-cash on the same card. Your company may not issue or even control the e-cash, but your brand managers can control the loyalty programme.

Cards can provide many functions — including loyalty

The professional marketer needs to be fully aware of the capabilities of digital channels

Conclusion

Clearly your company's survival depends upon maintaining your brand, which means providing the best levels of service to your customers. As we move further into the digital economy, payment mechanisms are showing signs of evolving and e-cash offers consumers and businesses alike a very attractive value proposition.

Marketers should examine very carefully their particular environment and evaluate whether or not smart cards are appropriate for them now — or perhaps could be in the future. Consider issuing your own cards, or talk to your local banks about the viability of implementing them on a larger, more general scale.

A shifting standard of consumer payment can leave once-great companies faltering. At the time of writing, former UK retail behemoth Marks & Spencer had announced further profit losses and job cuts. The company conceded that it was going to be forced to accept credit and debit cards for payments where it hadn't in the past in order to bring customers back into the shops. M&S clearly paid a heavy price for failing to shift its business model to keep pace with evolving consumer behaviour.

If the future of payments is digital, then the combination of e-cash and smart cards is a proposition that no professional marketer should take lightly.

References

1. IDG News Service/Paris Bureau, 'Smart cards flourish in France, boom globally', Borzo (16 April 1999). (www.idg.com)
2. Computergram International, 'Net Companies Should "Build a Brand Not a Commodity"', Fellows (1 October 1999). (www.computerwire.com/computergram)
3. NOP Research Group, 'DTV and Payment Plan Preference', Black (October 1999).

Further reading

Bull Information Systems (www.cp8.bull.net/about/about4a.htm).

Jupiter Communications (www.jup.com).

Lafferty Group (www.lafferty.com).

Microsoft (www.microsoft.com/windowsce/smartcard/?RLD=331).

Mondex International (www.mondexinternational.com).

Smart Card Forum (www.smarterd.com).

Smart Card Industry Association (www.scia.org).

Sun Microsystems (www.java.sun.com).

Visa International (www.visa.com/nt/chip/main.html).