

# Smart Cards for Smart Consumers

Prepared for the Advanced Card Technology Association of Canada

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## Table of Contents

- Introduction
- Adoption Begins
- Business gets the Case
- Real World Users
- Smart Consumers
- Smart Cards in Canada
- "you can't have just one chip..."
- Consumer Benefits
- Use limited only by imagination
- Conclusion
- Appendix - Links
- Endnotes

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## Smart Cards for Smart Consumers

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Our objective is to take a look at the benefits of smart cards from the consumer's point of view. We'll see how they are used around the world, look at Canada and think about the many beneficial ways smart cards will become part of our lives. Links are provided for further information.

***Smart Cards – a pc on a piece of plastic:***

***There are in fact two types of smart cards: microprocessor cards, which have nothing less than an embedded microcomputer chip; and memory cards (e.g. the telephone card) which are used simply to store data.***

Canadians have widespread confidence in the debit and credit card system, using these cards routinely in millions of transactions. The issuers protect us and do what is necessary to maintain our confidence. They will continue to do so, in an on-going social contract where we both benefit. Smart cards, however, enhance the services we can be provided by issuers, and will encourage the creation of new services for consumers. Cards are a key part of the evolving information age.

We're at the beginning of a new era of smarter, safer, more convenient cards.

Just as we wouldn't put away our remote controls,  
Just as those who get the Internet wouldn't give it up, and  
Just as we have come to depend on our current cards

Smart cards will now bring new conveniences and possibilities that we'll soon consider essential. They will also serve as a very necessary part of our personal security as we move forward in a less secure world.

### Adoption Begins

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Hundreds of thousands of Canadians already use smart cards, and this number is about to grow dramatically. These cards will provide a wide range of benefits, opening new applications and services to us.

'Application' is the generic term we'll use here, to cover the wide range of functions a smart card can support; from presenting ID, triggering a game, opening a door, paying for parking, to saving a life.

The first initiatives will be largely *supply driven*, to achieve corporate or government goals, by extending e-commerce opportunities, increasing security, enhancing communications and becoming more efficient. Later, we consumers will *demand* the convenience of smart card services in the same way. Our 'consumer expectation' standard will rise incrementally higher, and someday, just as we now expect firms to have debit and credit card facilities, we'll expect smart card services.

The chips and standards are now at a stage where significant rollouts can make financial sense, supporting multiple applications on a single card that can be mass-produced.<sup>1</sup> We'll soon be using them ourselves, or surrounded by friends and family using smart cards for a wide range of conveniences.

With respect for the technology adoption life cycle model, we can see smart cards will soon be entering the early adopter half of the mass market in North America. Test pilots and national programs in many countries have established their compelling value in a variety of user group segments. Visionaries still lead the way, but the business case is becoming more compelling.

## **Business gets the Case**

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Providing convenience and value, multiple application smart cards open new opportunities for companies to strengthen existing customer relationships, attract new customers and stay ahead of the competition. Among their many uses, companies are creating card operated building and inventory access controls, computer log-ins, and corporate spending cards operated with business rules. Business will use them to enhance employee, client and business relations. The driving factor will be the introduction of smart card applications to provide the security consumers want before they readily adopt e-commerce.

There are already examples of successful smart card implementations around the world and in many industries, including retail, financial services, commuter transit, wireless communications, and government. In some regions, particularly Europe, they have been in use for decades.<sup>ii</sup>

Today, financial firms are providing an impetus<sup>iii iv</sup> with leadership from global players such as Visa, MasterCard and Mondex, American Express, and Europay. Using the Europay-MasterCard-Visa standard<sup>v</sup>, (EMV), these associations, ProtonWorld and many others are developing smart infrastructures. In the US, credit card issuers have an incentive to move forward with smart cards as they bear the brunt of North American card fraud, losing over 1 billion USD in 2000.<sup>vi vii</sup> They are ideally positioned to be among the leaders because of their extensive consumer client-base.

On the government side the case is different, built on the need for security. Not only must they provide secure identification for their citizens, they must also protect those citizens from theft of identity, one of the fastest growing frauds of the decade. According to the Federal Bureau of Investigation, there are 350,000 to 500,000 instances of identity theft each year in the US. In Canada, our Social Insurance Number has become a target for identity thieves. As far back as 1998, there were 17% more Social Insurance numbers in the registry than Canadians aged 20 or older, the age at which most Canadians have obtained a SIN. Who is using that ID and for what purposes? It is no longer enough to prove who we are; we must also stop others from impersonating us.

Our need for payment and identification security is driving the industry schedules. According to the most recent professional estimates, the annual production of microprocessor smart cards will reach 1.5 billion units in 2003, allocated as follows:<sup>viii</sup>

- 350 million in the banking sector
- 700 million in the mobile telephony sector
- 150 million in national applications (ID, health, etc.)
- 300 million in the toll TV and network access sector

### **Smart Government**

This coming year will see substantial new implementations of cards in Canada, although mainly in the private sector. However, federal, provincial and municipal governments have an opportunity to create new applications for citizens, with new services and conveniences. We have already heard of a fast tracked national ID. Ontario has announced a citizen's smart government card to combat fraud and enhance efficiency. The benefits follow.

Consumers will access government services electronically, avoiding trips to government offices and long lineups – and do so securely. Digital signatures can make transactions secure. Paperwork will be reduced and services provided quicker. Money currently lost to fraud, can be reinvested in services to citizens. Government pilots at various levels are in the planning stages.

Governments around the world are implementing large chip card systems. In example, the US Federal government's General Services Administration (GSA) is implementing a 1.5 billion dollar

government-wide program to further use smart cards. In Asia, South America, and in Europe where governments are most experienced with cards, a wide range of uses is emerging.

**Smart Fact:**

Number of smart cards in Asia: 70 million<sup>ix</sup>

Visa-branded smart cards worldwide: 42 million<sup>x</sup>

**Smart Fact:**

August 10 2001 - Banks in Latin America are assessing PIN-and-chip as a way to fight credit card fraud, with both Visa and MasterCard planning to convert 25 and 50 million cards to chip, by 2004, and 2005, respectively.<sup>xi</sup>

**Smart Fact:**

July 24 2001 - Scotiabank and the six partners of the Solstice Alliance today announced a Canadian first -- one card that allows Canadians to access and choose credit, electronic purse, loyalty programs and other services using smart microchip technology.<sup>xii</sup>

**Smart Fact:**

July 20 2001 - Canada's seven major banks are now working with Visa, MasterCard, AmEx, Mondex, the Interac debit network, and London-based consultants, Zansa to plan a migration to smart cards.<sup>xiii</sup>

## Real World Users

In addition to the many private sector initiatives around the world, governments are playing a major role of enhancing their ability to serve their citizens in the Information Age.<sup>xiv xv</sup> There are many pilots underway, and many projects at the pre-pilot stage, with the following list showing several of the more advanced rollouts.<sup>xvi</sup> In many countries it makes sense to skip intermediate technologies and move to smart cards, just as cell phones make more sense than installing land phone lines.

A sample list of uses currently underway worldwide:<sup>xvii</sup>

Use	Country
Cash card pilots	Canada
Student ID	Canada - Universities of Waterloo, Toronto <sup>xviii</sup>
Government Employees	USA - GSA <sup>xix</sup>
Local Transit, Border control	USA - SF, DC, Chicago, US-NIS
Secure Retail client card	USA - 'Target' stores <sup>xx</sup>
Euro card/Mastercard/Visa EMV e-cash	Many - Europe, North America
Blue card	USA - Amex <sup>xxi</sup>
E-Purse, Ministry of Posts & Telecomm.	Japan <sup>xxii</sup>
Public Health Card, National ID, Lufthansa	Germany <sup>xxiii</sup>
Social Insurance, ID, Health	Belgium <sup>xxiv</sup>
Phones, Banking	Finland <sup>xxvxxvi</sup>
Private Health Insurance	Portugal <sup>xxvii</sup>
Internet, Government Services	Spain <sup>xxviii</sup>
Health - data, payment, e-cash, postal service	France <sup>xxix</sup>
ID, Elections, Health, transport	Norway <sup>xxx</sup>
e-purse, credit/debit	Sweden <sup>xxxi</sup>
National ID	Netherlands <sup>xxxii</sup>
Social Services	Austria <sup>xxxiii</sup>
Health - Professional's card, patients	European roll-out, in phases <sup>xxxiv</sup>
Adicarte - social services	France, Italy and the United Kingdom pilot <sup>xxxv</sup>
Health Insurance and Health Professional card	Slovenia <sup>xxxvi</sup>
e-purse	Switzerland <sup>xxxvii</sup>
EMV debit and credit cards	Turkey <sup>xxxviii</sup>
e-purse - parking	Israel <sup>xxxix</sup>
National ID	Namibia <sup>xi</sup>
Banking, e-purse - Mondex	Costa Rica <sup>xii</sup>
Driver's License	El Salvador <sup>xiii</sup>
Vehicle Registration and tagging	Mexico <sup>xiiii</sup>
Driver's License	Argentina <sup>xiv</sup>
National ID, Health Card, e-cash	Brazil <sup>xv</sup>
ID, License, Visa, Health, e-cash, debit	Malaysia <sup>xvixxivii</sup>
Utilities, phones	Vietnam <sup>xviii</sup>
National ID, eCash, loyalty	Thailand <sup>xlix</sup>
Health ins., ID, access control	Australia
Phone, POS, ticketing, cash	Australia <sup>li</sup>
National ID	Cambodia <sup>liii</sup>
Transit, eCash	Taiwan <sup>liv</sup>
Transit, eCash, parking	Hong Kong <sup>lv</sup>
Customs/Visa, Tolls, transit, eCash, military ID	Singapore <sup>lvi</sup>
Mondex, debit, loyalty, electronic commerce	Korea <sup>lvii lviii</sup>
Medical emergency / Health information cards	China <sup>lix</sup>
Driver's License, eCash, utilities, tolls	China <sup>ix</sup>

Sources: smart firm web sites, government web sites, news articles

## Smart Consumers

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For the majority of Canadian consumers, the case for adoption isn't seen as urgent. Today's cards appear to work well enough, but that may be because most Canadians haven't seen smart cards. The benefits are still abstract. This has been true of other emerging technologies. In the early days we couldn't imagine why we would want debit cards when we already had credit, cheques and cash. Today we couldn't imagine a life without the debit application as it provides convenience, something we can all appreciate. The coming public education campaigns, to be conducted by VISA, MasterCard, American Express, and other retailers will shape Canadians' impressions and introduce the future.

### **The only issue:**

Some have questioned how information about us is being protected and shared. Already, these information privacy concerns affect Internet use, with some people reluctant to share information about themselves. They wonder what might be done with the information?

Part of the proactive response to that concern lies in the smart card technology. These cards can securely carry digital signatures that provide certainty about who people and firms claim to be, and will enable the signing of their promises and contracts.<sup>lxii</sup> This will empower us to know with certainty to whom we're talking, and thereby alleviate much of the fear of dealing with people we don't know.

The other part of the answer is that we have an evolving societal understanding. Consumers in Canada have been protected and expect to be; from misuse of information and even from fraud. The companies serving us understand they must maintain our trust to keep the relationship. They are also governed by laws, which at the Federal level, were updated through Bill C-6.<sup>lxiii</sup>

"With the significant programs launched by the major information technology companies to interface with smart cards, many believe it won't be long until every PC ships with a smart card reader. Smart Cards will allow individuals to protect their privacy while card issuers will be able to ensure only valid customers access services. The goal of the industry is to protect the rights of the individual while facilitating the convenient remote access of services at any reader."

Smart Card Industry Association

### **Propositions:**

The 'social contract' of consumer protection will be maintained. Smart cards will make it easier to be safe. Firms we trust will develop cards that present winning combinations of offers to us.

### **Our Future:**

Modern society needs an enormous amount of information. Computers give us the means to process this information. Smart cards give us a way of individualizing the handling and control of this information.<sup>lxiii</sup>

The technology continues to evolve, with chip memory, processor power, efficiency and security becoming better every day, while becoming more affordable. Batteries as thin as a card have been developed to give them new functions.

## Our Benefits

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...and what are the compelling benefits to consumers? Certainly, to talk in practical terms, to describe tangible benefits we need to consider specific applications, as we will in a moment. But the consumer benefits in these applications can also be described in 'qualitative terms':

### **Convenient, Easy, Safe, Enabling, Empowering**

Before we return to these benefits in greater detail, let's take a deeper look at how smart cards can be used.

## Smart Cards in Canada

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Smart cards will become more than mere replacements for debit and credit cards, loyalty programs, memberships and government ID. But these basic applications will be among the core functions we will use.

Parties we already know will provide some of the more common uses.

Application	Natural or likely card issuer will be
Financial services, electronic cash, micropayments - physical or Internet use	Banks, credit companies, insurance firms, retailers, leasing companies
ID & Info - licenses, health care, program benefits, visas, customs, etc	Government – Federal, Provincial, Municipal Licensing bodies
ID - for children	Parents giving basic "I'm lost" cards to children to prevent them staying lost, or to provide bus fare or allowances
ID - firms - network, building, spending access	Employers and unions
ID - personal configuration, added vehicle locking security, network customisation, encryption settings, smart household settings	Car manufacturers, computer network administrators, device vendors
Loyalty and promotion programs, clothing and shoe store size/styles, gift certificates	Retailers: supermarkets, airlines, hotels, coffee shops, charities, etc.
Game cards - i.e. lottery tickets and scavenger clues	Retailers, promoters, charities, casinos and lottery corporations
Subscriptions, use rights, internet access / chat rooms, telephones	Utilities, newspapers, transit, health clubs, fairgrounds, car rental agencies, conferences, websites, kiosks, etc.

<b>Smart Fact:</b>	<p><b>"You can't have just one chip..."</b></p> <p>While a potato chip maker may have popularized this slogan, consider it here too. In fact, pervasive smart 'chip' functionality is a seismic change in the computing infrastructure, sending a ripple of change throughout networks.</p> <p>The chip itself can turn cell phones, PDAs and other computers into personal ATMs. They can be attached to goods to track shipments. It can be used to help locate inventory and track its movements within a warehouse, hospital, library, airport or other setting. It can link an air traveler to his or her baggage, instantly issuing a warning if that traveler fails to get or stay on board before take-off, so that the luggage can be removed for the safety of other passengers. It can be in a cell phone. It can help sort clothing at a dry cleaner. Business cards will add intelligent chips. Fruit will automatically adjust cooling systems to stay ripe. Household appliances will have chips.</p> <p>Our imagination is the limit. Have another chip...</p>
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## Consumer Benefits

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*Convenient, easy, safe, enabling and empowering.*

*Smart cards are better than the cards they replace, and open the door to new uses. They are a secure platform, capable of carrying multiple applications, an improvement over magnetic stripe cards, which require us to carry a separate card for each application. So, in addition to thinner wallets, let's review how they may help our lives.*

### **Convenience:**

Tomorrow's consumers will find their cards convenient in many ways, from merely useful to really important.

Filling out application forms to gain a membership somewhere, whether health club, car rental, video store, library or museum, can be easily accomplished through use of a smart card based application, saving time both in filling the forms and in assembling supporting identification.

Having one's medical conditions and current medications on a card for a paramedic to read when found unconscious in an accident, can be life saving. Today, many of us wear medic alert bracelets or necklaces to achieve this, but smart card applications can provide more information instantly and offline. Other applications may enable pharmacists to review a patient's prescriptions to ensure their compatibility and avoid negative reactions; another lifesaver.

Smart Card applications allow us to have our own personal ATM's. We'll load money onto a card from a number of personal devices including computers, cell phones, personal digital assistants and others, and save a trip to the bank or external ATM. Currencies can be automatically converted. We can have an electronic record of our expenses.

Stores, hotels, airlines, and others will be able to recognise you as a repeat customer, to serve you better by remembering your previous purchases and preferences if you choose.

Instead of adding new cards to our wallets, and new passwords to remember, smart cards will carry several applications, greatly reducing the growing pile of plastic we all own.

From the merely useful to live saving, and very convenient.

### **Easy:**

It is as easy as using a debit card. Or with a contactless card, merely walking near a terminal. Entering a 'shared secret' or PIN entry or possibly a biometric code, to unlock the chip's information.

Replacing a card will be much easier than replacing the handful we've carried so far, as a new card can be reloaded from a backup or the servers of our providers and in some cases we may be able to generate a new card from our own computer.

Card readers for home use will become standard, shipping on new PCs. They will plug into PDAs. Household smart device systems will recognise them. Kiosks or Internet connections out in the community will accept them.

Europeans are already using smart cards to carry common data such as telephone numbers, schedules and documents that they want to use with their cell phones, personal digital assistants and computers. They are finding a smart card to be more convenient than cables, cradles and other methods of synchronizing data.

Adding functions and applications will be easy too. Getting a new membership, whether at a library, video store or elsewhere, will be as simple as adding it to the card. Some cards will come bundled for us, while we should be able to create the multi-function card we desire.

The standards for cards worldwide are being worked out by a wide variety of firms, governments, and international organisations, to enable consumers to travel the world and find compatibility, interoperability and new security.

Loyalty programs will be common on smart cards, with a wide range of offers that can be routed to us, depending on our willingness to share information about ourselves. We'll easily use the 'smart coupons' when we shop with our card, instead of having to carry paper coupons with us.

Not only will they be easy to use, they will make our lives easier.

### **Safe:**

The cost of using paper, plastic or magnetic stripe credit, debit, or government benefit such as health cards, is that they are vulnerable to fraud. Smart cards will be more secure than the cards we carry now. The chips are hard to counterfeit. Tampering with the cards, such as trying sequences of PIN numbers, can cause them to self-destruct.<sup>lxiv</sup>

The personal lock on the card, the 'shared secret,' the PIN code or biometric, will mean there is less reason to steal them in the first place, as they can't be unlocked unless one allows the access codes to be known. As always, don't leave your codes where others can find them. Smart cards can be used to securely store a person's passwords and codes. Today we have so many that we often write them down and carry them in our wallet or keep them near our computer – risking their effectiveness.

Network wide shutdowns on lost or stolen cards can be quickly implemented. Smart cards have the richest tool set of security options available for cards. For multiple application cards, physical separation of data and firewall protection ensures that only authorized persons can access data and this protection can be implemented right down to each individual data field.

### **Privacy Enabling:**

In today's world we are struggling to balance privacy with security. The card technology in your wallet today offers no privacy whatsoever and if anything, puts your identity at risk if you lose your wallet. These cards have a significant amount of personal information printed on their surface; ready for use and abuse, so we need to look at what information we carry and insist upon both privacy and security. Both these objectives can be met if a person's private information is available only when their smart card is used to "unlock" their file or record, the same way we use a key to open a safety deposit box. Cards can also be used to identify people accessing information from computer files.

We often work and shop in a virtual world where it is easier for people to steal our identities and impersonate us. According to the Federal Bureau of Investigation, there are 350,000 to 500,000 instances of identity theft each year in the United States. In Canada, our Social Insurance Number has become a target for identity thieves. As far back as 1998, there were 17% more Social Insurance numbers in the registry than Canadians aged 20 or older, the age at which most Canadians have obtained a SIN. Who is using that ID and for what purposes? It is no longer enough to prove who we are; we must also stop others from impersonating us, adding to our need for security.

The Advanced Card Technology Association of Canada believes strongly in the need to understand privacy protection and to build it into all applications that sit on smart and other advanced card platforms. To that end, we have worked with the Office of the Information and

Privacy Commissioner/Ontario to produce two procedures for advanced card application designers.

They teach the designer the principles of privacy protection and the need to look at privacy systematically. Privacy protection is not limited to the data on the card but extends to all mediums on which that data is collected and subsequently stored. The designer is provided with checklists that allow the assessment and documentation of procedures for each privacy principle. Once the application has been viewed as a whole, the individual data fields are listed on other checklists. These are used to help the designer determine who should have access to each data field and what rights each authorized group has to view, add, change, or delete data in each field. The procedure also identifies the protection in place between applications residing on multi-application cards. This ensures that proper thought is given to privacy protection during the design stages of an application.

The principles of privacy do not change to any great degree. On the other hand, new technologies enter the market place with great speed. Unfortunately, the risks that we face from those who would do us harm grow with each passing year. Theft of identity is becoming one of the fastest growing frauds of this decade and governments and other issuing bodies can provide secure and privacy enabling smart cards to protect consumers.

Finally, an easy convenient means to enable greater security, and it has been well tested.

### **Empowering:**

These cards are smarter. Controls can be placed on their use and they can activate applications.

Consider the misuses of credit cards, such as the US Pentagon's credit card problems. The Bank of America has already written off \$59 million USD in fraudulent debts involving more than 43,000 military travel credit cards.<sup>lxv</sup> Smart cards can prevent these abuses as controls can be built into the spending permissions on the cards.

A parent can give their child a card and know that the spending can be controlled. For example, if your child is attending a school with a smart campus card, you can put money into their bookstore account on the card, knowing that it can only be spent at the bookstore, not the campus pub.

Our personal cards can also provide for anonymous purchasing, just like cash.

Lose a child at a fair? Not with a smart card. Upon entering the fair or exposition grounds of the future, one might find smart card friendly kiosks located throughout. With the insertion of one's card and a few clicks, one could tell the system that they are waiting at station 'X' to find the other person. The other party logs in and easily finds the message from their lost family member. Children could also carry their parents' contact information, so if they are lost, authorities would have access to phone numbers or other information the parent chooses to put on the card.

We can expect to see attractive value propositions from issuers, particularly in the multi-application / multi-function cards. Financial institutions will partner with retailers and other service providers to present us with packages of benefits.

Slowly the world is becoming networked. New coding languages, such as XML, add a tool to enable intelligent networks, where computers are able to do more of the things we do. Our smart cards will help us interact with these networks, activating applications. Personal agents, aka info-bots, will toil in the network for us. Our cards would securely access them, regardless of where we are.

Upon inserting a card into a reader, the network interface may tune to your homepage, while addressing any accessibility needs. It may bring up a page you created, with a link to your corporate network, latest email messages, information about stocks, headlines from your daily newspaper, and the latest offers from organisations you deal with. An ad space may be filled, making a micropayment to you for the privilege, presenting a product that matches your profile.

Computer aided human language translation is developing, and smart cards will help us communicate, tied to specific language servers that cater to our technical knowledge areas.

We'll able to control, or try at least, to limit the access to adult content and gambling sites to visitors with a 'digitally signed' proof of age, as carried on a smart card.

Being part of the new revolution, sharing the experience, is part of the human experience. Smart cards will provide a new frontier and excitement along its horizon for the new adopters.

**Convenient, easy, safe, privacy enabling, and empowering us to better master the world of information, applications, and appliances around us.**

## Use limited only by imagination

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Consumers will be able to use smart cards in a wide variety of ways. From these, we can spot the specific tangible benefits we'll most appreciate, each in our own fashion.

### Identification

- Our most basic ID cards, whether drivers license, health card, Visa, or other ID, will become smart cards, with the ability to securely store basic information about us.
- Adding and removing information will be easy. Signing up for new memberships will be easier, and merchants will be able to trust the cards.
- Cards may have a digital signature, which is given to you upon provision of sufficient proof of who you are. Various levels of personal ID will be required from us at different times.<sup>lxvi</sup> This signature will provide 'authentication.' It will help you know that others are who they say they are. The signature will confirm online interactions, by affirming the existence, date and the state of an electronic agreement or communication, such as a vote. Valid in court.
- The signature can be complemented by a public key encryption, where each of us will possess a public and a private key. Someone will use our public key to code a document for us, and we'll use our unique private key to decode it.
- Issuers, the organisations that provide the card to us, will keep a record of our identification, and provide verification of our card's validity to the system, enabling it to be shut down if lost.

### Stored Money

- Load your smart card from home, office or anywhere you are, save a trip to the bank.<sup>lxvii</sup>
- Use electronic money to make purchases over the internet
- Compared to credit cards and debit cards, smart cards are harder to copy, and can only be unlocked by their access codes - their 'shared secret,' thereby reducing their value to thieves. Access codes placed on the applications within the chip can further hamper access.
- Smart cards reduce the need to carry cash. With personal (handheld) devices, we can transfer money between ordinary people, just like we do with cash.
- Parking meters accept smart cards in some areas. Expect newspaper boxes, vending machines, and other convenient, ubiquitous vendors to adopt the payment technology, as it saves on handling coins. Soon, these will become smart themselves, electronically telling their owners when they're busy, when they're empty.
- Loyalty programs will issue us coupons and credits, which can be stored on the card.<sup>lxviii</sup>
- Currency conversion will be automatic.
- Due to the ability of the smart card to store information, we'll be able to keep electronic records of our 'cash' spending. Expect these devices to connect to accounting software.
- A card issued to a child may be programmed to control spending, how much, even when, and keep a record of expenditures.

### Physical Access

- Controlled access to a car, a building or other restricted area: fairs, shows, rallies, invitation-only events. Swiping a card to enter, or carrying a contactless card that operates within a given proximity of a terminal.
- Admission will become easier. We will determine how much of our basic information (name, address, telephone numbers, etc.) is provided. Saving time and shortening lines.
- Some buildings and computer networks, will use biometric information to add a further level of security to the cards. PIN, facial and voice recognition, finger prints, retinal scans, even DNA codes, will one day be coded, if you need it, to enhance security.<sup>lxix</sup>
- Networks within the event area may provide personalized services: concierge services, lost and found information, message boards, related products, coupons and discount offers.

### **Network & Computer Access**

- Computer security - with the PIN security and the digital signature of a smart card, only the cardholder will be able to access programs or files within a computer, a network or ASP.
- Authentication + non-repudiation - digital signatures will ensure we have electronic communications defensible in court.
- Encrypted data transmission - our preferences and public key infrastructure will be enabled.
- Passwords - the smart card will carry passwords if we wish.
- Cards will enable applications that run automated tasks, opening servers, handling travel arrangements, listing stock updates, tracking news items, or watching for the lowest price on something. If programmed to do so. We can expect them to become more sophisticated. We may be able to sign-in at ubiquitous public computers in the future to access the results.
- Storing small amounts of data, i.e. contact info, until downloaded onto a PC or other device. Handheld devices will be compatible with smart cards, broadening the range of the possible.
- Personal needs can be reflected in the card, by configuring local computers to account for special disability access needs, such as large fonts, speech recognition, and other tools.<sup>lxx</sup>
- Games may some day be built into the cards. i.e. providing competitors with scavenger hunt clues intended to lead them through participating venues, even web sites.
- The smart household of the future may be configured to recognise your smart card on arrival or departure, setting desired operations into action, such as turning music and coffee machines on or off, adjusting the temperature, etc.
- Remote log-ins and instructions to the smart household can be accomplished securely, confirmed with your smart card's digital signature and the system's password.

### **Medical**

- The health care system will benefit greatly from the use of smart cards. From the patient's point of view, paperwork and processing time is reduced, your records will be more accurately prepared, important data will be at their immediate disposal.
- Cards will be used to provide a patient's permission for their records or test results to be shared between their care provider's and can also provide the encryption code to ensure safe transmission. In this way family doctors and specialists can share timely and accurate patient information.
- Records of current medications can be stored on your card, allowing pharmacists and doctors to ensure negative drug interactions do not take place.
- Paramedics and doctors will be able to see your family doctor contact info, current or last treatment, immunization records, blood types, allergies, and medical conditions, for ease of reference, aiding them to more quickly plan treatment.
- By ensuring only confirmed citizens use the health system, with cards that are significantly harder to forge, smart cards will reduce fraud.
- A networked system may one day allow us to see the bills for our treatments, giving us a sense of how much we receive, while giving secure online access to verify our records.

### **Transit Uses**

- Reusable cards can simply be updated with each month's pass, and can carry transit tokens for single uses, replacing the monthly transit passes. As they can't be easily forged, they will be valuable only to the owner, and thereby reduce the risk of theft. It also opens options such as using a pass for a number of consecutive days such as seven or thirty, rather than being locked into a Monday to Sunday or specific month cycle. This will help commuters who want flexibility on when they start to use a transit pass.
- Cards will also be used to open gates to parking lots at bus and train stations.
- From parking meters to buses to taxis, to purchasing train and plane tickets, smart cards will become part of the transportation experience.

### **Kiosks / Data Outlets**

- We may see the presence of more networked kiosks in the future, which will allow us to access either the specific services provided by the kiosk, or our own information.

- Whether kiosks are offering coupons and news of sales in the middle of stores and shopping malls, or are placed in lounges where one catches up on email or scheduling, they can be personalized - making the experience more friendly and efficient.
- Our coffee shops may someday provide on-premise sheets of electronic paper, which we will load with news stories from a menu provided at the shop, charged in micropayments, before sitting down to read our 'daily' paper.

## Conclusions

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Each advance in our financial system has provided added convenience and new capabilities to our lives. Cheques were a step forward. Credit cards another. Then debit cards. And now the Internet. This history of innovation will continue and its next significant manifestation will be made possible by smart cards.

New laws have been passed to recognize digital signatures and their impact on authenticating transactions, updating the Canadian legal environment.

Privacy laws have been changed, phasing in change across Canada, setting higher standards. However, the court of public opinion is, as always, the severest judge.

Maintaining our confidence in the card system is what the providers have been doing for years. They will continue.

Issuers will encourage multi-application/multi-function cards to seek market share as 'the' card for their target market. Youth markets will have different cards than seniors' markets. Groups of people who make similar purchases, based on their lifestyle or geographic area, will have cards that fit their needs developed by groupings of vendors and issuers.

New combinations of partners will share space on smart cards. Initial offers and enticements should be a clear value proposition by trusted providers. Brands will be important. Trust is important.

We will be empowered to do things we could never do before. Safely. Conveniently. Easily.

**Smart Fact:**

Visa issued 3 million smart cards at the '96 Olympic games in Atlanta.<sup>lxxi</sup>

## Smart Card Web Sites

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### Organisations

The Advanced Card Technology Association of Canada  
<http://www.actcda.com>

The Smart Card Alliance  
<http://www.smartcardalliance.org/>

Global Platform  
<http://www.globalplatform.org>  
video - [http://www.globalplatform.org/comp\\_2\\_256.ram](http://www.globalplatform.org/comp_2_256.ram)

OpenCard Consortium  
<http://www.opencard.org>

PC/SC Workgroup  
<http://www.pcscworkgroup.com>

Java Card Forum  
<http://www.javacardforum.org/>

The International Card Manufacturers Association (ICMA)  
<http://www.icma.com/>

Organisation For Economic Co-Operation And Development, IT Policy  
<http://www.oecd.org/dsti/sti/it/>

TRUSTe's Privacy Seal service  
<http://www.truste.org/>

Government of Canada Public Key Infrastructure  
[http://www.cio-dpi.gc.ca/pki-icp/index\\_e.asp](http://www.cio-dpi.gc.ca/pki-icp/index_e.asp)

### Leading Financial Service Providers, Alliances

Smart Visa Card  
<http://www.visa.com/pd/smart/main.html>

Visa Cash  
<http://www.visa.com/nt/visacash/main.html>

Mastercard Smart Card Page  
<http://www.mastercard.com/newways/smartcards.html>

Mondex International  
<http://www.mondex.com/>

Blue, from AmericanExpress  
<http://www.americanexpress.com/homepage/personal.shtml>

EMVCo  
<http://www.emvco.com/index.cfm>

MULTOS - Multi-Application Smart Card Operating System  
<http://www.multos.com/>

## Leading Financial Service Provider Alliances - continued

Europay

<http://www.europay.com/common/Index.html>

Secure Electronic Transactions: SET (open spec)

<http://www.mastercard.com/set>

ProtonWorld

<http://www.protonworld.com/>

## Sources of Information

Report on Smart Cards (newsletter)

<http://www.brp.com/rsc/>

World Card Technology Magazine

<http://www.worldcard.com/>

SJB Services (Card Technology Today)

<http://sjb.virtualave.net/>

The Smart Card Resource Center

<http://www.smart-card.com/>

The CASCADE Project (Europe)

<http://www.dice.ucl.ac.be/crypto/cascade/cascade.html>

The Association for Smart Cards (Europe)

<http://www.cardeurope.demon.co.uk/>

EUROSMART

<http://www.eurosmart.com/>

The Asia Pacific Smart Card Association

<http://www.smartex.com/>

Financial Services Technology Consortium

<http://www.fstc.org>

epaynews.com

<http://www.epaynews.com/>

Nilson Report

<http://www.nilsonreport.com/>

CardTech/SecurTech and Card Technology Magazine

<http://www.ct-ctst.com/>

Card Technology

<http://www.ctst.com/>

Center for Research in Electronic Commerce & KPMG

White Paper on Smart Cards

<http://cism.bus.utexas.edu/works/articles/smartcardswp.html>

US Federal Computer Acquisition Center  
<http://www.fedcac.gsa.gov/smartcard.stm>

US GSA's Center for Smart Card Solutions  
<http://www.smartcard.gov/>

Washington Technology.com  
<http://www.washingtontechnology.com/>

smartcardportal.com  
<http://www.smartcardportal.com>

Glossary - courtesy of Gemplus  
<http://www.gemplus.com/basics/terms.htm>

Smart Cards - Scientific American article  
<http://www.sciam.com/0896issue/0896fancher.html>

## EndNotes

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[http://www.visa.com/av/news/press\\_release.ghtml?pr\\_form\\_edit=699%20](http://www.visa.com/av/news/press_release.ghtml?pr_form_edit=699%20)
- <sup>ii</sup> Press Release: mCommerce Driving Global Smart Card Use, Apr 06 2001, Mobile Transactions, Epaynews.com, Trintech Group, <http://www.epaynews.com>
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