Part IV – Canadian Case Study

SMART CARDS: TOOLS FOR KNOWLEDGE AND DECISION SUPPORT

Canada has long been a pioneer in smart card technology experimentation. Over the last 10 years, smart cards have been used in several experiments to determine their technological feasibility and their appropriateness for use for a variety of purposes.

Many of these systems are health care applications. Almost all provinces and territories have implemented either pilot smart card projects or full-blown health care applications. The range of applications runs from linking patient care among providers, to automating communication of laboratory tests, to linking pharmacies, to intake and case management. The information provided by these smart card projects can help health care administrators and government officials make decisions about providing health care in their area.

What exactly are smart cards, and how can they help to manage knowledge and to make decisions? Identical in size and feel to credit cards, smart cards store information on an integrated microprocessor chip located within the body of the card. These chips hold a variety of information, from stored-value (monetary) used for retail and vending machines to secure information and applications for higher-end operations such as medical/healthcare records. New information and/or applications can be added depending on the chip's capabilities.

Smart cards allow thousands of times the information storable on magnetic stripe cards. In addition, smart cards are more reliable, perform multiple functions, and are more secure because of the high level of security mechanisms that can be built in, such as advanced encryption and biometrics.

Despite the touted advantages of smart cards, several barriers are preventing widespread adoption of the technology in North America, not the least of which are consumer concerns over privacy and business mindsets, according to industry experts. "The prevailing myth is, if all of your information is on a card, and you drop it in the street, anyone who picks it up will know everything about you," says Catherine Johnston, president of the Advanced Card Technology Association of Canada. "While this might be true of unencrypted data on a PC diskette, smart cards can be both secure and private."

Because of the high cost of back-end infrastructure necessary for smart cards, organizations must form partnerships in order to help launch projects, according to Duncan Brown, director of research in North America of London, England-based Ovum, Inc. Different organizations—such as universities and banks—can share the infrastructure costs.

In 1996, approximately 805 million smart cards were issued worldwide; in 2000, 1.8 billion cards were issued, an increase of 27 percent over the previous year, and an estimated 2.8 billion smart cards were issued in 2001. Smart cards are most prominent in Western Europe, but growth in North America is expanding rapidly.

Worldwide, smart card projects support a variety of applications. American Express launched the first chip-based credit card in Australia recently, with ANZ Bank following. In Italy, chambers of commerce, the national railway, and many other businesses plan to use smart cards to store digital certificates to secure B2B commerce. Mexico City's subway system plans to issue 300 000 smart cards to employees and disabled riders; these smart cards will be combination cards so that commuters can pay transit fares by waving the card near a radio-frequency device on a turnstile, using the same kind of card as those being used in Paris on their subway system.

In light of the September 11, 2001 terrorist attacks in the United States, the Newport Beach, California-based International Association of Professional Security Consultants has recommended that airline carriers should consider issuing smart cards to tighten security at airports. Airline carriers could convert their frequent flier cards, which are often paper-based cards with the customer's name and account number on it, into a chip card that would use stronger means of validating a person's identity. Identification methods

could include a personal identification number or an application that would verify a person's identity with a physical characteristic, such as his fingerprint. Persons carrying smart cards would be processed separately from those not carrying cards. Bell ID proved the effects of tightened airport security by implementing a smart card system in combination with biometrics for frequent flyers at Amsterdam Schiphol Airport. The project was a successful pilot study.

Ken Scheflen at the U.S. Department of Defense says he would not be surprised if U.S. federal agencies accelerated any plans they may have to issue chip-based ID cards to employees. Scheflen is directing the Department of Defense's rollout of four million smart cards to military and civilian personnel to control access to their computer networks and physical facilities. "We probably know how to do it from a technical point of view," says Scheflen. "If asked, we will certainly share that expertise." Other U.S. agencies, among them the State and Treasury departments, already had plans to roll out smart cards. He added that some U.S. officials are calling for a national citizen ID card, which could also be based on smart card technology.

Here in Canada, there are many smart card projects being implemented by private businesses, health care providers, and government entities. In the first trial of its kind, Scotiabank will begin offering a chip-based Visa-branded credit card early next year in Barrie, Ontario. The bank will solicit 12 000 customers who live in Barrie for the multiapplication smart card. The chip will store a Visa Cash electronic purse, merchant loyalty, and transit applications, all of which have been tested in an ongoing Visa Cash smart card trial in Barrie. In 1999, Scotiabank was also the first financial institution in Canada to routinely deploy smart-card-capable PIN (personal identification number) pads.

In the fall of 2001, an undisclosed Canadian card issuer piloted a chip-based credit card in Edmonton, Alberta, that can be used in local merchants' loyalty programs. The issuer says it will mail 15 000 solicitations to Edmonton residents to apply for the card and hopes to sign 400 local merchants to install chip-accepting point-of-sale terminals for the pilot. Cardholders will be able to go online to lifestylecanada.com to download electronic coupons and other types of loyalty programs onto the card. The issuer will also provide a smart card reader that connects to a PC.

Mondex Canada, an electronic cash card manufacturer located in Toronto, has had mixed success with several pilot projects in the last few years. Their original pilot was in Guelph, Ontario. While a technical success—the system worked—demand and usage for the Mondex card in Guelph never really accelerated.

In Brampton, Ontario, Canadian Imperial Bank of Commerce (CIBC) and Northern Telecom (now Nortel) partnered to offer Mondex cash to Nortel employees at their Brampton facility. Employees' Mondex cards could be used at telephones and banking machine terminals to download value, check accounts and card balances, and review previous transactions. Mondex e-cash was also used to purchase goods at all on-site merchants and vending machines. The city of Sherbrooke saw 25 000 Mondex cards using the new MULTOS operating system issued with over 600 merchants enlisted in their two-year pilot project. This project included 750 vending machines, a student card program at Bishop's University and Champlain College, the first test of Mondex e-cash loading technology via the Internet, and involved almost $3 million in e-cash value. Mondex findings from the Sherbrooke project mirror their previous findings: Canadian consumers and merchants like the e-cash concept but want more places to use e-cash, more convenience, more flexibility, and more features. In fact, the vast majority of these Mondex users want the functions of a debit card included on their Mondex card, another reason Mondex has moved to the MULTOS operating system. The Sherbrooke project wrapped up over the summer of 2001. Mondex Canada says that future pilots will be conducted, but only after the additional infrastructure to support the use of multiple applications has been developed and implemented.

What is missing from these projects are the business implications of issuing smart cards. Mondex, Schlumberger, and other smart card manufacturers should perhaps focus less on consumer demand and more on the potential applications that could add value to businesses. The data collected from smart card use has untold potential for adding to the enhancement of customer relationship management data and decision support as well as enhancing decision support for marketing, human resources, and manufacturing, just to name a few potential business-side applications.

Using data collected by smart card banking applications, financial institutions could determine how best to support their customers—from where to build new offices, to types of services to offer online or at banking machines, to staffing of offices and call centres. Knowing the extent of their customers' use of smart cards for banking and conceivably other applications could assist financial institutions in developing new products, re-engineering their processes, modifying their pricing structure or pricing scales, and partnering with other institutions to offer one-stop shopping and banking.

A business that offered smart card technology to support customer interactions—anything from e-cash transactions to biometric security identification—could use the data collected from smart card use to determine its staffing needs, including the number and type of employees needed at a particular location. For example, if airports implement smart cards with biometric identification, it is conceivable that they could shift the number of low-level-trained security employees significantly downward while slightly increasing the number of highly-trained security employees. Customs and immigration officials might find that they need fewer employees at major points of entry.

Manufacturers who partner with retailers that use smart card technology for retail purchases could use the data arising from the smart card transactions to determine needed inventory levels of both raw materials and finished goods and could adjust production schedules based on the wealth of data available from the consumers' use of smart cards. Understanding how and when consumers use smart cards can help businesses to better understand their customers' needs and how to develop marketing approaches to satisfy those needs.

This sounds like a commercial business' dream. From the smart card manufacturers' perspective, partnering with a business that would market the smart card to their customers—with incentives for use—sounds great. Yet the smart card manufacturers have focused instead on the end-consumers' use of smart cards. Even so, smart card manufacturers like Mondex are using the data gathered in their pilot projects to determine consumer needs and desires for future implementations of smart card technology.

From the consumers' perspective, though, smart card technology could finally bring "Big Brother" privacy issues to the table. Nowhere is this more evident than in the issues involved in the Ontario government's plans to implement smart card technology in a variety of applications. The Ontario card would give citizens access to a variety of provincial services, from healthcare and drivers' licences, to hunting and fishing licences, perhaps firearms registry, student loan applications, tax payments, and more. The exact dimensions and applications of this project are still being negotiated as of this writing, but many experts question the wisdom of the Ontario project and its implementation.

As of this writing, the specific applications and data collected and maintained for the smart card have not been determined. The Smart Card Project is supposed to represent a major step in the Ontario government's transformation to "e-government," using electronic tools to improve the way government delivers services and manages its operations. Stated principles of the project include: improved access to Ontario government services; enhanced privacy and security; reduction of fraud; and rigorous and accurate registration procedures that ensure one person, one card. According to the Ontario government, it will only introduce the technology when it is assured that personal information can be fully protected.

Government also claims that the smart card will not contain information on a person's medical history and that information on the card and access to that information will be completely controlled by the cardholder. According to David Tsubouchi, MPP, "no decisions have been taken as to whether the cards will employ biometric technology. We are exploring many options, and smart cards will only use this technology if it represents clear benefits for security, privacy, cost, and feasibility." Tsubouchi also stated that the Information and Privacy Commissioner of Ontario was involved in development of the smart card to ensure and "enhance" personal privacy. Ontario Minister of Municipal Affairs and Housing Chris Hodgson also insists that protection of privacy is a paramount concern.

Still, concerned citizens and officials, like Federal Privacy Commissioner George Radwanski, are worried about the potential for privacy invasion of the Ontario smart card. In March 2001, Radwanski said: "First a single card like that would tend to very quickly become a universal identity card, a kind of internal passport…. Second, a single card like that opens the door to far too many opportunities for data matching

and cross-over uses of your personal information. Whether all the information is actually embedded in microchips on the card, or whether the single card simply provides access to information in various data banks, the outcome is the same; one card opens the door to all, or nearly all, the most sensitive information about you."

As much as $500 million will be needed to launch Ontario's basic smart card infrastructure, a bonanza for technology vendors advising the government on this project. The Ontario government conducted a $300 000 feasibility study on the use of biometrics in the smart card and have not released the findings of the report. Even if biometrics are not included in the initial project, biometric technology could be incorporated in later versions. Ontario has several smart card projects that are active in the health care field. The implications of combining these projects and placing these applications on the new smart card—a possibility given the slippery slope principle—are extremely worrisome for privacy. Once agreement is reached to combine the applications, the next step on the slippery-slope is to combine and use the data obtained from smart card use.

Yet, viewed from a "benevolent government" perspective, the information gathered—not on individual card users, but on card users as a whole—could enable the province to save money and benefit Ontarians by transforming its business processes, by reengineering its consumer interactions, by developing new applications and transforming old ones, and by providing additional access to services and funding for these services. All of these changes would be the result of using data collected through smart card use and transforming that data into useful information through decision support and knowledge management systems.

Ontario's pilot project is scheduled to take place in 2002 with a larger-scale roll out to the general public in 2003. According to a government news release, the majority of Ontarians support the idea of introducing smart cards to the province. The issues are difficult. It remains to be seen what will happen when Canada's largest provincial government introduces this state-of-the-art technology.

Sources: "Toward Electronic Health Records," Office of Health and the Information Highway: Health Canada, www.hc-sc.gc.ca/ohih-bsi/ehr/ehr_dse/c_e.html, accessed October 2, 2001; "Last Month's Smart Card and Biometrics News," www.bellid.com/site/news/smartnews_old.htm, accessed October 4, 2001; "Research Statistics: WorldWide SmartCards Market Forecast," www.smartcardcentral.com/research, accessed October 4, 2001; "Scotiabank First to Deploy IVI Checkmate Smart-Card-Capable PIN Pad," www.ckmate.com/news/scotia_oct19_99.html, accessed August 10, 2001; "Greg Meckbach, "Smart Card Success Requires New Partnerships," *Computing Canada*, April 23, 1999; "U.S. Will Be Smart Card Hot Spot," *Bank Technology News*, April 3, 2001, http://special.northernlight.com/banking/hotspot.htm, accessed August 10, 2001; "Mondex in Action: Sherbrooke Implementation," www.mondex.ca/eng/mondexinaction/sherbrooke.cfm?pg-inaction, accessed October 4, 2001; "Mondex in Action: Canadian Projects," www.mondex.ca/eng/mondexinaction/canadianprojects.cfm?pg=inaction, accessed October 4, 2001; "Canadian Smart Card Test Goes to the Back of the Class," www.cardforum.com, accessed August 10, 2001; "Ottawa Lacks the Smarts on Smart Card,: Canada NewsWire, www.newswire.ca/releases/March2001/27/c7374.html, accessed August 10, 2001; "Research on the Ontario SmartCard Project," www.fis.utoronto.ca/research/iprp/sc, accessed August 10, 2001; Andrew Clement, "Ontario's Project on Smart Card is a Bad Idea," *The Toronto Star*, July 10, 2001; Nigel Hannaford, "Smart Card Would Not Be Wise," *Calgary Herald*, January 6, 2001; Theresa Boyle, "Smart Card Chills Privacy Experts," *The Toronto Star*, January 15, 2001.

Video Resource:

"A Medical Mystery," *UNDERcurrents* 145 (January 23, 2000).

Case Study Questions:

1. What have been the outcomes of Canada's smart card pilot projects? Look on the Web for pilot projects conducted in other countries. Have these projects had the same results?
2. If your bank introduced smart cards in a project similar to those in Guelph and Sherbrooke, would you apply for the smart card? What if it was a different bank than your own?
3. What are the potential benefits of the Ontario smart card project? What government services do you think should be accessed through smart cards? Which services should not be accessed through smart cards?
4. How can Ontario's government use the data they could collect from smart card users to improve access, delivery, quality, and the number of provincial government services available to their citizens?
5. What is the potential downside of Ontario's adoption of smart cards for access to provincial services? In addition to ethical issues, what other issues constitute the potential negative impacts of the Ontario smart card?
6. How do you think businesses could implement smart cards? Should they partner with other businesses? Give some examples of these partnerships. What would be the benefits in terms of decision support and knowledge management that businesses could obtain from smart card adoption by their customers? Do the same privacy and other concerns apply to the use of smart cards in business as in government? Explain your answer.
7. Evaluate the approach taken by the smart card manufacturers. Why focus on consumers?
8. How could the smart cards improve security for airlines, border crossings, etc?
9. What would the disadvantages be?
10. Why was the Ontario government interested in smart cards?
11. What would the benefits have been?
12. Why did they not release the results of the studies?
13. Would you want to carry a smart card as a bank card? Advantages? Disadvantages?
14. What about a driver's license or health card? Advantages? Disadvantages?
15. What is happening in Canada for smart cards in 2003-2004?