

***INCIDENTAL PAPER***

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**Seminar on Intelligence, Command,  
and Control**

**The Smartcard as the Ultimate Thin Client:  
Looking Beyond the New York Smartcard Pilot  
Henry A. Lichstein**

**Guest Presentations, Fall 1997**

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## The Smartcard as the Ultimate Thin Client: Looking Beyond the New York Smartcard Pilot

Henry A. Lichstein

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*Henry A. Lichstein is vice president of Citibank, N.A. He joined Citibank in 1970, working first in corporate analytical positions, then managing corporate management information system development. Between 1976 and 1985, he held positions that included serving as regional treasurer in Nairobi, Kenya, and then as Consumer Group financial controller, treasurer, and chief of staff. After managing several of Citibank's technology projects and ventures in 1986-1987, he became assistant to the Citibank chairman until 1991. During 1992-1993, he was in the office of corporate finance, and returned to work for the chairman in 1993, devoting full time to technology planning and coordination. He became head of long-term advanced development in the Consumer Group development division in 1995. Before going to Citibank, Mr. Lichstein spent two years as a member of the technical staff at Texas Instruments, and two years in the Office of the Secretary of Defense, developing policies for computer and software utilization. Mr. Lichstein was treasurer and governor of the New York Academy of Sciences for 10 years, a member of the Board of Directors of the Teradata Corporation, and is a trustee of the Santa Fe Institute. He served on the Higher Education Issues Panel of the Association of Governing Boards of Colleges and Universities, and on the National Academy of Sciences' Committee to Study the Impact of Information Technology on Performance of Service Activities. Mr. Lichstein has B.S. degrees in electrical engineering and in economics, as well as an M.S. in management, from the Massachusetts Institute of Technology.*

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**Oettinger:** I won't give you any details on our speaker's biography, since you've had a chance to look at it. I remind you that in inviting him I wrote to him that he should feel free to structure the discussion in any way he wishes within the broad realm of the issues of planning for, and managing, far-flung, nationwide or global operations in the fast-changing market, labor, technological, political, and regulatory environments, and so on. As you can tell from the scrawlings on the whiteboard, he has picked one particular area in which to respond to that. He has declared himself willing to respond to questions anywhere along the line. With that I turn it over, with great pleasure, to Henry Lichstein.

**Lichstein:** As a further comment on the adaptability of human beings, I found out from Tony that he liked one of the papers I had written more than the others, so I decided to change the topic of my speech. I decided to follow up on your comment.

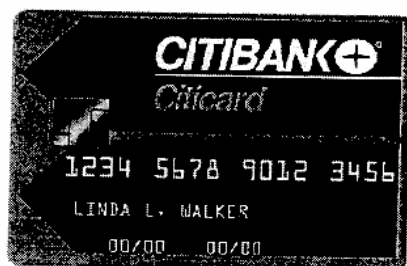
**Oettinger:** Oh, well!

**Lichstein:** I'm delighted to be here, moving up the river, as they say, from the back lots of MIT many years ago.

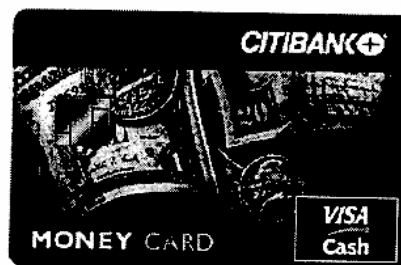
I know a lot about this subject. At least, I like to think I do, so I wouldn't mind interruptions at any point in time. What I'm talking about is this card (figure 1). This is a regular ATM access card with a computer chip embedded in it. I fortunately have some slides of it. What I'm going to talk about today is the evolution of the use of a computer chip on a piece of plastic. This is relevant to Citibank because we issue some 100 million cards a year, and it's relevant to me because I worry about what is happening in the future for technology that affects banking and technology that affects Citibank.

That's an opener. If you do know enough about my background, I won't go into it. I have the luxury of thinking about things in the future for the bank. I've been in the bank long enough that I know a lot about what the future may hold.

**Oettinger:** They've read your bio.



Feature Reloadable



Standalone Reloadable

Figure 1  
Smartcards

**Lichstein:** Good. Just to position us, the piece of plastic you use to access your ATM is called a debit card. It's called an ATM debit card, because you can get money out of an automatic teller machine. What we're doing in a specific geographic portion of New York City is to re-issue everybody's ATM card with a pad behind it on which there is a computer chip. The first one shown in the slide happens to be gold; mine is silver. It is a standard Citibank access card with a chip in it; it's called "feature reloadable." The other one is what's called a standalone card (I won't get into it, but I can explain it).

They have the identical chip, which is a small microprocessor. It happens to be the same microprocessor that powers an Apple II. So what you're seeing is the introduction, on this card, of 15-year-old technology with broad consumer use, at a cost of \$2. This card is available in Europe right now; there are probably about 20 million of these cards with chips, using the same technology. It's part of the evolution that began with the introduction of the microcomputer in the 1970s.

The point I'm going to try to communicate to you is that starting with a very small beginning, where we put a single application on the ATM card (which I'll describe in a minute), we're going to evolve to a fully branded article that's important to the bank and is important to the consumer as an entry vehicle to the bank. Since this is a policy-oriented group, what I wanted to talk about

was the way in which we would go from today's simple beginning to an implementation of a complicated structure where many different players play into the same system and technology can evolve over time.

The phrase "thin client" refers to the browser on your computer, and the browser on your computer is your interface to the Internet. I view this card as the interface to the bank. Since it's got Citibank's name on it, it's a branding issue as well as a distribution issue.

The distribution system is complicated, but it's not very exciting (figure 2). To begin with, where you would use this smartcard is a point-of-sale (POS) terminal in a store, next to a cash register. Instead of handing a \$5 bill to the clerk, you use this card, and instead of swiping it as you would a magnetic card, you stick it in the POS terminal, which accesses the microprocessor, reads the balance, confirms the card as being good, extracts the value from the card, and stores that value in the terminal. All of this is off line (and that's the important part, because the value of the card comes from its being off line).

Periodically, the information in the terminal is downloaded into the bank card system, which actually operates a separate processing center for smartcards. That bank card system sends its information to the bank. The information is not about transactions; it's about how much money has been loaded or taken off this card.

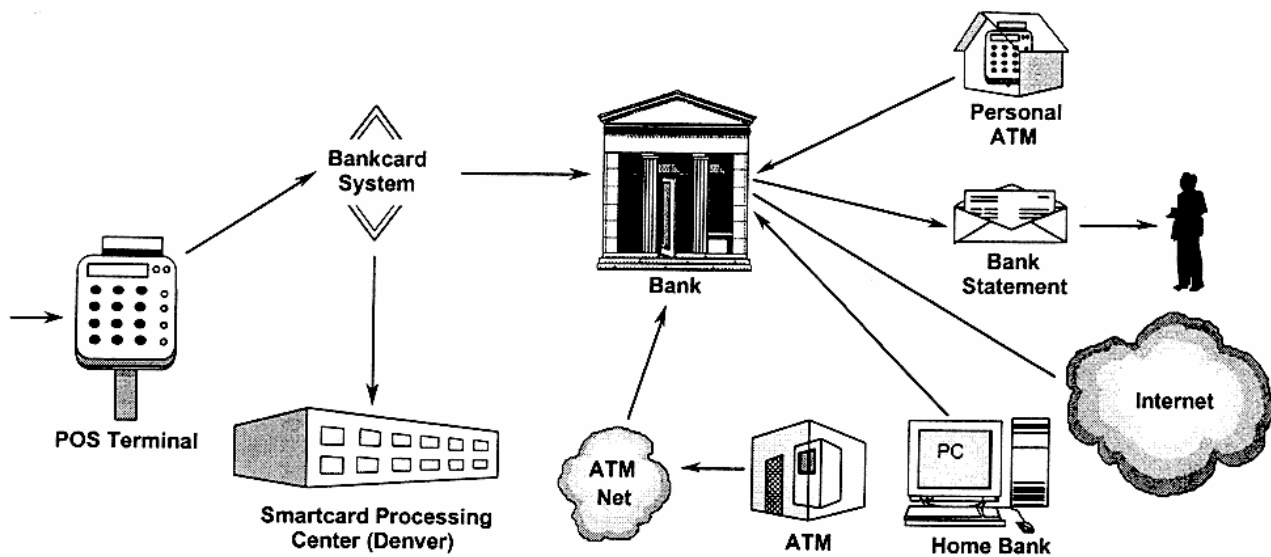


Figure 2  
Distribution System

When you want to load value onto the card, you go to an ATM or other standalone machine. Your account balance is accessed and money is put on the card. The money is taken out of your own checking account, and put on this card. When money is taken off the card, it eventually goes through the bank card system to the bank where the merchant has his or her money.

You also will be able to put money onto the card and eventually use this card in electronic commerce at a home computer, using the Internet or proprietary network. We will be able to use a little standalone, simple, non-computer-based device—which I just by accident have in my suitcase, because the system goes live today—at home to load money into your card. This is only usable in the Upper West Side of Manhattan right now, and that's because Citibank and Chase decided to go into the Upper West Side.

**Oettinger:** I'm sorry, I'm lost. How does that standalone home device get recharged? You bring it to the bank every once in a while?

**Lichstein:** You are in fact talking to a server. You're on line.

**Student:** So you have to have Internet access?

**Lichstein:** No. It turns out this is being done using a telephone connection.

**Student:** So you can just take this little thing, hook it up to your telephone, and it goes right into a server.

**Lichstein:** I tried it last night. It didn't work. I should say that it didn't work *better* last night. In the morning, it didn't work at all. It got to the point of saying that the load didn't work.

**Student:** You can do it from here using a long distance telephone line?

**Lichstein:** It's an 800 number, so I did it from my California home. We could do it from here, and I'd be embarrassed, because it would say it doesn't load. But it really went live yesterday.

Let's go back over this quickly. There are two separate sets of transactions that you have to deal with. One is the actual transaction, where money is taken out of the card. This is not the important part of the discussion, but you have to understand it, or the rest doesn't make any sense. The money is taken out as an off-line transaction, so it's fast. You do it for \$2 or \$3 items. I bought Coke and French fries in the Upper West Side a couple of weeks ago, and it happens as quickly as when you use cash, but it's off line. That's the crucial distinction. It does not require an on-line connection to a computer. It doesn't cause the merchant to incur a telephone charge every time, and it's fast. Once a night or once every two nights, the merchant downloads his value into the store's bank account.

The process to load the card is shown over on the right side of the slide (figure 2). You as an individual go up to an ATM (we actually have separate standalone terminals), and you go into your own bank account, take money out, and put it into the card. That's done on line for security purposes. You're basically staging your money. You're putting some money on the card, and in that sense, it's just like cash. If I throw this card away, I've lost the \$57.42 that's on there.

It happens that there's really no logical reason you should go to an ATM to get cash, except you sort of associate it with the bank. So you will—not now, but you will in June—be able to do it using your home ATM, and because Veriphone<sup>1</sup> was quick in getting a device together, we will be able to provide this service for 3,000 people in the Upper West Side.

**Student:** It's clear how you'd be able to use a password for the ATM and home computer, but does that personal ATM also use passwords?

**Lichstein:** Yes. It's a \$50 item, and we're selling it for \$9.

**Student:** What was this in response to? Was it consumers complaining about normal ATM

cards or merchants complaining? How did this idea come up?

**Lichstein:** You really want to know the truth?

**Student:** Yes.

**Lichstein:** I looked around the world to see what was new and interesting and exciting and what Citibank should be working on in the Internet. This was three years ago, and none of this stuff was really current. Nobody at Citibank was taking the Internet seriously. Then we got some projects going for the Internet, and electronic commerce was something nobody was taking seriously, so we got some programs going there. Then smartcards were being put in place, so then we decided we should have a smartcard project.

You need a critical mass of merchants and consumers. The merchant won't install a terminal unless he thinks a lot of people will show up. So we had to do it in a place where we had lots of consumers. New York City was the only place where we had a high concentration of consumers.

**Student:** I believe you said that similar systems already exist in Europe. Culturally, why do you think they were more receptive to the technology, or quicker to take advantage of it?

**Lichstein:** I'm going to give you both a very explicit and a very loose answer. In Germany, where things took off really quickly, telephone calls cost 80 cents, and only 18 percent of the people had credit cards. In the United States, 65 percent of the American populace (some large number) have credit cards and telephone calls are cheap. So, just that contrast said that an off-line system is very attractive in Europe. However, in Germany, smartcards began because (1) IBM had established a smartcard center of excellence in Germany, just by accident, and (2) the German medical system, the Krankenkasse, mandated that doctors and pharmacists get identification of people, and that they use smartcards. There were 50,000 pharmacists and doctors with smartcard ter-

<sup>1</sup> Veriphone is the name of the company that produces the home connection device.

minals before any bank ever heard of smart-cards in Germany.

Now, from that beginning, the savings bank association panicked, and they, without any business case, decided that nonbanks would get into the business of circulating the cards, and they put the ZKA system in.<sup>2</sup> There was never a rational discussion of it. But the real underpinnings were established because the government medical system dictated that there be a smartcard in every doctor's office.

For those of you who don't know it, the Upper West Side is an area of Manhattan, and in this case we define it as extending from Central Park to the Hudson river, from 60th to 97th Streets. That encompasses about 200,000 people. We counted about 1,400 merchant sites that we thought logically should use a low dollar value transaction card. We set a target of 700; we said 600 were signed up for the pilot. The launch date was set for October 6. Citibank went out with a product by Visa that was called VisaCash, Chase with a product called Mondex (figure 3). There's a long history behind each one of those that I think is actually quite interesting.

The test was the test of technology, although in all cases, the technology has been in place before on a standalone basis. The real test was if we could get Chase and Citi to work together and if we could cause the terminals to accept two different kinds of cards. That turned out to be a very complicated, drawn-out technical process. This was the first time the Mondex card of this flavor had ever been installed.

We launched it on October 6, 1997. We set that date in January; we chose it because you count back from Christmas and you don't want to get too close to Christmas or Thanksgiving. October 6 became a firm date. We actually met it. We've installed 500 merchant terminals, and we are installing more as the program becomes successful. We've sent out more than 50,000 cards each from Chase and Citi. We sent out 25,000 of our ATM access cards. The other, the

- Test of VisaCash, Mondex, and the ability to sell to merchants and card holders
- October 6, 1997, launch; ongoing
- Installed over 500 merchants, more than 50,000 card holders each for Chase and Citibank
- Demonstrations of interoperability at POS terminal, and parallel operation of acquirer systems
- Take-up and use by customers are ahead of target.

**Figure 3**  
**NY Smartcard Pilot Status**

standalone reloadable card, does not require a bank account associated with it. So this is a standalone card, and it has the same chip on it.

We actually have also come out with what you would call a collector's item kind of a card, showing the Ansonia, which is a landmark in the Upper West Side. It's an interesting branding problem, too, because there's no brand on the front of the card. So the chip has become the brand, and we'll see how effective that is. A lot of marketing people fainted when they saw that, because it really doesn't make any sense to leave your name off your product.

The important part of the test, from our standpoint, was that we could get interoperability at POS terminals. That phrase is very important to us because what we didn't want to have happen was Chase issuing one card, Citi issuing another, and the customer saying, "I don't want to take this card out of my purse or wallet. What if it doesn't work in that terminal?" So to stop that, to eliminate any confusion, we said that all terminals in the Upper West Side will use both Chase and Citi cards.

I had more battles with my own staff than I did with Chase during this whole time, because at every turn we wanted to go our own way. The two of us, the guy at Chase and I, said, "No, we've got to stay together on this." It was very difficult to achieve organizationally.

In point of fact, we set our targets realistically. The point of this discussion is not

<sup>2</sup> ZKA stands for Zentraler Kreditausschuss (the German Central Banking Committee). ZKA, introduced in 1987, provided a standard for home banking interfaces.

about the Upper West Side, but rather about the policy implications of doing things in a coordinated fashion. Things are going fairly well. We're finding that the people who activate the card, the people who put money on the card, use it about once every three days.

**Oettinger:** Before you go on to the consumer side, could you go back for a moment to getting the interoperability going? There was a similar history to check processing in the days when the E13B font was developed and then later credit cards. What arguments ultimately prevailed between you and your staff, or who said that it was better for the banks in New York to hang together rather than to hang separately? What persuaded people?

**Lichstein:** We convinced ourselves at the top that this would not be a slam dunk. This was not an easy task. You're asking consumers to change their behavior and, as implied by the question a few minutes ago, there's not a really compelling argument for this product. It's not like people walk around saying, "Boy, if I just had a piece of plastic that would let me get the change out of my pocket, my life would be better." They don't.

We see a pattern (I'll talk about it) of added capability that we can put on this card, so we want to start training people to use it. The choice of the electronic purse is not because we think it will be a killer app, as I mentioned a few minutes ago, but rather because everybody at least understands it. When you talk about cash and change and the possibility of using this at a point of sale, everybody understands it. They don't jump out of their chair and say, "This is fantastic!" They say, "Oh, I understand that."

Interestingly, when we showed it to them on a credit card, they said, "Why would I want cash on a credit card?" We said to ourselves, "Why not? It's a piece of plastic. You can carry the chip on a piece of plastic." But we don't argue about it. We put it on an ATM card, instead of the credit card.

My big contribution at the beginning was to say, "This is not a credit card product, this is a retail bank product." Nobody ever noticed it, but I said, "I'm going to have the meeting with the retail bank guys, not the

credit card guys," even though they ran the project from the beginning, and I had the independence to be able to do that. Then when we did a lot of consumer testing, the consumers said, "Why would you put cash on a credit card?" The answer is, "It doesn't matter. Who cares what card it's on? It's in your wallet; take it out and use it." But, okay. The ATM access card they relate to cash. In the end, I think it's a value-added extension to your basic proposition, and so I don't mind its being on the retail link. In fact, we have more credit than retail bank access.

Tony asked what led Chase and Citi to cooperate instead of going out on our own. Both of us, individually—the guy who ran the Chase product and I—just happened to be at meetings together often. We're not naturally the same kind of guys; if you ever meet us, we're very different. But he and I both concluded that trying to break in as the 15 percent market share owner, which he had at the time at Chemical Bank, into a marketplace where we knew it would be difficult to get people to change behavior, would be tough. We said, "This is not going to work easily, and why kid ourselves? Let's decide to do it in the same terminals."

Now, he changed products in midstream. That was just a horrendous situation! I had to stop for six months while my staff gritted their teeth and got angrier and angrier. But, I said, "No. We won't get people to change their behavior if they're afraid that they'll get rejected. We absolutely don't want rejection. When the terminals work it's fine. When they don't work, people get upset." We just decided that the consumer didn't care what technology they had. They couldn't care less whether Mondex or VisaCash was the product in their chip, and that's working out.

We've watched some other organizations. My counterpart and I were at the meetings where the guys were just going in every direction. We knew it would never happen if this big group was trying to get something done. So, we just decided to do it in New York City, and that turned out to be a wise decision because nothing else started in New York. As soon as we announced that we were going to do it in New York City, all the little splinter things stopped to see what we learned.



**Student:** What was the store owners' reaction to it? I can see why consumers might get advantages from it, or why the IRS might look at it, but why would the shopkeepers be interested, unless they're getting mugged every day?

**Lichstein:** Our target market was merchants that did lots of small transactions—fast food locations, kiosks, newsstands, for example. This is faster than cash, and the cash itself is a burden. You've got to collect it and physically take it to the bank, it is risky, and it gets stolen; the clerk steals from the merchant. So if this approach affects a large enough percentage of their transactions, it reduces their costs substantially. Right now it's a pain. Right now it's a small percentage of their transactions, and it's nothing but more work.

We actually had marvelously good reception by merchants. That turns out not to have been the problem. The system has got to work well.

**Student:** This could be, potentially, very interesting for the people who are in 24-hour shops and garages, because they get held up a lot.

**Lichstein:** Precisely. People don't steal point-of-sale terminals because the money can only go to a specific account.

We had no resistance. The one company that really got excited was the company that owns the terminals that run washing machines in major apartment houses. If you think of going down there to do your laundry with a bag full of quarters, you'll understand what that is. That's a constrained location that's worked out very well. It's taking time.

**Student:** When I buy something, can I finish the money transaction much faster than when I use a credit card?

**Lichstein:** You can finish this transaction much faster than credit because there's no on-line connection required. It's the on-line connection that slows down the credit card transaction. Now, in theory you can do it just as fast. In theory you could have an Internet-based on-line system, and there's a whole logical argument that in five years all transac-

tions will be done using on-line, Internet-based devices, with no delays, so you don't need standalone smartcards. So, there's another whole way to solve the problem of speed.

**Student:** How do you keep track of the transactions you make?

**Lichstein:** As an individual? The balance is shown every time by the device.

**Student:** But you don't get a statement?

**Lichstein:** No. Nor would you want it. The whole idea here is that this focused on small-scale transactions. You see the amount you've taken; you say, "Okay, I'll take \$50 a week," or whatever. You do it yourself. You see those transactions, but you wouldn't want the individual 50-cent transactions showing up on your bill.

**Student:** I was just sort of troubleshooting. If I have 100 bucks in my wallet and I open up my wallet and 20 bucks are missing, I notice the 20 bucks are missing. What would be the process if somebody took this card out, used it, and then put it back in my wallet—although I'm not sure why they would?

**Oettinger:** You trust your roommate.

**Lichstein:** It would be no different than somebody taking money out of your wallet. We have what we call a fob reader. I should have brought it.

**Student:** Does it have a PIN (personal identification number)?

**Lichstein:** Some implementations have PINs, but think about putting a PIN on this.

**Student:** That slows it down.

**Lichstein:** It slows it down and it defeats its purpose. Now, in some cases there is an argument in favor of a wallet that allows you to lock the card, so you can only unlock it and use it when you want to. There are actually a number of modifications of the basic product which over time we'll settle on. In the Proton case (there are about 15 million Proton cards



issued in Europe), they do have a lock feature that they'll be using.

Do we have the basic kind of construct in place here? You can talk a lot about the basic construct.

**Student:** So, if you lose the card ...

**Lichstein:** You've lost the cash. But every time you stick the card in the device it tells you what your balance is. The thing I've got in my suitcase says, "Your balance is so and so. Do you want to add money?"

**Student:** Is there a maximum balance?

**Lichstein:** It's \$500. It's purely a question of how much exposure we wanted to have and how much exposure we wanted you to have. Chase chose \$200.

Now, let's just pretend that this pilot works out very, very well. If it works very, very well there are not many questions. That means that this standalone product is a success. But it's not going to be a rousing success. It'll sort of work. Then we face the issue of whether we roll out in a larger area, or in a different area, or in a new country; if we try to influence industry, change or upgrade technology, or develop the customer proposition (figure 4). Some of these are more interesting than others. We could talk about each one, because there are interesting issues as you deal with this as a worldwide problem.

What I want to talk about are these last three. They relate to the issue of what

happens once you get a technology that sort of works. Remember, this is old technology; it literally is the same microprocessor that powered the Apple II, the 6502. Mondex uses the Z-80. Those of you who know old computers know that was the alternate at the time. They made it for Amiga or something like that. So, those are still the same mask, made smaller. It is now sold for a buck. But, to my mind, the issue is going to be standards and what you add in terms of functionality; what capability you give a consumer as this technology matures. It turned out that when I was worried about what the next generation was, there was a very clear pattern as to what technological evolution was going to be important to smartcards.

So, as we look to the next generation of smartcards, we realize that the electronic purse isn't a "killer app" (figure 5). By contrast, for example, it took me 20 minutes to go through the Sumner Tunnel this morning, but on the New Jersey Turnpike there's now something called E-Z Pass which is a radio frequency (RF)-driven contactless smartcard. It's the same basic technology except that it's contactless. You drive right past the toll booth, something reads the RF signal, and it deducts the money from the card. It has the same effect as this contact card I just described, except it's done at a distance. So, it saves 20 minutes a day. That's a killer app. You really want to use something that saves you 20 minutes a day. The electronic purse doesn't save anybody 20 minutes a day, so it's not going to be a killer app.

- Roll out in larger area?
- Roll out in different area?
- New country?
- Influence industry?
- Set standards?
- Change, upgrade technology?
- Develop the customer proposition?

**Figure 4**

Once Pilot is in Place, What Next?

- Electronic purse does not appear to be the "killer app" (in fact, no single one does).
- Banks need a value proposition that will make customers carry and use the smartcard.
- E-Z Pass is an example of a "killer app" that works because it saves 20 minutes or more each day.
- Rollout of e-purse may or may not be feasible.

**Figure 5**

The Next Generation Smartcard

Similarly, we would go through the pain and agony of putting this system in on a worldwide basis only if we had a value proposition that appealed to a large enough number of our consumers that we would say our offering is now better, and it's worth spending the literally hundreds of millions of dollars to make a worldwide offering. So, we have to come up with a set of values we give our customers that would make sense.

In watching where the technology was going, we came to the conclusion that by asking the card to do more than one thing, if we added enough functions to the card, we would end up with a capability that was worth our investing the hundreds of millions of dollars (figure 6). It would make the offering that we gave our customers sufficiently more attractive that we would keep customers whom we would otherwise lose, or we'd get new customers.

- We feel the multifunction smartcard is the "killer app."
- A multifunction smartcard holds more than one application and carries out more than one function.
- The smartcard industry must move to the next generation smartcard infrastructure and to next generation applications.

**Figure 6**  
**Multifunction Smartcards**

Now, I'll go a little bit to what functions we're talking about, but the crucial thing is that this generation of technology cannot accommodate multiple functions. This generation of technology, for \$4, will do one thing at a time.

**Oettinger:** Technology refers to the chip?

**Lichstein:** The chip, and the type of cryptography used. We use private key cryptography because it's simple and fast for the relatively low-capability microprocessor on the chip. But you can't roll that out, because it's not flexible. If somebody breaks into the system anywhere your entire system is wiped out.

If we put more than one function on the card—a combination of the value of the electronic purse, secure access (which tells a system who you are in a secure way), and electronic ticketing, for example (that's the concept of multifunctionality)—then the consumer will have more functionality (figure 7). The investment will be amortized over a larger number of products, and so the cost

- Consumers will have greater functionality and convenience.
- Investments in smartcard technology will be paid back sooner.
- Cost of each application is lower.
- Acquirers invest in terminals only once.
- Silicon manufacturers will sell vast numbers of smartcards.
- Card associations offer members a consistent smartcard infrastructure.

**Figure 7**  
**Multifunction Card Advantages**

of implementing each application or function goes down. As you put more functions on this card, the terminals are used for more and more purposes. You can see a larger market for the silicon, and so the manufacturers—largely Hitachi, Siemens, and Toshiba—will see larger markets, and you will then be able to use the same infrastructure for more and more activities. So, the advantages to getting multiple functions on the same card make it attractive.

The definition of interoperability becomes important (figure 8). Interoperability means that the card and the card operating system have two or more functions; the terminal also has more than one function on it, and so do the settlement systems. Behind all of these, this bank card system is one large settlement system. It's a huge back office clearing operation for multiple banks' products to be able to settle or close out at the end of the day. The idea that more than one function will coexist is relevant to the terminals, is relevant on the card, and is relevant in the back office. So, the interoperability actually can be achieved by doing things on the card, and necessarily at the terminal, and some

- Two or more applications or participants can use each piece of the infrastructure:
  - The card and card operating system
  - The terminal, acquisition and card management systems
  - The settlement systems
- Interoperability is needed:
  - Among applications on a card
  - Among applications at the terminal
  - Among different industries
  - Among infrastructures from different industries

**Figure 8**  
**Interoperability – 1**

- Create standardized card operating system, virtual machine interface, and supporting class libraries
  - Allow applications from different service providers to operate at the terminal
  - Allow application to be read on more than one terminal type
  - Support multiple application schemes on the network infrastructure
- ...Banks should not compete for customer's interest and attention on the basis of technology*

**Figure 9**  
**Interoperability – 2**

of the interoperability will occur further up in the system.

Some of you are aware that there are competitive systems for smartcards in place in Germany, for example, and for the electronic purse in The Netherlands and in Belgium. Over time, these systems will have to interoperate. It's not an exciting problem, but it's the kind of problem that we deal with in relation to Visa and otherwise. In the case of Europe, with the Euro coming in, every country will have two currencies for a little while and then everybody will move to Euros.<sup>3</sup> So, they will all converge to a single product and a single cash type in Europe. But there will be an overlap for a period of time.

The policy issue here, then, is how do you get disparate functions, like ticketing and value and secure access, to converge on a single technology on the card, in the terminal, and up through the back office processing (figure 9)? This back office processing for bank cards, for example, isn't necessarily the back office process that ticketing would use. So, the constraint that we face is that we're trying to put on one card simple functions that operate through very different back office environments. That is turning out to be a

very, very difficult problem—a multiyear problem.

**Oettinger:** Can you say another word about that subject? My naïve reaction is that the terminal generates some appropriate information or receives information in some appropriate form and, as long as it knows whom it's for and as long the destination knows what it's for, the complexity would be in each of the remote processing units. What subtlety am I missing?

**Lichstein:** If I say different cow paths, does it help? It's like the consumer saying: "I see why you want to put it on my ATM card, but I don't want to see why you want to put it on my credit card." To our mind, it's so similar, so why should they balk? The answer is that they don't see it. If I say, "Here's an electronic ticket. It's going to go on the same card as your ATM access," the answer is: "Why put a sports ticket on my ATM card?"

**Oettinger:** But is this stupidity or is this digging in to keep one's turf? It may be being stupid as a fox, as an excuse.

**Lichstein:** I'm talking now about consumer attitudes. Then, separately, the guy who sells tickets just doesn't think of going to a bank

<sup>3</sup> The European Currency Unit, known as the ECU, never came into circulation. The currency to be phased into the European Union is called the Euro.

and working out a way to sell tickets and put them on the ATM access card.

**Student:** If you increase the value of the card, not necessarily the monetary value but the functional value, aren't you increasing the need for security for that card?

**Lichstein:** Yes, definitely. As a consequence, the security model becomes ever more important. That was another benefit of the conclusion we all came to, which is to use the Java language and the Java security model: code that isn't executed until you got a chance to look at it (figure 10).

- JavaCard platform is emerging as the *de facto* standard for the next generation smartcard infrastructure, for "write once/run anywhere."
- Visa has been actively promoting JavaCard as a multi-application platform; Proton and others also support it.
- Mondex announced that applications written to JavaCard 2.0 API will run on MULTOS.
- The JavaCard 2.0 specification is out.
- Application designers will write for JavaCard.

Figure 10  
The JavaCard Infrastructure

All that is what will be done in this multi-application card for the next generation.

**Oettinger:** It's mind boggling, but you have this empirical evidence. It took centuries to get folks to accept the notion that cash, money, is totally fungible. Nobody in the 20<sup>th</sup> century and in an industrialized nation would question the idea that you use currency to buy anything, and that's the whole point. What you're saying is that when the currency is, in one way or another, congealed on a card, that's sufficiently different that people don't see it.

**Lichstein:** Just as it took centuries for people to reach the conclusion that cash, or the abstract value of cash, is acceptable and fungible, it will also take a lot of time to accept

the idea that this nonphysical thing that you carry is the same thing as cash.

**Oettinger:** What's surprising about that is that's on top of having accepted the very abstract notion of cash; that you have to repeat, essentially, the experience.

**Lichstein:** But, albeit abstract, at least there's a physical representation of it. You know that two of them are more than one of them.

**Student:** When they changed the \$50 and the \$100 bills, a lot of people had trouble with just the fact that the bills looked different, and didn't consider them to have value all by themselves.

**Lichstein:** When we start talking about whole new functions like electronic ticketing, there's really nothing about a ticket except that it's a physical representation of the option you have to sit at a seat. It turns out that counterfeiting of tickets is a big problem, so the idea of downloading the electronic representation onto a card is a very powerful one. You can uniquely associate that card with a person by the information on the card.

There's also a concept in electronic commerce called the electronic wallet. The electronic wallet will reside in a browser, or a piece of it will reside in a card. This is the electronic representation of the physical wallet you use today to carry around your credit cards, your debit cards, your information. All of these have a referent, an analogue, in the electronic commerce environment. A standardized view of an electronic wallet is growing up, because you want to know where the information is in that wallet. The distinction has since been made between an *electronic* wallet that exists in a device like a personal digital assistant, and a *virtual* wallet that exists in a browser.

**Student:** The more you talk about the multi-function card, the more it sounds like a great point-of-sale intelligence collection tool.

**Lichstein:** Yes. It could be, and that's, of course, scary to some people. I did an on-line chat a couple of days ago, and fully a third of

the questions were about privacy, because, in theory, we could be tracking where everybody uses their money.

Now, cash is anonymous; the ATM card for electronic value, in theory, is not anonymous. I don't look at the transactions that happen; it would be too expensive.

**Student:** From a marketing point of view, with the multifunction card you could see what kinds of tickets people are buying and all sorts of other things on there that might be useful. It's similar to the practice of offering cookies on the Internet, and seeing where people would go.

**Lichstein:** We're developing a concept that says that, to the extent that people are worried about privacy, they're saying there's value to knowing about what they do. Just as banks make a business of taking money from individuals, keeping it for them, and paying them interest on that value, why not say that we're going to collect information about what you do. We'll protect your privacy, but we'll sell the information about it.

**Oettinger:** Would you give me interest? Will you pay me for the use of my information?

**Lichstein:** Why not? It's the same parallel idea.

**Oettinger:** That's an interesting idea, because much of the privacy debate is as much over letting somebody get value from it as it is over privacy. I think that if one could dissociate genuine privacy concerns from value concerns—you pay me for the use of my demographics, if you will—then I won't call it privacy, because I get a fair return for it. For some people that won't be enough, but at least it dissociates what is now a very muddy kind of a controversy.

**Lichstein:** A lot of the agent activities—the firefly kind of activity that you know all about—is gathering information about people's buying and selling habits. If individuals are sensitive to it, then, as you say, there's value. We're trying to develop that idea.

**Student:** You said that the store would transfer the information, say, every week or every two weeks?

**Lichstein:** No. They do it daily. They don't have to, but they do. They want their money immediately transferred into their account.

Behind this there's a huge debate (not exciting in general, but it is to the people involved) between Mondex, which is an unaccounted scheme, and all the rest of the schemes in the world, which are accounted. An accounted system says that at crucial points in the transaction stream, you know which account it's coming from or going to, so you have control of it. Mondex has chip-to-chip flows, and the central bank of Mondex is a chip just like the ones in the card. That one can go negative and create value. In theory (they didn't do it in New York City) the money can be transferred from card to card. Our fear is that card itself can be figured out, and somebody else could just sit there cranking out value. The scheme then becomes broken. They've got very complicated ways of trying to track behavior to catch a counterfeiter, but it will happen.

**Student:** If you use a credit card, it takes about two or three days for the merchant to get to his balance?

**Lichstein:** The things you learn! It turns out that we added half a day to the processing flow here, and that's a problem. No, the typical credit card is now next day. We didn't match that. This still is a problem.

**Student:** How did you guarantee to the vendors that the machines wouldn't break and they wouldn't lose all of the money that had been exchanged? Did you give them a guarantee that you'll cover so much of their sales if something goes wrong with the terminals?

**Lichstein:** That's interesting. I would have thought that was going to be a big problem. We learned a lot about what's called the acquiring function in this project. I originally thought that the bank issues the card and somebody else collects the money, but there are about 10 different players that take differ-

ent pieces of that process. It turns out the merchant has a contract with an acquiring company, and the end merchant who holds that card can be responsible for the quality of the terminal. It's worked over time. The answer is they have a big risk and they don't realize it.

**Student:** What's the theory on how this may or may not affect illicit transactions, such as small drug deals or illicit gambling?

**Lichstein:** Mondex, the competing technology, has a huge problem because you have no sense of where the money comes from. So we think the Mondex scheme is a risk on that basis. The system where you know where the money comes from and where the money goes doesn't cover the problem that a given merchant might be doing something illegitimate, but they can do it by cash, today.

**Student:** Right. So in your system, on balance, there's really no change. Under the Mondex system, that makes money laundering a lot easier?

**Oettinger:** So theoretically, the converse is that Mondex could argue they're as anonymous as cash.

**Lichstein:** Absolutely, and we can't argue too loudly that ours isn't, or we'll run afoul of privacy advocates. We have the middle ground problem. Somebody could come in and say, "I have zero money on this chip, and I know I had money when I started today. Your chip broke." We haven't had that happen, it turns out, but we anticipated that it would be a problem. Under those circumstances we would say, "We can investigate the transactions when we're asked. If we wanted to, we could tell what the balance is at the end of every night, through the smartcard processing center."

**Student:** Can you find out where it is?

**Lichstein:** We know just where, because every card has an identification number. We definitely could prove the balance on everybody's card. So, if somebody comes in and says, "I have a zero account on this now,"

then we can show them that the transactions occurred down to zero and zero is today.

**Student:** You said this is most useful for high-quantity, low-cost transactions and I understand why it's not in the consumers' interest to get a balance sheet each time they buy the newspaper, for instance. But, should they challenge the accuracy of their balance, there is a way at that point to retrieve it.

**Oettinger:** There are monstrous public policy problems behind it, you might say, because then the question of under what circumstances that's disclosable by whom and to whom becomes a major issue. I just give you one historical note on this. Telegraph technology is such that there was no way in the early days of the telegraph that you could dissociate the telegrapher from the telegram, to the extent that if the telegrapher wanted to look at it, he read every message. If you look at telegraph legislation, it essentially punishes not acquisition of the information, which is unavoidable, but disclosure. Once you make that punishable, then the question of disclosure becomes crucial. The president of Western Union, a guy named William Orton, refused to honor a U.S. Congress subpoena because he wanted to protect his customers. The Congress of the United States arrested him and held him prisoner in the basement of the Capitol because they wanted him to talk and reveal. So once you're in a technology where knowledge and disclosure become the issue, it turns into a hairy policy problem, and I imagine that one of prices of success of your scheme will be that you'll get into that in a bigger way.

**Lichstein:** To tell you the truth, I never thought of it that way. In a very minor way, it turns out that the VisaCash and Mondex flows are very different. The VisaCash flows are all over the place, but the Mondex flows all go to a single computer. The single computer is owned by Chase Merchant Services. So I just assumed that my counterpart who is running the Chase program knew what my numbers were (it's a little more subtle than that), and he said, "What are you talking about? Do you think the guy at Merchant Services would violate the trust he had by



telling me?" They are both Chase employees. He said, "I don't know your number." I said, "Come on, now, you're just kidding." "No, I don't!" So, within a corporate institution, they recognize that if it became known that Chase Merchant Services told Chase Bank what they were doing, they would fall just a little bit in their standing as an honest broker in a service industry. So, within the Chase Bank there's a Chinese wall.

It turns out that the cards are manufactured by about 10 different companies, and you don't get into this business unless you're willing to spend \$100 million. So, we're seeing \$1 billion worth of investment to be able to create the modules, they're called, that go in the cards. They're computer chips that are generally made by Texas Instruments or Siemens. The card operating system, the specialized software that's embodied in a mask, goes on top of the card, and they're then wired together. That's a \$100 million investment.

The policy issue is: Do you standardize on an operating system and lose your chance to differentiate as a product provider, or do you accept the idea of a standard operating system with the expectation that it will increase the number of users? It's same problem that NEC has when it tries to compete with Intel. In this case, Intel both manufactures the cards and sets the standards. Fortunately, in the case of smartcards, the industry standardized on something called JavaCard, which is the definition of a virtual machine that runs the Java language, but it can be implemented differently by the different manufacturers (figure 10). So, we will see in a year that every card manufacturer will have a JavaCard compatible operating environment.

When you achieve that level of standardization, then the applications written for the card can all be written in the Java language. If I want a secure access application I will get it written in Java, so that it will run on the JavaCard. If I want a ticketing application, it will run on the JavaCard. At that point, the applications from different service providers will operate at the same terminal, they will operate in different terminal environments, and multiple applications schemes will operate in the terminal network.

At that point, we see our way to having multiple functions on the card, usable in different terminal applications. This will allow us to give greater value to our customers: the owner of the card, in this case the individual, and the issuer of the card, in this case the bank (or any issuer of the card), and will give them greater influence. It will therefore provide a reason to use the card and a reason to invest in it. So, this idea of interoperability on the card, and at the terminal, is very important.

It also turns out that the Java language was built as a distributed language, and so the relationship between the card and the terminal, when all cards and all terminals are Java based, will allow you to do an awful lot between the card and the terminal, so you'll have tiering of functions. It won't just be that the card is read by the terminal; instead, you will do something that's meaningful in the interaction between the terminal and the card as an amount of functionality.

You can envision the ticketing operation where, based on the day of the month, you may or may not want the ticket on your card. The terminal will decide when to download the information about what sporting event you're going to onto the card. You may know you have the ticket, but the information that validates this card to be used at the sporting event may not be put on the card until the day of the event, so if you lost your card five days before, you wouldn't lose the value for the sporting event. That's a patentable idea. We are in the process of patenting many of the things I've just talked about, because nobody has really thought some of these things through.

**Student:** What about other third-party types of functions, such as advertising, where you could put your card in and download some information and take it home, and then plug it into your computer, like a notebook?

**Lichstein:** Yes. I hadn't thought of that.

Here's Amazon.com's front page (figure 11). My secretary took it off the Net after that. Look at all the branding that's going on here, and all the possible applications shown here. You probably signed in to Amazon.com because you wanted to buy a book, but



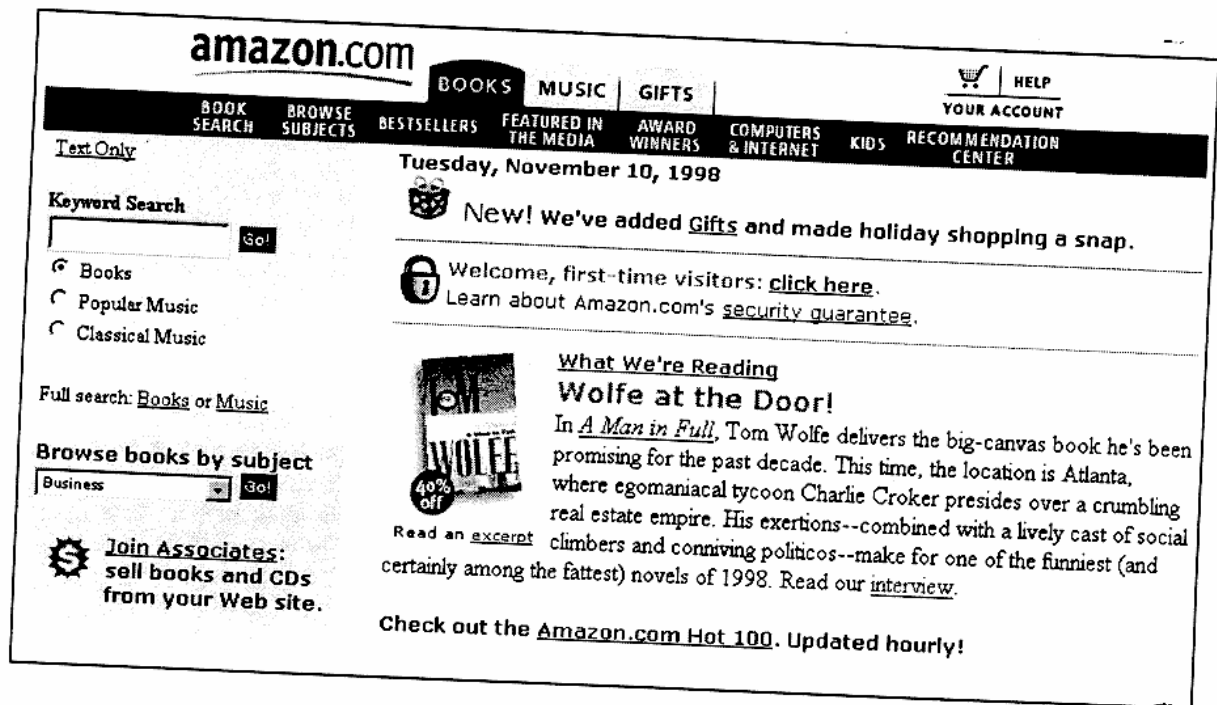


Figure 11  
Amazon.com Home Page

before you can get to the book, look at what you're being offered. You're seeing offers to buy specific gifts for kids, or gift certificates. You can get information about insurance, a safe shopping guarantee, the so-called Citibank inside I'd like to do. You can get information about particular types of books, and you can learn about new books.

Amazon.com will hold onto their leadership, even when the other real booksellers get into the game, because you share your reactions to books on Amazon.com, giving you a sense that you are part of community. Amazon.com has succeeded in creating a community about books and book ideas, and in the process they're able to try and sell things.

**Student:** Not only that, but if you've used it recently it comes up and tells you, "By the way, based on your profile, here's the latest stuff that might interest you."

**Lichstein:** Right. That kind of thing is good news or bad news for the custom-

ers—that they know enough about you to anticipate your wants.

**Student:** You have to volunteer that. They don't collect it without your approval.

**Lichstein:** Similarly (this is a much more industrial view), this is IBM's page about their electronic commerce activities (figure 12). When they're talking about collaboration, the image that they're trying to evoke is one of real people doing real things in real environments, and yet they're talking about using computer-based systems to do business on the Internet.

Notice all the branding that's going on here. Here's the standard IBM logo that's almost disappeared, e-business, and this little at-sign (@) perverted into an e-sign in an attempt to ride on the Internet's choice of the at-sign. For those of you who read about the @ sign, it was just considered a symbol that nobody would normally use in a name, and it became a delimiter within a name. Some guy was asking which symbol to use for the delimiter within a name, and

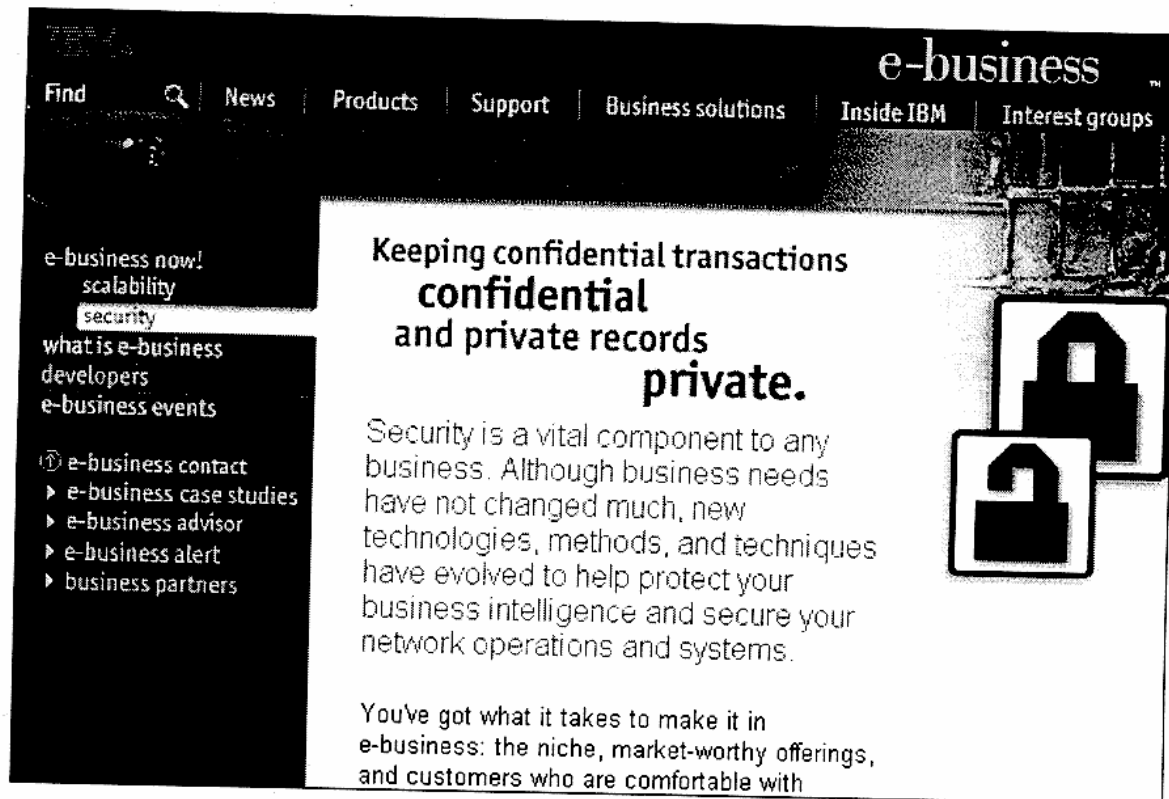


Figure 12  
IBM Electronic Commerce Home Page

chose the @ sign. From then on it's become a symbol of the Internet.

**Oettinger:** When he was showing you the foil (figure 3) with the (essentially) great assumption of cooperation—of hanging together rather than hanging separately—there are precedents that go that way, but there are also a lot of precedents for folks who break away. They figure that by going it alone with their \$100 million they will inherit the world and let everybody else go hang. So, in a sense, what you stated as positive predictions are really hypotheses about one way of looking at the future. Judging from what Henry told you about his own staff having qualms about this, the odds of the competitors taking this in the same spirit that Chase and Citicorp managed to do are not 100 percent at all.

The future of all of this has a degree of uncertainty. I recommend that you keep an eye on this, because you've heard a lot throughout the semester about similar issues—things like competition among the military services—couched within a much more centralized set of environments, where ultimately there's somebody with full power to knock heads. The question then of whether the marketplace that Henry is describing is more likely or not to lead to cooperative versus competitive behavior than a constrained environment like the military is kind of an interesting one. Look at it at 5- and 10-year intervals, as your own experience accumulates and this moves forward, because it's an interesting set of questions that I think will occupy you throughout your professional lives.

**Lichstein:** Think about what happened in the automobile, tire, and petroleum industries. They started off as small-scale things. There were 100 tire makers in the United States in 1905. There were hundreds of automakers around the world. Now there are tens. There's a consolidation that goes on.

To address Tony's point, Brian Arthur, whom I know well at Stanford and the Santa Fe Institute, has written extensively on how you come together to create the standard product or the dominant product; how you achieve dominance over time. You don't know it from preconditions. You don't know which one will have it.

In the case of smartcards, I literally surveyed 14 companies' efforts and decided that only a small number of them had the next generation on their drawing boards. Of those, only the ones who were Java based made sense. So I then put Citibank's weight behind the Java initiative and got a lot of people to focus on it and moved it along. Who knows? I did it thinking of it as a cheap thing to do. It turned out to be very expensive for Citibank. So, there was nothing rational about what I did at all. It was just an intuition that it was going to be important over time. The jury's not in; we absolutely don't know. For better or worse, you find crazy individuals at the center of a lot of good and bad things.

We think that this focus on Java and JavaCard is a rational one (figure 10). The JavaCard platform has emerged as the de facto standard for the next generation smartcard. Visa has been actively promoting the JavaCard.

In an interesting twist, Mondex is a proprietary application. There's a lot of money for a small number of participants if the Mondex card becomes successful. They also have their own proprietary operating system. Mondex is both an application and a platform. JavaCard is just a platform. If my idea is successful in pushing JavaCard as the platform, then all of the new applications will be written for JavaCard and it will leave out the Mondex applications, because Mondex, right now, does not run on JavaCard. It will take them three years to rewrite their applications. They had to announce that their cards would be rewritten to accommodate Java applications. Some of us think that will never work,

but they've announced it. So, if people depend on it and it doesn't happen or if it's slow when it comes out, it's a problem. We boxed them on purpose by announcing Java.

**Oettinger:** MULTOS is their operating system?

**Lichstein:** Correct. This is a subtlety that will take a year and a half to play through. How fast will it run when it comes out? Will it be twice as expensive? The difference between \$4 and \$8 a card, when you're issuing 200 million cards, means a lot of money. So, there are nontrivial reasons for me to believe that this is an important point.

Since Java is a language of choice, everybody's excited by it, and all the college kids are learning Java. Nobody's writing in C, the language that the MULTOS operating environment uses. We felt we jumped on the right platform, and that was part of the reason for choosing it. So, we think all applications will be written in the Java language and therefore operate on the JavaCard. That will drive people to use the JavaCard over the competing alternative.

For those of you who know a little bit about programming languages, it turns out that when you have a language like Java, you can write a template and then fit different attributes for a specific application to the templates (figure 13). We're working toward having templates written for stored value, loyalty, emergency medical, and telecommunications. The biggest users of smartcards around the world happen to be telephone companies. It's not the case in the

- Templates offer the foundation for building generic applications.
- The definition of a template is best left to knowledgeable industry groups.
- Candidates are:
  - Stored value
  - Loyalty
  - Emergency medical
  - Telecommunications
  - Travel
  - Secure access

**Figure 13**  
**Applications on Multifunction Cards**

United States today, but within two years it will be. If you go to France you cannot operate the telephone without buying a smartcard. We use it for travel.

Secure access means that something special about you—for instance, your ID number—is embedded in that card, and no computer network will let you get access without that secure number. It turns out that the secure number is probably one that I've used for something else as well, so we're going to try and get the Microsoft standard for smartcard access to be consistent with the bank standard for secure access.

We alluded to branding a few minutes ago (figure 14). This moves away from the technology and from how you build a network into what it means from a marketing

- The card provides the context.
- Issuer provides the context.
- Application is the content
  - Stored value    – Tickets

*...but content is essentially free in the virtual world, so the application brand gets submerged in a high-profile program.*

Figure 14

#### Brands on Smartcards Are Vulnerable

and product positioning standpoint. These aren't unrelated, because one thing I'm worried about for Citibank is that as the Internet rises and as the Amazon.com brand becomes a thing you look for, Citibank's role in this transaction will disappear into the background. So I've paid a lot of attention to branding, because I think that the smartcard, and in an Internet environment the brand, are vulnerable.

Notice that on the Amazon.com slide (figure 11) there was only one brand: Amazon. The IBM Internet page (figure 12) had three different brands, but they're all IBM-owned brands. They're looking to popularize the e-sign for the equivalent of the @-sign: e-commerce, which is just a kind of a product area, and then the idea.

I showed you the card slide before (figure 1); let's put it up again for a minute. Notice that there are differences even among these,

which look very much like standard products. This without the chip is the standard Citibank ATM access card. Is that a brand? I don't know. I think I always felt this was the best brand we could play with. This is a credit card, but which is the brand? We have spent hundreds of millions of dollars to make the Citibank symbol the brand instead of the Visa symbol.

**Student:** Whenever you buy things by phone or via the Internet or whatever, they don't ask if it's a Citibank card; they ask if it's Visa or Mastercard or American Express.

**Lichstein:** Exactly right. Because this has become an acceptance mark. This brand used to be the whole card (in fact, those of us who are old enough remember that it used to say Bank of America card, but that's a whole different story). Over time, it's literally gotten smaller and smaller and smaller. That's not an accident. The association has been forced into letting it be smaller and smaller, because we only issue 21 percent of these cards. We don't issue 100 percent. So we'd like to think that we can control all the branding.

And now, why is that important? If the Internet submerges the brand names, in general, what remaining icon, connoting value, does Citibank have? It's got the sign over the branch, but the branches are increasingly unimportant. It's got the sign somewhere in the Internet, but not if you're just buying something through Amazon.com.

So, I worried a lot about putting enough value on this branded icon, this card, that people keep remembering that there is a Citibank. Otherwise, Citibank disappears. I don't care, but it's interesting.

Many years ago, when television was new, Marshall McLuhan wrote a book about television called *The Medium Is the Massage*.<sup>4</sup> The idea was that this medium, these black and white (at the time) images, would go around the world and would communicate global information with inclusiveness, but that it would be cold. *The Medium Is the Massage* was an obscurely written book, actually, that talked about the interest in global communities, and in this case, the medium

<sup>4</sup> New York: Random House, 1967.

became the message. You'll see the phrase, "the medium is the message," saying that the important message is the globality of the image.

I came to talk about the Internet and smartcards by saying the medium is no longer the message. The Internet isn't the message; the message is the content, what you have on the Internet, and the context, the Amazon.com page, the Yahoo page. Who owns the eyeballs on the Internet today? Who owns the attention span for users on the Internet? It is actually based on the brand name—the Yahoos, the AOLs (America Online), these first points of contact. Then you go off into a million different places. There is some transfer of brand value from your existing, trusted space onto the Internet. Where did Amazon.com come from? It came out of nowhere. It was created completely, totally, 100 percent in the virtual world.

And so, old brand names are useful, but new brand names can provide new services, or services with new brand identities. In this case, I've been pushing this multi-application card in part because it provides a context and the brand is associated with the context. We're an issuer, so we worry about the cards.

The content, in the case of a smartcard, is the application, such as the stored value of the ticketing. The content is essentially free in a virtual world. This gets to the issue of whose brand is on the electronic purse. I'd like to think that the VisaCash brand and the Mondex brand are irrelevant in the long run.

So, if we have a context, we can brand it, because the infrastructure provides the context (figure 15). The Internet provides the context. The physical world changes slowly and a brand image relates to that context. A brand image in the physical world stays rather stable: the Ford brand, the GE brand. In this case we'd like to think that the smartcard is the unchanging brand vehicle—the context in this case.

But the content is changing (figure 16). It is fleeting. In the Internet and smartcards, the content will be changing over time. There'll be new content operating in a fairly stable context. The content provides the differentiation among different issuers. In the case of the smartcard that we've been talking about, the smartcard application is the content.

- Infrastructure establishes *context*.
- Physical world changes slowly.
- Brand image relates to context.
- The smartcard is the unchanging brand vehicle, the *context*.

**Figure 15**  
**Branding of ConteXt**

- Content is changing, dynamic.
- Provides competitive differentiation.
- The smartcard application is the content.
- The payment vehicle is subordinate to the brand.
- ...*The application is subordinate to the card.*

**Figure 16**  
**Branding of ConteNt**

So this idea of multifunctions, of changing functions, on the card is consistent with the virtual world imagery of new content all the time. The JavaCard, the next generation smartcard, will actually have changing applications. The same card will have new applications, and old applications of the same function will be changed, so that the application is subordinate to the card.

I've moved into branding on purpose, because it's a fascinating area. If you say you want standards in a technologically driven infrastructure, then you very quickly have to ask yourself where the branded identity is and where the value differentiation is. Am I getting this across?

Branding in the physical world is associated with iconography, and it takes 15 years to establish a physical world brand. It takes many, many things that you do for the customers (or, in the case of mistakes, to the customers) for them to associate a certain set of values with that brand. In the virtual world, in the Internet world, all of this is sped up dramatically, and so many of the de-

cisions about standards setting and what technology you use in the virtual world are also sped up dramatically.

The search engine in the Internet has become a branded identity. Yahoo now uses the DEC search engine, Alta Vista, so Alta Vista became a branded product in the Internet. A year and quarter ago, Alta Vista thought it was going to be its own search engine, if you remember. So there are just some fascinating needs that the virtual world, and I think the smartcard world will force us, as a commercial enterprise, to understand. I don't know how this works in with the government command and control world.

**Oettinger:** I'm trying to check my understanding here. Do you then come out that zeroing in on the card as the kind of immutable common element says that's the place to brand, because it's the only thing that stays reasonably stable? Underneath it, the content—the many applications, data, all of that—shifts, and therefore any branding below that is so ephemeral that it's hardly worthwhile developing?

**Lichstein:** That's the argument I'm making. I'm doing it from the context of an institution that I think is a very powerful issuer of a large number of cards. So it's a self-serving approach. But I hadn't thought about it until a week ago when I started writing this way, because I have been struggling with the issue of what is dominant. What is important in the context? This gets into what we discussed briefly at lunch. What is worth doing yourself and when do you want to buy from somebody else?

Again, Yahoo and Alta Vista were both positioning themselves as the same thing two years ago: as search engines. One just did a much better job of selling itself, and therefore became the dominant brand. What the hell does Yahoo mean? Alta Vista became the product that is now subordinate to the Yahoo brand.

**Student:** One of several.

**Lichstein:** But at the same time, Alta Vista, because it really was a good search engine, has become a standard product to be sold as a

value-added enhancement to the dominant brand. So you'll see Alta Vista shows up as five or six products, and is part of the branded search environment now. But it's the aggregate that's making the money. Yahoo's worth \$2 billion in the marketplace.

**Student:** The service is making the money, not the product.

**Lichstein:** Precisely; sorry. The market capitalization of Yahoo is about \$2 billion. That's terrifying.

**Student:** But that agrees with what you're saying. You're saying the service that's associated with that card is what you're selling, not the functions that are on it. So if your card doesn't make mistakes, your card is secure, and you offer very trustworthy services, they remember the brand of the service. —

**Lichstein:** Exactly. In the virtual world it's very difficult to find a physical icon that makes sense. Yahoo has achieved it. AOL has achieved it. In this case it's a brandable icon.

**Student:** I imagine at some point there's somewhat of a fine line between having dominance and subjecting yourself to anti-trust. Is that an issue or not? Are there things you're doing to sort of prevent walking down the road that Gates has taken?

**Lichstein:** When Bill Gates gets away with what he gets away with, I ain't worried about it.

**Student:** When he finally gets in trouble, you'll know how far you can go.

**Lichstein:** Yes. I'll know that 98.7 percent is okay.

**Student:** You have a Java application.

**Lichstein:** Java just got itself accepted as a private standard writer, and Bill complained miserably that he was being excluded from an activity and that he had the only true open standard, called Windows. A few people who knew what he was saying said, "Does

this guy really believe what he says—that there was a proprietary standard and he writes all the interfaces?”

**Student:** So that's not a worry.

**Lichstein:** The antitrust is not a concern. Now, having said that, we got very good legal advice when we started working with Chase on what we could talk about and what we couldn't. We never talked about price together. It was going to be zero, it didn't matter, but we just made sure nobody talked about price, because that became price setting.

**Student:** Going back to the branding structure, they talked for a long time about MS and MS-DOS, which came from Microsoft. You get far enough ahead, and all this stuff stops being called an ATM card or a smartcard, and instead it gets called a Citibank card. Xerox has stopped people using the name generically.

**Lichstein:** If you look very carefully at our card, you'll find three copyright symbols. The manufacturer kept the word "Kleenex" in the name, but they call it "the Kleenex brand of tissue." There's another product, though, that lost their brand coverage: Jell-O, I think. They were careless in using the word "Jell-O" as a generic term, and they lost the coverage.

Here are the propositions that I make for multifunction capability on the smartcard, which isn't the most exciting topic in the world (figure 17). This just summarizes what we talked about. The openness in standard setting was, I thought, the issue that would be of interest to this group. By the way, in the last generation of smartcards, every application was unique; every operating system by a card manufacturer was unique to that manufacturer; nothing moved from card to card. We went in one step from a totally unique set of applications (because it was one to one it didn't matter) to: "If we do make this jump, we go right to a set of open systems and standards-setting processes." But it won't happen unless specific industries pick it up. It happens that the banks, because they want

- A multifunction smartcard is needed.
- Interoperability must occur among the multiple applications, at the terminal, the card, the system.
- The next generation smartcard infrastructure will be on the JavaCard platform.
- Open systems and standards are imperative.
- Specific industry efforts are needed for each application.

**Figure 17**  
**Five Basic Propositions**

ubiquity of cash, find themselves with a broad interest in doing it.

**Student:** Looking at the identification purposes of this card, in some markets it just happens to provide a strong governmental selling point: "Show me your papers" becomes "Show me your card." That's now your identification, at least your internal passport, not in the United States, but in certain other regions of the world.

**Lichstein:** I told you before that each country has its unique story as to the implementation of smartcards. It turns out that I would say half of the country-specific implementations of smartcards will be because governments decide to control access to their health systems.

**Student:** It becomes your driver's license.

**Lichstein:** There's a lot of objection to using smartcards for driver's licenses, because of the concerns it raises about identity. There's very little complaint about using them for access to health systems and benefits, because you're trying to get something that the government is offering you that's a value, so there's a kind of trade-off between value and identity. There's a governmental regulation (I should have brought this up) that all benefits transfers will be done using smartcards by some date in the future.



**Oettinger:** The Treasury Department hopes to get there. There's beginning to be some resistance to it. It turns out there's a lot of little old ladies who want to get checks and will not accept electronic transfers, and the Treasury is beginning to crumple on that. Which leads me to a point that I wanted to make: the history of this sort of thing suggests to me that there may be a single medium or technology, but the odds of there being "one card does everything" strike me as fairly slim, even when you've got a wallet full of stuff. If it went to the point where there were too darn many and so you pulled it back ...

**Student:** But if you lived in Singapore ...

**Oettinger:** Singapore is a small territory, and rather dictatorial, so they can get away with things that other places can't.

**Student:** If you're a bank in Singapore, and your card did everything ...

**Oettinger:** Yes, but Singapore is the size of the part of Manhattan that he's dealing with, so a single card in Singapore doesn't impress me.

**Student:** But you'd see a bank label on it.

**Lichstein:** Singapore is a unique situation, and they get away with strange things.

**Oettinger:** They get away with all sorts of things that don't work in other environments.

**Student:** But Singapore isn't a bad market to look at.

**Oettinger:** No, but it is a sufficient combination of dictatorial regime and small geographic area that generalizing from Singapore is probably not reasonable. There are centrifugal forces at play as well: commercial rivalries, different efficiencies, and changing technologies, so the odds of a single medium prevailing in a non-Singapore environment strike me as being fairly slim. As you say, is there going to be a large number? The experience indicates that something in one digit or two digits seems to be where things settle in after a while.

**Lichstein:** Let me finish this off, because I don't want to enter into that kind of a discussion. My bank-centric view says that the concept of a smartcard as an ultimate thin client argues that there's a lot of value there (figure 18). It's not what you'd call a policy set of concerns. This is a summary of what I've been saying to you.

- Gives control of the relationship to the customer
- Moves from a terminal-centric world to a customer-oriented, smartcard-centric world
- The branded smartcard integrates a financial institution's products, ties payments processing to other services, and provides value-added services for a customer segment.

Figure 18

#### The Smartcard as the Ultimate Thin Client

**Oettinger:** Is the word "client" in "thin client" used here in the sense of "client/server"—as a computer metaphor, or as a commercial metaphor?

**Lichstein:** Absolutely, a computer metaphor. It's what you carry around, it's your identity, and it has a set of functionalities over time. In listening to myself through your ears, you guys have had some real policy debates going on around the room. You've had some real strategic issues going around. This is not a strategic issue in that sense, although it is for Citibank, but you probably don't see it as an issue of strategic importance.

**Oettinger:** On the contrary, because the control of the commercial world and its functionality—money and who issues it and who controls it and how it's handled—is about policy. The odd thing about it is that there hasn't been a major debate about the nature of money in about 100 years, so it's thought to have been settled. But if you look at U.S. history from about the founding of the republic to the mid-19th century, the debate over control of money, who could issue it—

states, banks—the nature of currency, et cetera, was a major one, and all consuming.

**Lichstein:** I know the answer is unemployment, but when did we create a Federal Reserve Bank?

**Oettinger:** That was during this century; 1913.

**Lichstein:** It wasn't early in our life.

**Oettinger:** Although the Federal Reserve system, as a product of the early 20th century, is an endpoint of what were exceedingly bitter and widely fought debates throughout the 19th century. So the regime that we take for granted now in the United States is less than 100 years old.

**Lichstein:** There will be changes, as there are in Europe.

**Oettinger:** I think we all appreciate that this is not just Citicorp survival or profitability, but the opening shots of a major global debate over the nature and control of money.

**Lichstein:** As electronic commerce increasingly becomes real, and as commerce moves to the Internet, the nature of money on the Internet becomes a very interesting problem, and the role that smartcards will play in small-scale transaction. The issue of branding will relate to what kind of players will end up dominating or participating in the virtual world activities.

**Oettinger:** It's fascinating.

**Lichstein:** We have a little bit of time. Are there any other questions people want to raise?

**Student:** We were just talking about this. Singapore may not be all that relevant, but the U.S. military is an organization that would certainly fit this. If you're a bank and you're willing to issue those cards and the direct deposit system that anyone would like to have available, if they were to be the initial clearinghouse for all that funding, that would per-

haps provide them with an incentive to do something like that.

**Lichstein:** There are a number of smartcard issuers in the service directorates. Because, as you put it, it's a closed environment, there's a chance that it will be successful there.

**Student:** Its ties to the banking system are very real. You could say that your pay records and your direct deposit will be done via smartcards because the drive right now is to get rid of the checks, and you don't have to worry about the little old ladies too much because they're not in the military. If you take all the 25-year-olds who are comfortable with this kind of technology in the military and you start saying that you're going to implement this system, you get to moving money with these cards.

**Oettinger:** But I want to make sure you're not confusing the technology—where I agree with you—with the brand, because you might get the military to do it with smartcards, but the politics of a sole-source contract with Citicorp are unimaginable.

**Student:** But if we were outsourcing this function, there'd certainly be a bidding consideration.

**Oettinger:** You're bloody right, but in a country with 50 states, and 100 senators, the odds of a New York-based organization getting it all are minimal.

**Student:** Could you start going in so we can provide the overseas access for members of the military at foreign locations?

**Lichstein:** We're writing the presentation.

**Oettinger:** But there are all those senators from California.

**Student:** Aren't there Citibanks in California?

**Oettinger:** You're being too rational. Let me give you an anecdote from my days of working on the Apollo program at NASA's

Office of Manned Space Flight. I flew around the country and it dawned on me how silly it was to have something launched from Florida that was built in California, controlled out of Houston, with R&D done in Alabama, et cetera. Then my boss pulled out the list of members of Lyndon Johnson's Space

Council, and the senators on that Space Council and the locations tracked perfectly.

I think we're getting to the point at which we thank our speaker for a delightful session. We would like to give you a small token of our large appreciation. Thank you very much.



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