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PRIVACY ASPECTS OF THE CASHLESS AND CHECKLESS SOCIETY.
TESTIMONY BEFORE THE SENATE SUBCOMMITTEE ON
ADMINISTRATIVE PRACTICE AND PROCEDURE

Paul Armer

April 1968

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Paul Armer^{*}

The RAND Corporation, Santa Monica, California

Senator LONG. Do you have a prepared statement for the Record?

Mr. ARMER. No, sir. However, I would like to enter for the record an annotated bibliography, *The Problem of Privacy in the Computer Age* [1], prepared by an associate of mine, Miss Annette Harrison.

Senator LONG. Due to the size of this, we will put parts of it in, with your permission. We will look at it and ascertain the parts.

Mr. KASS. That is available at The RAND Corporation?

Mr. ARMER. Yes, it is available from The RAND Corporation.

Mr. KASS. And free of charge?

Mr. ARMER. Yes, sir.

Mr. KASS. Thank you.

Senator LONG. The Chair will be pleased to hear your opening remarks. We must recess by 12 o'clock. If you and counsel will keep that in mind, we will be very grateful to you.

Mr. ARMER. Let me begin by saying I speak as an individual and not as a representative of The RAND Corporation or of any

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of its private or governmental sponsors. Nor do I speak for AFIPS, the American Federation of Information Processing Societies. The opinions I will express will be attributable only to me.

My experience is in the information processing field, with which I have been associated for over twenty years. During the past six years I have maintained a considerable interest in the social implications of information processing technology as well as in the implications of technological change in general. I am here not as an apologist for the computer, although it is often blamed for things in which it is blameless, but rather I am here to make the point that changes in computer technology and in the information sciences will have profound implications for our society.

In my studies of technological change in general, I have been struck by the fact that the pace of change is increasing, although some of my associates say there is little evidence of this. But to me and many of my colleagues, the evidence looms large. It has been pointed out that large quantitative changes often bring about profound qualitative changes. When things are changing rapidly an "order of magnitude" or "factor of ten" is a convenient measure of change. For example, we can travel by foot at about 4 miles per hour, by auto at 40 miles per hour, and by jet aircraft at something more than 400 miles per hour; i.e., each mode differs from its predecessor by an order of magnitude--a factor of ten. The capability of getting around at 40 miles per hour has profoundly affected our way of life, and jet travel has shrunk our world immeasurably. If we contrast the pace of these changes with what has been occurring in the computer field, we find that the last order of magnitude change in transportation took about 50 years for us to achieve, and while another factor of ten may be but 10-15 years in the making, another order of magnitude beyond that, at least for earth-bound travel, is probably infeasible. But the speed of the *electronic*

portions of computers has been increasing by an order of magnitude about every four years, and it looks like that pace will continue for some time. Size (again I'm talking about the electronic portion of the computer) has decreased by an order of magnitude in the last ten years, and will probably decline by three orders of magnitude during the next ten years. More importantly, the cost of raw computing power has declined by an order of magnitude every four years, and this trend looks like it will hold for sometime. The amount of computing power in the U.S. has been expanding by an order of magnitude every four years.

Shouldn't we expect a great impact on society from such rapid change in computer technology? And now, with the advent of systems in which computing power is distributed in much the same way as electrical power and telephone service, computing capability and information will be more widely available. Developments in the computer field will indeed alter our way of life significantly.

I am here this morning to discuss only one of those developments--the cashless and checkless society--and only one of the many implications of that development--its impact on privacy. There are many other important implications, for, as Anthony Oettinger has pointed out, "Automation affects not the mere mechanics of banking, but the very foundations of banking; not the individual bank, but banking systems and the national and international economies in which they are embedded" [2].

I will not dwell on the need for privacy--by both individuals and organizations. I do want to point out that I realize that privacy is not an absolute. As Alan Westin has often pointed out [3], there exists a conflict between the individual's right to privacy and society's right to know. By the latter I mean the belief that society has the right to know anything that may be known or discovered about our world--and man is part of that world. Professor Westin

has pointed out the threat to privacy arising from law-enforcement data banks. Here the individual's right to privacy might be said to be in conflict with the individual's right to freedom from violence. Thus the problem is one of achieving the proper balance between the right of the individual to privacy and the common good. We must insure that appropriate attention is paid to the question of privacy so that systems developed for the common good do not unnecessarily impinge on privacy.

Let me now turn to the particular topic of the cashless and checkless society. First of all, what does it mean? Literally, it means a society without cash or checks. In this extreme, all financial transactions, even the purchase of a newspaper, the tipping of a doorman or passing through a highway toll station, would take place via some mechanism not involving a check or cash. It usually would involve an electronic payment and bookkeeping network (probably nationwide in the sense that regional centers would be interconnected) in which electronic pulses in a computer and communications systems replace checks and currency. There are many ways in which such a system could be implemented, usually involving a terminal device at the point of sale for recording the details of the transaction. In a sophisticated system the record would be transmitted electronically over communications lines to a central computer which would verify the buyer's ability to pay, and either complete the transfer of funds immediately or set up the transfer for some later date. Less sophisticated schemes would batch the records and forward them later as a group. Proposed systems involve paying bills by phone and other embellishments. No matter what system evolves, we will have a major change in the payments mechanism. In the extreme, some people have advocated a large nationwide system installed and controlled by either the government or a financial information public utility.

Most people who use the phrase "cashless and checkless" are not talking about the extreme case where cash and checks totally disappear. In fact, some have proposed the substitute phrase "less-cash and less-checks." What they do mean is a society in which a much greater percentage, compared with the present, of our financial transactions will not involve the use of cash or checks. It might be noted that if our forefathers could look at today's situation, they would conclude that we have already moved a long way from their system, which was largely based on cash.

Since I am not concerned here with the implications for the financial world but rather for privacy, let me focus on four attributes of the various possible future systems-- attributes important to privacy. The first is the percentage of financial transactions actually recorded; the second, the amount of detail about a transaction that is recorded and subsequently computerized; the third, the degree to which this information is centralized; the fourth, how rapidly the information is transmitted to the central computer.

Why are these particular parameters important to the privacy issue? The percentage of transactions recorded is obviously important because it determines how complete the picture is. The same is true for the amount of detail recorded about a transaction. The amount of detail actually computerized is important because if we visualize future computer systems with remote terminals connected to the computer, only the information actually in the central computer will be available electronically at the remote terminals. Information written on a piece of paper such as a credit-card sales slip or check and not in the computer could only be obtained by someone eyeballing the piece of paper. Lastly, the rapidity of transmission is important chiefly when we think of such a system being used for personal surveillance. The value of information about an individual's whereabouts declines rapidly with time.

The extreme case, in which all transactions go through the system and all the details are recorded (who, what, where, when, and how) and then sent immediately to a single center, obviously represents the greatest threat to privacy. Such a system would know where we are and what financial activities we are involved in everytime we so much as buy a candy bar or pass through a toll station. Now it is unlikely that we will get to this extreme situation in the near future, if ever. But how fast are we moving towards it, even if we may never reach that limit?

First of all, what are the forces propelling us towards that limit? A major factor is the rapid growth of the number of checks processed and the high cost of that processing. Interestingly, however, the use of credit cards actually increases the amount of paper in the system. Why, then, is the use of credit cards growing? Consumers like them because they reduce the amount of cash that must be carried (though credit cards present a greater risk of loss). There are other disadvantages of cash such as the necessity to remember to replenish one's supply; and, compared with writing a check, credit cards do reduce paperwork for the consumers (especially when using expense accounts in which the credit-card bills are processed by the employers). Credit cards also provide a means for consumers to postpone actual payments. Sellers also like credit cards, because they promote sales (as the granting of credit usually does).

Thus we see that two of the forces pushing us towards our hypothetical extreme case are the economics of the situation and consumer demand. Now the costs of the present system would not be so important (that is, we'd live with them) if it was not for the fact that advances in computer and communications technology offer ways of doing the job at considerably less cost. As one banker put it recently: "It's clear that we're not being driven into the checkless society by the computer but that we're pushing the computer

into delivering us that kind of society" [4]. These computer based systems generally involve recording and computerization of more details about the transaction, rapid transmission and greater centralization.

Thus there are three major factors in the computer's impact on privacy. The first is that computer technology is introducing order-of-magnitude reductions in the cost of collecting, transmitting, and processing information. Second, centralization of data is usually a concomitant of computer use. The payoff to successful snooping is much greater when all the facts are stored in one place. Though most of the data to complete a dossier on every citizen already exists in the hands of the government today, it is normally so dispersed that the cost of collecting it and assembling it would be very high. The third factor is that computer systems with remote terminals can permit, unless proper safeguards are provided, remote browsing through the data with a great deal of anonymity.

To see how the four attributes (percentage of transactions recorded, amount of detail recorded, degree of centralization, and rapidity of transmission) I enumerated earlier interact, let us look at several modifications of the present system. Imagine a system that uses only checks as they are processed today. My bank would have some information about each of my transactions, but there would be a delay before it got that information. If someone were able to look at all my cancelled checks, he could learn much about me; but little of this information is actually computerized. To be specific, only the amount of the check, the number of my bank, and my account number are machine readable. The date the check was paid by my bank can be entered easily into the computer; but information about to whom, where, and when the check was written can not be easily computerized in today's system; and information on what was purchased is not available in the computer. Note

that information on all the people in a given locality is spread over a number of banks (unless there is but a single local bank). Of course, if the various computers are interconnected there is little difference.

Another possible modification of the present system would be one which uses credit cards (as processed today) entirely--no cash and no checks. Credit-card transaction slips generally contain more information about what goods or services were purchased than do checks, but under today's scheme little of this information is computerized. Further, today one usually deals with a number of credit-card companies (although there is a tendency toward fewer and more universal systems). But in this system, much of the information is not computerized and there is a delay between the time of the transaction and the time the information gets to the computer.

One over-simplified way of visualizing the cashless and checkless society is to think of a universal credit card system with immediate transmission of transaction details to a central computer. At the very minimum, the details would have to include payee and payor, time (place could be inferred), and amount. For audit purposes, some information on what was purchased would likely be included.

When is the cashless and checkless society apt to be here? To answer that question, we would first have to define exactly what is meant by a cashless and checkless society. I doubt if cash will ever totally disappear--I hope not. But one of the arguments advanced to show that it will not happen is that of cost. That is, if the *average cost* of completing the transaction is ten cents, one would hardly use such a system for a ten-cent purchase of a candy bar or newspaper. We don't write checks for such purposes today, although there are candy and cigarette vending machines on the market that accept special credit cards.

I have pointed out that the cost of computing power is declining rapidly. Terminal costs and labor costs (through increased productivity) are also declining, but not at such a furious pace. Communications costs are essentially dependent upon the same state of the art as computing power but are not declining as rapidly due to the absence of market place forces in the communications field.

Let us suppose that the *average cost* some time in the future gets to be one cent per transaction, as it well may. Further, if the percentage of transactions outside the system gets very small, then it makes sense to consider *marginal costs* rather than *average costs*--and marginal costs might be very small.

The point I am trying to make is that I believe those who use the economic argument against our approaching a condition wherein only a very small percentage of transactions are outside the system are underestimating the rapidity with which costs will decline.

I would also like to point out that there is little sanctuary for privacy in a system where even though cash is an option, it is seldom used. In such a system, any large cash transaction is automatically suspect.

I really have not begun to shed much light on the question of when the cashless and checkless society is apt to be with us. A precise answer is obviously impossible. Experts tend to give answers ranging from 1975 to the year 2000. I am sure that each of them has a different definition of what they mean by a cashless and checkless society.

For such a system to come into being, it must be technologically and economically feasible; and also socially, politically, legally, and psychologically acceptable.

Senator LONG: It would require perhaps a complete re-writing or very definite change in our currency system and laws dealing with money and matters of that kind, would it not?

Mr. ARMER. Yes, it would.

Most experts agree that such systems are technologically feasible today (with some shortcomings) and that the economics are changing rapidly.

The impact of the other factors, for example, the legal ones, is much more difficult to predict but indeed would be quite large. What is being said here today will probably have some impact on political feasibility, just as the hearings of 1966 and 1967 had a very large impact on the political feasibility of the Federal Statistical Data Center.

I want to make it clear that I am not absolutely against any further mechanization of our system for handling financial transactions. I only intend to raise questions and to ask that the privacy aspects be given full consideration.

I have emphasized the negative aspects of the problem. There are many positive points. Computer technology can supply safeguards to a degree. In fact, some computer based information systems--I am now referring to such systems in general and not only financial systems--may provide greater privacy than is available from today's manual systems. This will be especially true in those areas where the advent of the computer brings to light a problem badly in need of legislation and regulation. For example, we have Professor Westin's discussion earlier this morning of credit bureaus.

I also want to point out that there will be socially desirable results from a cashless and checkless society. I have already mentioned reduced costs. Such a system will also make it feasible to provide financial counseling to individuals, which will save them money. Better information on the functioning of our economy, which will be a by-product of such a system, will make the economy more efficient with resulting benefits to all.

One of the aspects of the privacy problem that disturbs me a great deal is the fact that privacy lacks an organized

constituency. In general, we find only a few Congressmen and Senators, plus a few isolated scholars and writers, and the ACLU pleading the cause of privacy. Most of their presentations tend to be philosophical in nature, as this one is, rather than in-depth studies. In fact, there are very, very few studies comparable in depth with Professor Westin's monumental work [5]. One reason is that scholars and organizations interested in the problem are limited in the places to which they can look for financial support. If one is interested in doing research on the problems of health or education in our country, he can look to the Department of Health, Education and Welfare; but if he is interested in privacy, he can look only to private foundations. Professor Westin's study was supported by a grant from the Carnegie Corporation.

The little work that has been done at RAND has either resulted from related work on military security or has been supported by RAND Corporation funds, which can generically be thought of as similar in nature to foundation support.

It seems high time to me that some organization in the executive branch of the government be charged with concern over the problem of privacy--just as the Department of Defense is charged with providing for the common defense, and as HEW is charged with the problems of health and education.

The forces of the market place are apt to have little impact in the near future on improving the state of privacy in our society. In credit bureaus, for example, the individual is a third party not involved in the market aspects at all.

Corporations will soon undoubtedly realize that they have an economic interest in computer systems, which do provide them corporate privacy, and thus will be willing to pay for the safeguards that computer technology can offer. The computer industry will respond to that market demand by offering systems with safeguards--at a price, of course,

because such safeguards have costs associated with them. The computer industry and the financial community will realize that it is in their self-interest in the long run to be concerned with the issue of privacy, just as the automotive industry is beginning to show more concern for safety. But the market mechanism works very imperfectly in such areas and needs prodding from the government. Better support for in-depth studies of the problem is also needed to point out the seriousness of the problem and possible solutions to it.

In closing, I want to assure you that many professionals in the computer field are very interested in the privacy problem and in the other social implications of the technology with which we work.

I would also like to make a brief comment on the notion advanced in the United Planning Organization's Data Bank proposal that security results from the fact that names are not included in the file. I think this is more apparent than real. This first came to me a number of years ago. I needed some data on salaries in the computer field, but none existed. So I decided to take a survey. I was concerned about the privacy aspects and set up an elaborate system whereby the respondent companies keypunched information into cards without names. They sent this information to a public accounting firm that batched the cards and sent them to me. I did not see any postmarks. We had asked for very little information other than the individual's salary, when and in what field he had received his degree, and in which of three geographical regions he worked.

When I received the cards from the public accounting firm, the first thing I did was sort them inversely on salary (that is, highest salary first). When I picked up the top ten cards, I immediately knew, from the data therein, the name of each individual. Let me try to explain with another example. Suppose there exists a data bank in which you know there is a file on me. You can ask for a listing

of those people who are 43 years old, live in southern California, and obtained a bachelor's degree in 1946. If you know a few facts of this sort, you don't need the name to retrieve my file.

Senator LONG. Mr. Armer, as I understand it now, your suggestion is that the trust system that Mr. Branton mentioned a while ago, where these materials would be compiled over here in one computer and/or of this size, we would have John Doe listed as No. 234 and then it would be possible for you to go through this information over here and find out--

Mr. ARMER. If I already know a few facts about Mr. John Doe that are in that file.

Senator LONG. If you knew the facts--

Mr. ARMER. If I knew a few facts and if I am allowed to browse through the file in this fashion. I didn't mean to imply general criticism of the whole U.P.O. approach to privacy. I think what they are doing is quite laudable. What I am saying is that I don't think there is as much reason as one might think of at first for a feeling of security in that names are not included in the file.

Senator LONG. More theory than real, that it would be a good security measure?

Mr. ARMER. The important thing is to make sure that the people who have access to the file are limited in number and can be trusted.

It was mentioned that it would take collusion between the man who has the name file and the man who has the substantive file. I believe that is not entirely true.

Senator LONG. That is interesting. It creates a more than ever importance that every consideration be given to the protection of the right of privacy of individuals, there must be continual study and investigation and effort made by men in your position, companies like yours, the same as the type company Mr. Branton had, that every effort be made to protect the information that is in those files.

Have you completed your statement?

Mr. ARMER. Yes, sir.

Senator LONG. At this time, before there are any questions, we have a paper here which you prepared for a symposium on "Computers and Communications" for the University of California at Los Angeles on March 20-22, 1967, entitled "Social Implication of the Computer Utility" [6].

Without objection, I would like for that to be placed in the record at this time.

(The information referred to follows:)

COMMITTEE INSERT

Mr. KASS. Mr. Chairman. Incidentally, Mr. Armer referred to browsing through the records and he had the opportunity in his salary study to browse through the records and he said he could get the information. I prefer to use Mr. Armer's earlier words in a private discussion in which he said "running barefoot through the records." I think that has much more significance as far as we are concerned.

Senator LONG. You country boys understand that.

Mr. KASS. Mr. Armer, one of the protections of privacy is the element of choice. If I have the choice to do something, perhaps my privacy is better protected. As you described the potential checkless-cashless society, I got the impression there is going to be very little choice left so that when I buy a newspaper or a \$100 television set, that by and large the cost of computerizing the transaction will come so low to the merchant that I will have no choice, I will have to put it on the computer. Is this a correct statement?

Mr. ARMER. Well, if indeed we get to that extreme, that would be correct. I would hope that the social and political pressures keep it from getting to the point where we will be denied the use of cash. As I said, I believe it is not only necessary that we have the option to use cash, but it is also necessary that we frequently use cash.

Just to have the option isn't enough, for if you always use the cashless and checkless way of doing business and suddenly there is something that you would like to purchase for cash in order to keep the transaction private you will find you have a problem. For example, let us suppose that you know what your wife wants for her birthday, which is a couple of months away, and you notice that what she wants is on sale at the local department store. You would like to go buy it now. Suddenly you now want to buy something outside of the system. But if you do, it will be flagged because you have suddenly made a large cash purchase, which you never have done before. When your monthly statement comes from the bank or financial utility, she is going to wonder what you are up to. If you seldom use the cash option, then it is not worth very much.

Mr. KASS. Well, how far along the line are we? You say we aren't at the point now where you can buy on the computer the dime newspaper, but aren't there some systems in operation now for airline tickets where everything is recorded on the computer?

Mr. ARMER. Yes, that is interesting in the sense that an acquaintance of mine recently asked an airline employee for some information about a friend, and in trying to be helpful, the airline man keyed the friend's name into the computer system and came back with the friend's complete itinerary. The airline man gave the itinerary to him--a complete stranger to the airline employee.

Some of these airline systems not only have the itinerary but also hotel and motel reservations, and information on car rentals. An associate of mine wrote to the CAB inquiring as to what position they take on this question. The CAB wrote back saying they take no position; that it is entirely up to the airline.

I know there are some airlines that will tell you that they do not release such information, but if some employee decides he wants to be helpful he can do it.

Senator LONG. Was that a government agency making the inquiry?

Mr. ARMER. No, that was the President of the American Federation of Information Processing Societies.

Senator LONG. I mean who made the inquiry of the airline?

Mr. ARMER. No, it was a private individual.

Senator LONG. Do you know whether he represented an agency?

Mr. ARMER. No, he was essentially a man on the street.

Senator LONG. He could have been a Federal agent?

Mr. ARMER. He could have. He could have been a private detective. He could have been anything.

Mr. KASS. This information is on the computer. We have talked about the interconnection of the various systems, the airline system with the banking system, with the credit system, with the Federal Data Bank, with the possible UPO data bank, isn't this probably the most significant invasion or potential invasion, when individual isolated data banks, for better or for worse, are being created today, they may not pose as much of a threat to privacy but when, as you say, the cost of communications goes down and the cost of storage goes down, leased lines will certainly be cheaper than in-house computers, isn't this the potential danger?

Mr. ARMER. As I mentioned, one of the important factors is the centralization of data. However, there are some technological problems in standardization which are going to make the actual interlinking of these very diverse systems quite difficult for some time to come. If the cashless and checkless society is planned and standardized from the beginning, as the banking industry did with the magnetic ink character recognition system, then it will be standardized and will be compatible. Most of the existing systems have not been standardized. As Mr. Branton mentioned in his presentation, they had to get together with the various agencies from which they were getting data to agree on standards.

Mr. KASS. I have a number of other questions but our time is short. I wonder if I could submit them to Mr. Armer and have them put in the record?

Senator LONG. I would be glad to, and I would appreciate it if you could cooperate with us to that extent.

Mr. KASS. Also, there is a very interesting article in the *Business Week* of January 13, 1968, entitled "Money Goes Electronic in the 1970's" that I would like to submit in the record.

Senator LONG. Without objection, that will be submitted.

(The information is as follows:)

COMMITTEE INSERT

Mr. FENSTERWALD. I would like to thank Mr. Armer. He has been an extremely helpful witness and I certainly appreciate his coming and testifying.

Senator LONG. Your statement has been very helpful to us. The information you have given us has been, I am sure, very helpful to the Committee and it will be food for thought that certainly the Committee will make some further investigation into some problems that you have raised.

We are grateful to you and I am sure the Committee will be in touch with you again.

At this time the Committee will adjourn and will meet in this room tomorrow morning at 10 o'clock in executive session.

(Whereupon, at 12 noon the subcommittee adjourned, to reconvene tomorrow, Wednesday, February 7, 1968, at 10 a.m.)

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