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Abstract:

A narrative account of the origins of PAPA.

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1 The Origins of PAPA

PAPA is an acronym standing for Privacy, Accuracy, Property, and Accessibility. It encapsulates four ethical issues that are generated by the use of information technology (IT). During the early 1980s it occurred to me that, due to the increasingly expansive use of IT, almost all members of society would be dramatically affected. Most of the consequences would have ethical implications. An article published in *MIS Quarterly*/March 1986 entitled “Four Ethical Issues of the Information Age” summarized some of these ethical concerns.

Ethics, for me, relates to the spirit and the compass that guides one’s actions toward what is right and good. The ethical question is: do actions taken via IT lead to the right or the good? Or, do some result in harm to its users? On the harmful side, IT applications have made identifiable information about a person available to others without consent—lack of privacy. They have committed errors that harmed people—lack of accuracy. They have compromised one’s right to own and control their information—violation of property rights. And, they have precluded some people from obtaining information they deserve—lack of access. These outcomes potentially are harmful to many if not all of an IT application’s stakeholders and thus may be judged to be unethical.

What led me to these conclusions? In this case, it involves the confluence of two threads of my experience: how I learned about computers, data processing, and information systems, and how I learned about ethics. Here is a brief synopsis of some of the events that prepared me to develop PAPA.

In my early experience, there were three sources influencing my thinking: my family life, my experience at Oregon State College (now University), and my early years as an account representative and computer specialist for the Burroughs Corporation. In this recounting, I recall some of the earliest experiences that served as precursors to my further thinking on computers and ethics.

My first memory of discussing ethical issues concerning the acquisition and use of information dates back to conversations with my dad circa 1946 or 1947. At the time, my father was the agency manager for Prudential Life Insurance for the state of Arizona. Soon after December 7, 1941, he volunteered to join the military. But, a medical exam found him to be 4F and he was sent home. We were living in Memphis, Tennessee at the time. Before the depression dad had started a career as a life insurance salesman. It was a career he considered his calling. During the depression, people were not buying insurance. Times were difficult. So, when prohibition was repealed in 1933 dad found more lucrative work selling wholesale for Old Mister Boston. He was making a comparatively good living during those latter years of the depression. After learning he was 4F, however, he sought opportunities to return to his first career passion: the life insurance business. He told my mom “I don’t want my kids to go the school and when asked what does your father do answer: ‘Sells liquor.’” He was hired by Prudential and assigned to establish the company’s first agency office in Arizona. The family--mom, dad, Jim, Susan, and me-- settled into an aged Packard and drove from Kansas City, MO, to Phoenix, Arizona. We arrived on New Year’s Day January 1943. Soon thereafter dad began to recruit and train new insurance salesmen.

In the evenings during dinner and afterward mom and dad would engage us, my younger brother and sister and I, in conversation. Dad often mentioned some managerial issues he was facing at the office. I suspect that this was more likely to help him to think through these issues than it was to get our input. One night, likely in 1946 or 1947, he raised an ethical issue concerning the training he and Prudential were giving his new agents. He had concluded that the present training program covered well the basics of life insurance and “Pru’s” offerings. It also did well on sales techniques and customer management. But he felt it came up short on establishing an agent’s social responsibility. Respected agents, in his experience, were entrusted with a substantial amount of information about a prospect’s or a policyholder’s life and lifestyle. They knew a great deal about their financial status and many other aspects of their client’s personal even private life. I am pretty sure dad did not stress terms like “ethics” or “privacy” at the time, but he emphasized his concern that each agent was responsible for holding each of his client’s personal information in confidence and should not disclose it to others without their consent. He had recently become aware of a violation of that norm by one of his agents and was very upset about it. He thought that what the agent had done by divulging private information was morally wrong and it was bad business.

That was one reason he thought that the issue of being a repository of private information ought to be a part of an agent's training.

At that time, I found that family conversation interesting but it had little continuing impact on me. I recalled it later as I began to think about issues of privacy and ethical responsibilities regarding the acquisition, holding, and dispensing of personal information that an organization collects. During my undergraduate years, I became more sensitized to ethical issues while at the same time I began to learn about computers and information processing.

In the Fall of 1952, I enrolled at Oregon State College (now University) on a football scholarship (we called it a “ride”) primarily intent on playing quarterback. I also wanted to get a useful education. Before I arrived on campus, I had not given much thought to a major or even in which school to enroll. During the first two weeks at OSC—football players reported several weeks before classes started—I learned about my options and decided to enroll in the School of Business and Technology (SB&T) believing that if nothing else it would help me get a job after I graduated. SB&T proved to be a propitious choice. I believe that OSC's was the only business school in the nation at the time that specifically had technology in its name. It was the brainchild of Dr. Clifford Maser who in 1942 had been appointed head of the then newly formed Division of Business and Industry at OSC. At the time Maser, then age 32, was the youngest dean of any school of business in America. Under his direction, in 1947 the school was renamed the School of Business and Technology (SB&T).

Maser was an expert in international business. He had worked on the problems of refugee settlement in postwar Europe and had become a leading authority on the threat of communism. He was also a strategist. Before he accepted the job, he conducted a personal strategic exercise during which he assessed the academic strengths and weaknesses of every one of OSC's departments and programs to determine how they might relate to the business school. Unsurprisingly, he concluded that the strengths of the college as a whole lay in its exceptional science and technology schools, their research record, and the programs they offered on campus. At the same time after reviewing several economic studies, he forecasted that American businesses would boom during the post-war period and that the country's businesses would need well-trained talent. In particular, he maintained that managers and employees would be challenged to meld their businesses with emerging technologies. Incidentally, Maser reached these conclusions a few years before the publication of the 1959 Gordon and Howell Report “Higher Education for Business.” That report together with a Carnegie Foundation report by Frank Pierson, radically changed business education in the U.S. and subsequently influenced education for business in many other countries. Among their other recommendations, these reports called for business schools to focus more on scientific research and to hire faculty trained in science, technology, and behavioral sciences. Based on his earlier strategic assessment Maser concluded that the management of technology would be central to the future success of most businesses. He devised a four-prong curriculum that incorporated: 1. OSC's required undergraduate curriculum such as English, writing, math, etc. 2. Traditional business courses such as accounting, finance, and marketing. 3. A technological minor requiring 6 one-quarter courses. 4. Four one-quarter courses in the social sciences. Technological minors available at the time included architecture, food technology, oil and gas geology, forestry, agriculture, as well as several offerings in the engineering school. Maser set out to recruit a faculty that met the needs of his vision. One was Dr. Lawrence (Larry) D. Coolidge[1]. His father was William D. Coolidge a physicist, inventor and one of the very first directors of the General Electric Research Laboratory considered to be the first industrial research facility in the U.S. Larry was able to get considerable materials from his father to use in a course. I believe the title was “Management of Science and Technology.” I audited the class and found Coolidge's knowledge and ideas about the management of science and technology stimulating and useful in the years to come.

Freshmen students took “Introduction to Business and Technology.” It was a very different introductory course and deviated significantly from the typical Intro. to Business course offered at most universities. It was conducted primarily by examining different industries running from steel making and automobiles to national retailing firms such as Sears and Montgomery Ward. The objective was to understand the role that technology played in these industries. Then, at the beginning of their sophomore year, SB&T students

[1] Larry left OSC in 1957 to become dean of the Leeds School of Business at University of Colorado. He served as dean 1957 to 1964 and became emeritus in 1983.

had to select a technology minor. I tried to schedule for special courses in operations research or computers but none of these were available at that time. I ended up taking a technical minor in mining and petroleum geology. The content of these courses, of course, pre-dated an understanding of the role that digital computers would eventually play as the driving technology for many businesses. It was for that reason that I subsequently tried to find out what the OSC campus as a whole had to offer in computers. It began with an “Aha.”

During my sophomore year at OSC I took one of the required courses in accounting. Sometime in early 1954, the class was given a “massive” practice set to complete. It contained numerous slips of paper describing transactions such as sales, purchases, transfers, etc. The task was to examine and post them individually to the appropriate ledger sheet. Then, I was to close the entries in those ledgers and eventually produce a Profit and Loss sheet and a Balance sheet. For me, the work was tedious and time consuming. I hollered out loud from my desk at the Sigma Nu house “There has got to be a better way than this!”

Shortly thereafter I encountered an article in a magazine (I think it was *TIME*) that contained a review of a relatively recent book *GIANT BRAINS, or Machines that Think* by Edmund C. Berkeley. Berkeley was an actuary at Prudential. After visiting Howard Akin at Harvard in 1942 and seeing the Mark I he became convinced that computers could be used to improve business operations. In August 1947 at Prudential he signed a contract with Eckert-Mauchly for one of the first UNIVAC computers and subsequently installed some of the very first business applications in the U.S. These included premium billing and dividend and commission calculations. I went to the OSC library to check it out. They did not have it in their collection but the librarian said she would order it and let me know when it arrived.

Several weeks later I got a notice that it had arrived. First published in 1949 *GIANT BRAINS* explained the principles behind the then rare “computing machines.” It also contained a technical but rather accessible summary of original research projects on computing that were underway at various institutions: MIT, Harvard, the Moore School at the University of Pennsylvania, Bell Laboratories, and a few other places. Berkeley makes a strong argument that by using computers the accuracy and efficiency of making required calculations in the insurance business is greatly improved. The book proved to be a handy compendium of the state-of-the-art on computers at the time. The book also energized my interest in computers, especially as they might affect businesses.

Since I had already established that there was very little if any research or teaching on computers or data processing in my school, I set about finding out about what efforts were being made on campus as a whole. It was 1954. There wasn’t much, but I was able to uncover a couple of helpful activities.
I discovered that the math department in conjunction with some electrical engineers in the School of Engineering had just received the parts for a disassembled ALWAC III-E computer and were in the process of putting it together on the top floor of Education Hall. (Appropriately, OSC’s first computer would be housed in its very first building: originally Agriculture Hall built in 1902.) The computer’s name was an acronym for Axel L. Wenner-Gren’s Automatic Computers. In 1954 it was Axel’s third version. The machine’s technology was similar to that of the IBM 650 and ElectroData’s Datatron. These machines were powered by vacuum tubes with a spinning magnetic drum memory. Being a first generation machine it came with no software. A major part of the team’s project was to develop useable software for it. An additional challenge was that the machine’s architecture was based on a hexadecimal system. The hexadecimal numeral system is a positional numeral system that represents numbers using a radix (base) of 16 rather than the more familiar base 10. The people from ALWAC argued that the “hex” system was more efficient for scientific computing. They may have been right, but I found it quite difficult to comprehend and dreaded my attempts to program it even for the simplistic programs. Much to my surprise, however, I discovered that one of the math majors on the project, Mary H., could actually *think* fluidly in hexadecimal. She helped me get through some rough spots. (Hex systems although effective in some limited areas have never become popular.)

I handled a few of the components as they were being assembled. For the most part, I merely tinkered, observed, and discussed. I did, however, pick up some valuable information by talking to the two representatives from ALWAC. The main plant for the company was located in Los Angeles near the corner of Crenshaw and El Segundo Boulevard. There was also a satellite in Newport Beach. In those early days, perhaps with the possible exception of Boston, Los Angeles was the hottest center for innovative computing. (Silicon Valley had yet to evolve.) Numerous innovators and entrepreneurs were coming up with new concepts and seeking funding. My informants had only recently joined ALWAC and they were talking about leaving for other opportunities soon. Things were that dynamic and fluid in the computer scene in LA at that time.

One of the companies they mentioned was ElectroData, a spin-off from Consolidated Electrodynamics Corporation in Pasadena. The company had just shipped its first computer, the Datatron 203, to the Jet Propulsion Labs in La Cañada (a suburb of Los Angeles). Several additional units were on order. ElectroData enjoyed early success. By 1956 it had become the third-largest computer manufacturer in the world. (IBM of course was number one. Univac second.) I made up my mind to explore possible opportunities at ElectroData. Meanwhile, I sought other ways to learn about computers.

Being a land grant school OSC had a leading edge agricultural research program. In 1953, building on this strength, the school established a new Department of Statistical Service and hired Dr. Lyle Calvin from North Carolina State University to run the Agricultural Experiment Station. In the field of applied agricultural statistics, NC State and Iowa State were considered the leaders at that time. In January 1956 I discovered that Dr. Calvin was offering a course in which students would be required to program a project on the IBM 650 computer. The 650 was a magnetic drum vacuum tube data processing machine of a similar design to the Alwac and the Datatron. Between 1954 when it was released and 1959 when it had, for the most part, became obsolete, the 650 was the most popular computer in the world. This success was due largely to IBM's vaunted marketing and service infrastructure.

I went to Dr. Calvin's office and asked if I could enroll in his course. It turned out that it was a graduate course with only 7 students enrolled. Three were PhD students hoping that they could write applications on the 650 to do statistical analysis for their dissertation research. Looking me directly in the eye, Calvin maintained that the content of the course was quite advanced (inferring that I could not handle it). The primary text was Sir Ronald Fisher's classic *Design of Experiments* first published in 1935 in London by Oliver & Boyd. *Design* is still regarded as a foundational work in experimental design. I asked if I could audit the course. Dr. Calvin responded that he thought that this course was too advanced for an undergraduate "business" student and that moreover, he did not intend to conduct classes in which some of the students were unable to keep up with the material. I told him that I was deeply interested in computers and that I had completed two one-quarter courses in statistics in SB&T with Byron Newton. Newton was one of the finest and clearest lecturers on statistics in my experience. This includes taking advanced courses from nationally recognized faculty at U.C. Berkeley. During the first class, I took Newton stressed the point that "No statistic should ever be considered by itself. One should always ask 'compared to what?'" This I learned many years later is called the "reference class problem." It is crucial for drawing meaningful conclusions from statistics. On the lighter side Newton, acknowledging that I was a football player, made a comparison that I have used many times over as an academic administrator. He once told me, "Football is the best taught class in the university. First the teacher (coach) gets to recruit and select the very best students. Then, the teacher conducts an educational session for an hour or more at the same time every afternoon during the week. Then on Saturday all of the students are given an exam. If the students fail too many exams the teacher is fired!"

Calvin knew and had good things to say about Newton, but was still unimpressed by my credentials. So, I pleaded my case again. Finally, he said, "I don't take auditors. You must sign up for the class for credit. You must take all of the exams and complete all of the exercises. If you fail one, I will give you an "F" in the course." I think he thought that would scare me off. Nevertheless, with some trepidation, I enrolled.

There were three PhDs and four masters students in the class and me. It was conducted in a seminar room with individual chairs but no table except for a small one on which Calvin kept his notes. The PhD students moved the chairs so that they could sit together on one side of the room, the masters on the other. I sat alone in the middle. I found the class to be heady and challenging. I studied much harder for this class than any other I had taken. Calvin covered only about a third of Fisher's book, focusing primarily on chapters IV, V, and VI. Those chapters deal directly with the design of agriculture experiments. Calvin started the class, however, with Fisher's famous scenario entitled: "Principles of Experimentation, Illustrated by a Psycho-Physical Experiment." The text begins, "A LADY declares that by tasting a cup of tea made with milk she can discriminate whether the milk or the tea infusion was first added to the cup (p. 11)." The text goes on to consider the problem of designing an experiment by means of which the tea with milk assertion—and hence others like it—could be tested. Fisher covers the concept of statistical tests of significance and follows up with his innovation: the "null hypothesis" (HO).

The purpose of an HO is to provide direction for a research project. Significantly, however, it serves to separate the test from the investigator's values and decisions. It is then drawn on to prove whether or not the HO is supported. Ideally, an HO states the exact opposite of what an investigator or an experimenter predicts or expects to find. A successful research project often rejects the HO in favor of an alternative hypothesis. Hence, Calvin argued that there is an ethical as well as scientific reason for proposing and testing an HO for any research project relying on statistics. Ethics is required to give the right direction to a research project so that the analysis is objective and reflects the truth. I had never thought deeply about these possible ethical implications before. The null hypothesis concept, so engrained in graduate students today, was only slightly familiar to me at the time. I have drawn on both the technical and the moral aspects of that lesson in the application of statistics throughout my career.

C. West Churchman, my PhD advisor at U.C Berkeley, later would expand on both the moral and scientific aspects of this approach to statistics. He told the story of the first class he took in philosophy at the University of Pennsylvania. Thomas Cowan, then a teaching assistant for Edger A. Singer (Singer was William James' last PhD student at Harvard) began the class by claiming, "There is no difference between science and ethics. We will spend the rest of the semester examining this proposition." The core of his point was that doing science properly requires ethics. Doing ethics well requires a comparison: "What is" the factual basis deriving from fact finding against moral principles relating "What ought to be."

But to learn statistics or consider their ethical implications was not why I had enrolled in Calvin's course. We were also given a basic workbook on programming the IBM 650. Announced in 1953 and first installed in late 1954 the 650 was an early Magnetic Drum Data-Processing Machine. For the next five years—due in large part to IBM's effective marketing—the 650 was the most popular computer available in the world. In January 1956, unfortunately, it was programmed almost exclusively in machine language. Programming the 650 in machine language proved to be an infuriatingly tedious chore. The assembly language SOAP 650 (Symbolic Optimal Assembly Program) may have been available at the time but we were unaware of it.[2] There were no compliers and few if any other programming aids commercially available in those days. Those tools would come a few years later.[3]. Consequently, we had to program our projects in machine language. A 650 machine language program consisted of a series of instructions each of which required a sequence of ten digits: a 2-digit operation code, a 4-digit operand address, and the 4-digit address for the next instruction to be executed. All of this had to be specified and written by hand. For example, the opcode for an add instruction was 10. An add instruction, one of the fastest on the 650, took about 0.4 of a millisecond. Meager by today's standards but it seemed terribly fast at the time. The PhD students programmed statistical routines that they intended to use for their dissertation research projects. I am not sure what the master's students attempted. I undertook programming the simplest statistical technique I could find for which a data set was readily available. It involved some elementary correlation analysis.

About midway through the academic quarter on a Saturday morning all of the members of our class packed up our programs and drove—in the rain as it turns out—from Corvallis to Portland (about 85 miles). We all had converted our handwritten programs to 80-column punch cards. The 650 was located in the IBM office on Broadway Street at the corner of Elm. It was housed in a "glass case" room situated prominently on the corner so that passersby could see and marvel at it. It was the first electronic computer in the state of Oregon and, allegedly with the exception of Boeing in Seattle, the first serving Washington state as well. The central machine ("mainframe") itself was placed on a false floor in the middle of the room and was canted slightly to the right so that it was more visible to people walking by on Broadway. The false floor platform was raised about a foot above the concrete floor so that numerous cables connecting ancillary equipment to the mainframe could be hidden and to make the floor safer for operators to traverse. IBM implemented runtime allotments. Our class was scheduled for just a one-hour block from (as I recall) 12:15pm to 1:15pm. Other service bureau[4] customers used the 650 before us and quite a few waiting in line behind us.

[2] An assembly language makes programming more efficient. Each line of text consists of a single machine instruction. It uses a mnemonic—called an "opcode"-- to represent each desired operation. For example, the word "Add" instructs the machine of engage in an addition operation.
[3] Fortran—FORMula TRANslator—was first written in 1954 but not released commercially until 1957. Fortran was not available for the 650 until 1960. SOAP II was released in 1957
[4] A service bureau typically would sell time to users on a computer that was relatively powerful at the time. It can be viewed as a precursor to some kinds of outsourcing and cloud computing.

Prior to our allotted time, we were given access in the IBM offices to keypunch machines and a printer so that we could make last minute changes. Finally, our runtime arrived. (As was typical, our predecessors ran a little late.) We each placed our batch of program cards in the reader. As each batch was being read the lights on the 650 began blinking. It was surprisingly exciting. Almost like it was thinking. The first in line was one of the PhD students. He got error messages indicating that his program had one or more errors and would not work. The second in line got the same result. I was one of the last of 8 and I got the same result. In fact, not one of our programs worked! Our time expired. (We, too, bled a little into our successors time allocation.) It was a dejected group that drove back to Corvallis that afternoon. Moreover, it was still raining.

During the following week, we all studied our printouts and error sheets and made corrections. A new batch of program cards was punched. The next Saturday we drove again to the IBM office in Portland. This time four or five of our group's programs worked. I had to make a couple of online corrections, but eventually, I was among those whose program was successful. The experience was an important lesson on the humility of programming. That lesson has stayed with me over the years. I passed all of Dr. Calvin's exams and got a passing grade in the course. It turned out that he was a wonderful person and was very helpful to me as I decided what to do after I graduated.

One career possibility that intrigued me at the time was the Bank of America's ERMA project. During the post-war expansion—a period between 1943 and 1952—bank check use in the U.S. had doubled from about four billion checks per year to over eight billion checks. That volume was projected to grow even faster. The Bank of America would be especially affected as California's economy expanded. Bank of America's president S. Clark Beise, who had personally been recruited to be his successor by founder A. P. Giannini, foresaw a massive problem confronting the bank as it tried to process this increased volume. Consequently, when associates of the Stanford Research Institute (SRI) approached him in the early 1950s about funding the development of a prototype bank-oriented computer he was quite interested. Then in mid-November 1950, Bank of America awarded SRI $15,000 to be spent over six months to develop a complete proposal for creating a bank automation system. The project ultimately resulted in ERMA—Electronic Recording Machine Accounting. It also developed a more efficient input source: MICR, Magnetic Ink Character Recognition. At about the same time Bank of America also initiated an IBM 702 computer project devoted to bank accounting and credit card operations, making the bank an early originator of business applications. Beise appointed Al Zipf, Bank of America's leading operations expert at the time, to be responsible for overseeing and critiquing the project. (Zipf became a forerunner of what today is called the Chief Information Officer, CIO.)

I first learned about these events sometime in the spring of 1955 when it was announced that the computer's basic design was complete and that Thursday, September 22, 1955, had been designated to be ERMA Day. With its design in hand, Bank of America now had the task of selecting a qualified computer manufacturer. I learned that Burroughs had submitted a proposal but it did not survive the first round due to its excessive cost. The four finalists were IBM, RCA, Texas Instruments, and General Electric. GE eventually got the contract to build ERMA. Meanwhile, I obtained contact information for a person who was familiar with Bank of America and the project. He told me about Zipf. I called Zipf's office at Bank of America. I wanted to explore a career opportunity. When I finally reached Zipf's office I talked to an assistant who was polite but said that they were looking for experienced engineers and veteran bank operations personnel. I then got in contact with someone at RCA but to no avail. One of the fellows I met from ALWAC had given me the name of Charlie Asmus at GE. I eventually got in touch with Asmus. He told me that GE was starting a new computer division in Phoenix, but that he didn't have any openings at this time for new hires. (Asmus became rather famous as one of the early gurus of business computing.) Although I was rather frustrated at not landing a job with any of these computer innovators I was still captivated by the promise of computers. It was a heady time. Thomas Morrin, Director of Engineering at SRI who made the first proposal to Beise, summed up the importance of ERMA: "ERMA was the absolute beginning of the mechanization of business." That was a little self-serving but close to being true.

Not connecting with either Bank of America or GE I followed up on the ALWAC guy's suggestions about ElectroData. I ended up talking to Jack Stalley who at the time headed up Marketing for ElectroData. He expressed interest in my joining the firm but said it was premature because the company was involved in merger negations. It turns out that Burroughs merged with ElectroData early in 1956. Having had several interviews with Hugh Flynn Burroughs branch manager in Portland, in a sense, I now had two opportunities for the price of one. That greatly influenced my decision to join Burroughs. (The research I did on banking automation in search of a job proved to be quite useful later when I was assigned to be a bank automation specialist for Burroughs.)

That is about where my knowledge of computers and the computer industry stood when I graduated from OSC in 1956. I had, however, previously been exposed to a little bit more about ethics.

The curriculum of the School of B&T required that students take four one-quarter courses in the social sciences. For my fall program in 1954, I needed such a class. I had already taken an introductory course in psychology. Since I had football practice every afternoon I strongly preferred an 8:00am class. The one being offered that quarter that most interested me was "Introduction to Ethics." So, I enrolled. It turned out to be another propitious decision with long-term career implications. Our instructor was a recent PhD graduate in philosophy from the University of Oregon. He was extremely enthusiastic about ethics both as a philosophical discipline and for practical day-to-day decision making. His first class centered around two discussion questions, "What does it mean to say that something or someone is *good*?" Followed later by, "What are the principles one should use in attempting to do what is *right* and avoid doing what is wrong?" These questions dealing with the right and the good were rather daunting but intriguing. As far as I could tell I was just one of two or three business students in the class. The other class members came from a wide variety of other disciplines and schools. Students interested in the humanities tended to be the most comfortable engaging in ethics dialogue. I was generally hesitant. As soon as the first student ventured to say something, however, most of the rest of us felt a little more comfortable chiming in. The professor closed that first class by saying that we would be studying the approaches to ethics that various ethical philosophers had come up with in their efforts to address questions like those we had just been informally exploring that day. He warned us that some of the readings would be difficult but sloshing through them would have a payoff. I indeed had difficulty with several of the readings, especially Kant. But during class sessions, he was often able to offer some real-life examples in contrast to some of the turgid passages we had read.

That was my introduction to formal ethics. I realized that I had also been exposed to "day-to-day" ethics. I recalled some of my earlier experiences at home. As dad from time to time over his morning coffee during our before-school discussion sessions or our family discussions over or after dinner was wont to do posed practical ethical questions most of which came up in his daily business. He would espouse principles such as "It is important to always tell the truth." Mom was especially strong on truth telling. She could ferret out the least little fib any one of us told. Another principle was, "Treat people fairly." Dad, however, did not engage very much if at all in theories. The ethics course awakened me to the possibility that one could address a moral dilemma in a more systemic way. Later in life, that understanding played an important part in my career both in addressing ethical issues occasioned by information systems and as the director of the Maguire Center for Ethics at SMU.

Just before I graduated, I happened to run into my ethics professor on campus. He asked me what I intended to do after I graduated. I said I planned to go into the computer industry. He responded "Good! You will encounter many ethical issues there!" He proved to be right—more than perhaps he appreciated at the time —but it took me some time to fully realize it.

I joined Burroughs Corp. in Portland, Oregon, in June 1956 about the same time that the ElectroData merger with Burroughs was completed. But the Burroughs office in Portland had yet to incorporate the computer line. Moreover, I had another obligation to deal with. Having been in ROTC[5] I was committed to going on active duty for six months from mid-January to mid-June 1957. So, Hugh Flynn devised a training program for me to take before I had to report to the Army. My program covered learning about most of the full line of Burroughs business equipment beginning with adding machines on up. I was also sent out in the field to call on business leaders and try to inform them about Burrough's offerings. I estimate that I visited and met with people in more than 100 Portland area businesses during that time.

Then in January 1957, I attended the Army Finance School at Fort Benjamin Harrison, Indiana. There, I became instructed in the new Army Command Management Accounting System the first application of

[5] The Reserve Officers Training Corps a group of college based officer training programs for developing commissioned officers of the United States Armed Forces.

Generally Accepted Accounting Principles (GAAP) to the military. Upon completion, I was assigned to the Finance and Accounting Center at Fort Lewis, Washington. When I arrived, I reported for duty at the base Finance Center and met with the Colonel in charge. His office was rather stylish by regular army standards. I noted that behind his desk was a huge aerial photo. On closer examination, it was not of some military engagement but rather of fishing holes in southwest Washington State. The Colonel was congenial and told me that he would try to find a detached pay station for me to manage, given that I only had about four months left in my tour of duty. That was a typical assignment for a recently commissioned second lieutenant. I mentioned that while I was waiting to see him, I overheard a conversation about a new computer and saw some equipment being carried in. He said, “Yes. We are one of the pilot installations for a new Univac computer that will eventually be installed Army-wide.” Somewhat overstating my credentials, I told him that I was with Burroughs and was familiar with computers and that among other things I had written a program for the IBM 650. He said, “Great. I have been looking for personnel who could help with the installation and develop the initial applications.” He called in another second lieutenant and introduced me to him. He too was a “six-month wonder.” Prior to reporting for duty he had just completed a Harvard Business School MBA. At Fort Lewis, he oversaw the preparation for the rooms where the computer and the related facilities were installed. His tour would be complete in about a week so this became a kind of “passing the baton” event. His accomplishments included installing keypunch machines in a separate room for input preparation and beginning a training program for the keypunch personnel. He showed me through the entire operations floor and introduced me to a couple of the staff. Then we went for a late lunch at the Officer’s Club. The next morning, I sat down with the representatives from the Seattle Remington Rand Univac office to be briefed on the computer, the applications they envisioned, and where we stood in the installation at that time.

At first, I was disappointed. The UNIVAC being installed was not the UNIVAC 1 of census fame. It was instead a newly named Univac 120. Previously the Sperry Corp. had acquired Remington Rand which, in 1951, acquired UNIVAC. These acquisitions were taken largely to compete with IBM. The new line had been named to draw on the UNIVAC cachet. The 120 had evolved from the Remington Rand 409. In 1949 Remington Rand designed the 409 and claimed it to be the world’s first business computer. (It likely wasn’t the first—think LEO[6]—but it was close.) Having been updated, it was sold later as the UNIVAC 60, 60 being the number of decimal digits it could read from each punched card, and also as the UNIVAC 120, with 120 readable digits. The 120 did have a claim in history. It was the first computer used by the U.S Internal Revenue Service and also the first computer installed in Japan. The 120 had a programmable unit for arithmetic and logic operations but a wired control panel for input and output operations. It was, hence, a transitional computer: it was more programmable and powerful than a conventional punch card calculator but short of a full-blown digital computer. Released in 1953 the 120 was arguably the most powerful commercial computing system available prior to mainframe digital computers like the IBM 650. But it was unwieldy. Just to physically install it was a challenge. The 120 weighed over 3000lbs. Despite my disappointment, I decided that I could learn the basics of computer programming and systems design by using the 120. So, with a little hesitancy, I took on the assignment.

The first application we implemented was accounts payable. Previously the payables app had been performed on relatively old mechanical bookkeeping machines with some manual handling of exceptional transactions. The application was straightforward. In summary: Invoices were received for goods or services supplied to the Fort every day arriving at approximately five detached finance centers and at the main office. These were stamped and approved by the receiving party and transmitted to the main office. The volume of transactions ranged from 100s to 1000s a day. Then, the invoices were submitted to the keypunch department. The 120 used 90 column punch cards versus the IBM 80 which used a column card and had round instead of rectangular holes. My predecessor had proposed a preliminary design of the input card for the payables application. However, we found that there were several contingencies that he had not taken into account. I met with our team and we talked through the system, recording thoughts on a flip chart, and eventually came up with a modified design for the input card. We also designed the accounting reports and the inputs to the check-writing program. Early on we produced a flow chart of the application. Then one of our programmers with the aid of a Remington Rand tech rep began writing the program. I met with him multiple times a day to talk through the details and address any problems. Within

[6] LEO is an acronym for Lyons Electronic Office. It was developed by the popular tea-and-cake company that “seemed to be an indelible part of London life” beginning in 1949. See *LEO: The Incredible Story of the World’s First Business Computer* (McGraw-Hill 1998.)

about three or four weeks an initial version of the program had been completed and tested. After detecting and eliminating several bugs it passed the initial dry run. This, it turns out, was when the hard part began.

In reading about the history of computers I learned about Charles Babbage's Analytical Engine, built in the 19^{th} century and generally regarded as the first computer. Later in life, reflecting on his experience with his innovations in computing, Babbage reflected, "On two occasions I have been asked, 'Pray, Mr. Babbage, if you put into the machine wrong figures, will the right answers come out?' . . . . .I am not able rightly to apprehend the kind of confusion of ideas that could provoke such a question." All of Babbage's successors, however, have had to cope with that "kind of confusion." Computer scientists now call it GIGO, garbage in, garbage out. It states the obvious conclusion that if one inputs flawed, nonsensical, or erroneous data the output will inevitably be nonsense, i.e., "garbage," as well. I did not know about the garbage phrase at the time—it reportedly was coined on November 10, 1957, in a story about an Army Specialist named William Mellin. Nevertheless, it captures well the most difficult problem I faced in getting the new accounts payable system to work.

Most of the invoices we received were printed or written on paper of different sizes and shapes. Fort Lewis is a sprawling Army base. It encompasses about 87,000 acres and served as the home of the 2th Infantry Division, 7^{th} Infantry Division, 593^{rd} Expeditionary Sustainment Command and numerous other units.

First built in 1917 the Fort was constructed as a "city" consisting originally of 757 buildings and 422 other structures, all lighted and heated for 60,000 men. It had expanded considerably since then. Consequently, our office was receiving invoices of various types from multiple points throughout the base's expanse, and under various conditions.

To describe just one source, at Fort Lewis an Armored Force unit had a field office manned primarily by privates none of whom considered handling paper their primary concern. Some papers coming from that unit were crinkled, torn, blotted, or worse. Some of the sheets did not contain all of the information required to adequately describe the transaction. Almost on a daily basis, our keypunch unit would receive a disheveled and variegated batch of documents. All of the elements of this motley batch had to be flattened out and interpreted before the input process could begin.

Sometimes, staff would have to phone the submitting office and request more specific information. If they were unable to obtain the necessary information the documents were sent back. One day one of the clerks came into my office obviously agitated. She laid a stack of disorderly documents on my desk and said something like: "I have had it with this unit!" I looked over the stack. Many of the documents contained difficult-to-read information. Some were unreadable. She said that this batch had been sent back to the initiating unit saying that these documents needed to be cleaned up so as to be readable and they should be checked to be sure that they contained all of the necessary information. That unit had just robotically sent the batch back saying something like "These are the documents we have." She had called their office complaining that this batch could not be processed "as is." Someone apparently said something like "These are the documents we have. It's your problem."

Upon hearing this I sent the batch back with a note explaining the importance of accuracy, completeness and readability. Soon thereafter I received a scathing phone call from the Captain in charge. He ripped me up one side and down the other for being so disrespectful as to question his command. He told me that he had looked up my record, that he knew that I was to muster out in a couple of months, and that if I was to be processed out by his office, he would see to it that my papers were delayed and that my pay withheld. I went to my commanding Colonel and explained my predicament. He laughed! Then he explained that the Capitan was a West Point Graduate who had recently been passed over for promotion. He was angry at the system. He gave me the name of someone in the unit to contact about fixing the nonconforming batch. I did. It was fixed. Subsequently, that office's batches were in much better shape.

Luckily, my orders specified a unit other than the Captain's at which to appear at midnight to be discharged. Parenthetically, due to severe budget constraints, the armor unit could not purchase any additional gasoline beyond the safety stock needed in case the unit was activated. Consequently, every day for months crews dutifully ran to their tanks, jumped in, and seriously play-acted battle conditions.

I had anticipated—or perhaps hoped—that my major challenge and learning opportunity would be developing computer-based programs. Overall, by spending several months learning about and working with the technology I did in fact grow in knowledge and in confidence, not only by directing the installation of a new system but also by interacting with representatives for Univac, from other Army units and various others from industry who came to view the installation. Often our conversations over lunch at the Officer's Club were wide-ranging about the industry and who was doing what. For example, what new developments were in the pipeline? At a less lofty level from my day-to-day experience, my main takeaway was that one had to manage the entire system from its very first elementary inputs through each processing phase and so on and including the final reports, files, and databases. This was as much a social, psychological, organizational, and cultural undertaking—and perhaps ethical—undertaking as it was technological. Among other things, a computer-based system installed in the Army had to reflect the Army culture. This insight was among those that attracted me to the field of Socio-Technical Systems some years later when I joined UCLA.

Towards the end of August, 1957, I mustered out unscathed and returned to Portland. I learned that the previous June a Burroughs Datatron 205 computer had been delivered to the Pacific Power & Light Company in Portland. The location was just a few blocks walking distance from our offices. PP&L was the first utility in the West to convert its customer accounting and billing to an electronic computer system. Eventually, the system was also used for payroll, stockholders' records, sales analyses, rate analyses, and for solving engineering and scientific problems. Due to its being the first, several representatives of power and light utilities from various parts of the country came to visit the installation.

First shipped in 1954 the Burroughs Datatron 205 was of the same technological genre as the IBM 650. It employed decimal electronic vacuum tubes for processing. Data was stored on and accessed from a magnetic drum that served as main memory. The drum contained 4000 words of main memory and revolved at 3570 RPM. To this capacity, however, the designers had added four quick access bands of 20 words each. That unique adaptation provided access that was 10 times faster than that of the main drum. Clever programmers could design programs with "block moves" to any of these four quick access tracks. By taking advantage of this feature programmers were able to achieve a much faster rate of processing than was possible on other drum based computers, including the 650.

Flynn told me that a newly hired former UNIVAC representative, George Etsell would be overseeing the PP&L installation. He would visit frequently from his office in Seattle. I was to work with him while I was preparing to become a Computer Specialist, a new job description recently created by Burroughs. Consequently, I was to have a dual reporting relationship. I would be housed at the Portland office and report to Flynn but I was also attached to the newly created Computer section in the San Francisco office. The ElectoData division had also assigned Ken a full-time "tech rep" to work at the PP&L installation. Under the direction of Etsell this rep was to provide training and consulting to the PP&L staff working on the project. Although some tech reps ended up doing some programming and considerable troubleshooting it was Burroughs' basic philosophy that providing that service was an exception. Their primary responsibility was to build up as much capacity in the customer's team as possible. In addition to the onsite rep, one or more other technical specialists would fly in as needed from the San Francisco office to provide specialized training and consulting to the PP&L systems group. Among these visiting tech reps, two stood out.

One was given the nickname "Stealth." I can't recall his real name. Usually, when a rep was coming to town, we would receive his itinerary ahead of time. Meet him at the airport or have him take a cab to the office. Arrange for hotel accommodations. Plan to take him to PP&L offices and introduce him to the staff with whom he would be working. Stealth did none of this. He knew when he was supposed to talk on a particular day, in the first case at 1:00 pm, and then just show up. For his first anticipated visit to PP&L I arrived early prepared to make excuses in case he did not show. I had never met him but had been warned that he wore tight pants, a shirt with flowers on it, a light tan sports jacket, and upscale tennis shoes. So, I recognized him immediately when he walked in about a minute before 1:00pm. Without saying anything he walked to the front of the room, examined two flip-charts, turned to the audience and introduced himself. He then gave a lucid and entertaining talk about the programming structure of the B205 and explained some tricks of the programming trade. The programmers in training were captivated, as was I. When he completed his presentation, he took a few questions and dealt with them with alacrity.

The “class” gave him a round of applause (rare in my experience with programming presentations). I was standing at the back of the room. He walked by and nodded to me and said something like “Good group.” He said he had to go now and disappeared. I never saw him again until a few weeks later when he followed the same mysterious routine.

His supervisor was Vaughn Beard. I called Vaughn and told him that Stealth was a hit but the experience was really weird. Vaughn chuckled and said that Stealth was the brightest most effective programmer he had ever encountered but that his behavior was “unusual.” He then told me how he got his nickname. Stealth would be assigned a major programming project and then he would disappear. No one knew where he was or how to get ahold of him. They knew he was alive because when paychecks were put in his office mailbox, they would be gone the next morning. If Vaughn had a consulting or teaching assignment for him, he left a note with instructions with a specific secretary. Somehow that secretary and Stealth got in touch with each other. One of the other tech reps noted this behavior and called it “Stealth.” The name stuck. IBM would never abide such behavior nor would Burroughs a year or so later.

Stealth was an extreme example of a cultural clash that emerged within business equipment companies as they began their transition into computer marketing, installation and support. The prevailing culture of companies like Burroughs, IBM, NCR, and the like tended toward *The Organization Man*, as described by William Whyte in his 1956 book by that name. Whyte, a former Fortune writer based his theory on extensive interviews with corporate executives. Those interviews revealed that employee commitment and loyalty were fundamental values in corporate culture during that era. They were characterized more by a collectivist ethic than by “rugged individualism.” The Merriam-Webster dictionary defines rugged individualism (RI) as “the practice or advocacy of individualism in social and economic relations emphasizing personal liberty and independence, self-reliance, resourcefulness, self-direction of the individual, and free competition in enterprise.” In my experience, virtually all of the technical personnel—systems analysts, programmers, etc.—for the computer marketing companies and in universities etc. during that era tended to be RIs. Their technical knowledge was absolutely required for a computer installation to reach its promise but most executives and most companies found that they had to manage these people differently.

Vaughn Beard understood this distinction and was effective in managing a diverse set of individualistic tech reps. He served as an effective buffer between the more classical managers and the more idiosyncratic technical personnel. A few years earlier Vaughn had been a computer expert with SRI in some capacity. When Bank of America’s ERMA was conceived he became a member of its initial programming and technical staff. He recounted the thrill but profound uncertainty that he and his colleagues experienced when they first assembled in a basement room at the Bank of America offices in San Francisco at the corner of Market Street and Van Ness. The walls were blank, the sheets of paper in front of them were blank, and they had a stack of SRI technical manuals set in the middle of the large conference table around which they met. Their challenge was to write the first demand deposit application for a digital computer. Actually, it was to be one of the first business applications of any kind on any computer. Each of the room’s four walls contained a blackboard with trays for chalk and erasers. First, they laid out a flow chart of the application. Then they started assigning ERMA computer instructions to each step. One instruction step might have gone something like this: the computer reads an account number from a check, it locates that account’s record, accesses the amount of the check, accesses the balance for the account, etc. All spelled out in detailed and precise terms. Beise and Zipf had emphasized that the program must be error-free—accuracy was crucial—else customers and bankers would lose confidence in the new system. As each programmer detailed a step on the blackboard the others critiqued it, sometimes initiating a lively debate. Every step was checked and rechecked. Vaughn said that the process while thrilling and was terribly exhausting. This process went on for several weeks until finally everyone agreed that the program flowchart and instruction set met all of the requirements of the application. They were pleased and breathed an air of relief...for a short while. As the team turned to implement their program, they discovered that it was larger than the storage capacity of the two magnetic drums of ERMA. Then the team had to engage in its most excruciating task. They sat in their swivel chairs and carefully examined each step and each detailed sequence. Then one of them would jump up, run to the board and say something like “if we do this instead of that we can reduce the program by one instruction.” If everyone agreed the old instructions would be crossed out and the new replace them. They kept note of the changes because they were also in the process of developing a theory of programming. They kept repeating this strike and replace process. I can’t recall how many instructions they had to save or how many days and nights they had to work to complete an operational program but I do know they were under considerable pressure. But they succeeded! According to an SRI ERMA History, on September 14, 1955:

> *SRI gave a public and press demonstration of the prototype electronic accounting machine, by then designated ERMA (for Electronic Recording Method of Accounting). Its performance proved the soundness of the concepts and workability of the electrical and mechanical elements*. (SRI ERMA History)

Vaughn maintained that people who were effective at systems analysis, understanding technical design, and detailed programming were of a different ilk than the more traditional managers, administrators, and sales personnel. They “beat to a different drummer” and required different “care and feeding.” That was the case with Stealth and numerous other “tech reps” with whom I worked during my time at Burroughs. It was also true of George Etsell. He had been a humanities and math major. He had an intellectual flair and an almost hippie style that was quite different from a typical businessperson. He tended to talk about our computer products in esoteric terms. Some people were impressed. Some were not. One day a secretary in the Portland office who supported us called me over to talk. We went into a conference room. She laid out on the table a large raft of long-distance telephone bills, the total far exceeding our budget. I knew that I had made a few calls to San Francisco, at least one to Detroit, and a couple to potential customers in Idaho. The sum total of my calls came nothing close to the total bill. After some investigation, we learned that virtually every time that George came into our office, he almost immediately placed a call to Miami, Florida. The calls would typically last 20 to 30 minutes. I knew of no business we had in Florida. After some probing, we found out that George had a friend—a former UNIVAC representative—who had accepted a job heading up a new computer installation for a company located in Miami. At UNIVAC they had begun a series of chess matches. Now they were playing remotely. That was the main reason that every one of George’s visits to Portland resulted in several long-distance calls. (He had other friends in other parts of the country as well whom he called.) Flynn met with him and he stopped the practice. In discussions with other people in our industry, I found that this type of behavior was somewhat typical of new computer sales and technical personnel, especially those who joined any of the seven dwarf companies. It was less true of IBM but they too struggled with how to merge these different personalities given their more “Organization Man” culture.

Donald C. Frisbee was the executive that PP&L who was put in charge of the B205 installation. He became the first executive I worked with whom I would now call a “maestro of technology.” (Arthur Squires, a chemical engineer who worked on the Manhattan Project, coined the term to describe executives who understand the technology and how it affects the organization and serve as an intermediary between chief executives and the technical leaders and team members.) Don, a veteran, and a Harvard MBA, had joined the company as a financial analyst in 1954. When the decision was made to acquire the B205; the company’s top executives had given him the responsibly of managing the project. Don was not only analytical he was also gregarious, engaging in conversations with everybody associated with the project. In the process, he not only got to know all of the parties involved he also learned a lot about PP&L, its systems and its technological structure. While George was nominally in charge, I called on the account frequently and followed up during the times when he was back in Seattle. One day early during the installation we were installing a new high-speed punched paper tape reader. Rather than keypunch meter reading data into 80-column punch cards we had the data punched into a roll of paper tape. Don asked me how it was going and I said something like “Fine.” I explained that a set of transactions from the field would be punched into paper tape and then read into the computer at a much higher rate than by punched card reader. He already knew that. What he wanted to know was how the original input from meter readers in the field was being validated and protected. Historically meter readers had carried a small black book for each route they traveled. The book contained the customer name, number, meter number, address, and other identification and location information. The readers entered the current meter recording in the book. From there it was entered into the billing process. Importantly, the book contained site-specific practical information such as where on the property the meter or meters were located, if there were any gates or locks that had to be opened, and if there were any threats such as mad dogs (or people) present. The few meter reader books I had examined were somewhat grimy from having been carried out in the field—frequently in the Oregon rain. They also contained many doodles and codes that only a field person could understand. The book, hence, contained information that was highly valuable for field workers. With the new system, the pocket-sized book would be replaced by cards and/or slips that served as the sources of input. Initially, the change was confusing. Frisbee was deeply concerned about the morale of the meter readers. “They are our front line.” If they were disgruntled, unmotivated, or inattentive it would not only result in errors but also in a deeper issue of commitment and performance. He viewed the B205 project as a total organizational systems undertaking and potentially a strategic asset. He managed it from that point of view. He was the first executive I encountered who excelled in this role, one that in 1981 William Synnot and William Gruber would call the "Chief Information Officer" (CIO). Al Ziff also did, but I only knew him from afar.

Don Frisbee was to go on to have an illustrious career at PP&L and become a stalwart in the Portland community. In summary Don's obituary written in 2015 reads:

> *. . . he developed his corporate leadership practices and vision 'to create an atmosphere where each employee recognizes how he/she can make a difference and is motivated to make a difference.' He rose through the ranks and served PacifiCorp [PP&L's successor] as President, CEO, Chairman of the Board and Chairman Emeritus retiring in 1997*.

Once major applications were working satisfactorily PP&L found that it had excess time on the B205. An enterprising intellectual from the Bay Area named Floyd Campbell moved to Portland and convinced Frisbee he could run a service bureau by buying time from the B205 and compete with the IBM 650 service bureau. Campbell started one of the first mainframe computer-based independent (from IBM) service bureaus in the country, several years before Ross Perot started Electronic Data Services in 1962. It was successful for several years. George Etsell and I moonlighted a project for the Portland Savings and Trust Bank to perform the bank's end of the year interest calculations on PP&L's 205 through Campbell's organization. It took us all of a Saturday afternoon and most of Sunday to complete the job, primarily because of bugs in our rickety programming style. But we did complete and balance it. At least the bank's comptroller was pleased.

A few months later I became a "Bank Automation Specialist" and called on large banks such as First National of Oregon and U.S. National of Oregon. In both cases, I was trying to encourage them to get rid of their current inventory of paper checks, deposit slips, and accounting sheets and to print and replace them with new checks and deposit slips with routing and account information encoded on them with the newly developed Magnetic Ink Character Recognition (MICR) font—that was a necessary requirement nationwide if bank automation was to work. My next task was to encourage them to buy Burroughs systems like the newly released B220 computer for bank automation, together with MICR sorter-readers and proof encoding machines. I prepared and presented, with home office help, major bank automation proposals to U.S. National Bank and First National Bank of Oregon. I lost both contracts to IBM.

For banks that did not generate enough volume to justify a computer installation I also had responsibility for selling a transitional technology called the Sensitronic. It was a bank oriented electromechanical machine that could store balances on a magnetic strip affixed to the back of an account ledger card. As an operator inserted a customer's ledger card into the machine's carriage the previous balance was automatically read and the ledger aligned to its next printing position. The operator then keyed in the amounts of checks, deposits and other transactions. The updated balance was written on the magnetic strip for future processing as the ledger card was automatically ejected. At the time the Sensitronic was especially economical for medium sized or somewhat smaller banks for processing demand deposit accounting. It improved the productivity of posting demand deposit transactions by about 20% over Burroughs and other previous electro-mechanical machines. After several calls and demonstrations, I ended up selling and installing 5 Sensitronics at the Portland Trust and Savings Bank (PT&S).

PT&S was a comparatively small community bank founded in 1887. The Chairman of the Board was Charles Frances Adams Jr. a descendent of the famous Massachusetts Adams family of early American history. After I was told that the Board had tentatively approved the purchase, I got a call from Mr. Adams. I had seen him at the bank several times before but had never talked to him much beyond pleasantries. He invited me to meet with him for lunch at the Benson Hotel. (He had a special table there.) I don't recall his exact words but his message—delicately delivered—was clear. The bank had an almost Swiss-banking-like dedication to confidentially as well as to service and reliability. It took seriously the word "trust" in its name. According to its ethos customer accounts were sacred. For decades some of Portland's and Oregon's and even Southern Washington State's most prominent and wealthy people did business with this more exclusive bank. Adams told me that I would inevitably see various customers' bank balances, checks they wrote, overdrafts and, indeed, be exposed to all sorts of activity associated with their customers' accounts. He reminded me that the bank originated as a "trust" bank and still valued highly the moral requirement behind it. Maintaining confidentiality and customer privacy was the bank's *sine quo non*. I sort of knew all of this before the meeting, but I had never thought about it as deeply and sincerely as Francis Adams required. I also realized that he was in his polite way "checking me out." I was comparatively young and inexperienced. Maintaining his customers' privacy was at the crux of the bank's business. Before finally approving a contract, he wanted to make sure I would not violate the bank's trust.

Soon thereafter I got the contract and made the installation. Moreover, he was right. I was exposed to some remarkable information with respect to some very interesting and exceptional people. I am pretty sure that since then I have not divulged any of that confidential information. A piece of inside information did however influence at least one vote I made during a rather contentious local election. More importantly, that lesson about the importance of maintaining the privacy of one's customers' information has stuck with me ever since.

The PT&S experience helped acculturate me to the social issue of privacy. I recalled that at the dinner table as a child my parents would share something rather personal. Then almost immediately say "Now, don't go talk about that at school tomorrow at 'show and tell'!" Once before in my grade school class, I had told the class about something that my folks had talked about at dinner the evening before. Somehow my folks learned that I had shared it at "show and tell." (Phoenix was a small town in those early post-war days.) That evening our dinner and post-dinner discussions were rather tense. It was made clear to me, and to my brother and sister, that there was certain family information that was private and therefore should not be shared with others. (Kind of a family version of the Las Vegas line, "What happens here stays here."). I came to discover that most social groups in which one becomes involved have similar norms—implied or explicit—about confidentially.

After completing my PhD at U. C. Berkeley during the summer of 1968 I joined the U.C.L.A Graduate School of Management (now the Anderson School of Management) as an assistant professor. Price Waterhouse and a few other C.P.A. firms had provided funds to start an information systems research program and a research center in the Accounting Department. Three other recent PhDs—two in accounting and one in management control systems from the Harvard Business School—arrived at the same time. We devised one of the first programs in management information systems and began offering it to MBAs and PhDs during the fall of 1968. At the direction of the department chair, the new program was called "Accounting Information Systems." Eph McLean joined us the following year. In a rather amusing set of events, Eph led the charge to change the department's name to "Accounting *and* Information Systems," remarking that the *and* could be replaced by an ampersand (&). This led to an extensive faculty discussion and debate on what an ampersand is and why it is important to the field of information systems. The name was changed.

I also participated actively in the school's Socio-Technical Systems (STS) program headed by Eric Trist and Lou Davis. The sociotechnical systems approach evolved from the Tavistock Institute in London. Its main tenet was that designing complex organizational work settings requires the simultaneous design of the social system with the technological system. The goal was to achieve "joint optimization." Trist and former coal miner Ken Bamford had conducted an archetypical study illustrating this principle. In the aftermath of WWII Great Britain was heavily reliant on its coal industry for economic recovery. In an effort to improve the coal industry's productivity several key mines changed from their historically more teamwork based "hand-got" method of coal getting to what they anticipated to be a more efficient scheme, the longwall method. The first step in the longwall method is to identify and locate large rectangular blocks of coal. Then miners are deployed to extract the coal by moving along the face in a single continuous operation. This method was presumably more efficient. However, in their study, Trist and Bamford described how by converting to the longwall technology the workers' social structure and cohesion were effectively shattered. The result was a loss of social bonds that resulted in an array of dysfunctional behaviors: morale problems, internal fighting, aggravated blaming and increased worker resistance to their managers. I noted that heretofore most organizations tended to install their computer technology first and then deal with the social effects later. My experience at PP&L and other installations led me to believe that following the STS approach would be more effective for designing and installing computer-based systems.

Eric Trist told me that Enid Mumford at Manchester was pursuing a similar objective. She focused especially on the need for user involvement in the design of computer applications. I did not meet Enid until several years later. It is instructive that Enid called her approach ETHICS. An important result of focusing on the social aspects of a project from the outset is that it inevitably raises ethical concerns that should be addressed before they become unmanageable. This led me to believe that organizations should address and protect against potential issues of privacy, accuracy, property, accessibility, and other ethical concerns during the very earliest design stages of an information systems project.

The episodes recounted above occurred over about a 16-year span from roughly fall 1952 to fall 1968. During that period, I developed an interest in computers and IT and in understanding how they affected businesses and organizations. In retrospect, in those early days, I think I tended to treat the ethical issues I encountered as "one-offs," interesting and important in themselves but not as part of general concern. Today I am inclined to favor a version of Tom Cowan's philosophy, "There is no difference between designing and installing a computer-based information system and practicing ethics." Any human-oriented organization will almost inevitably generate issues concerning privacy, accuracy, property, and accessibility. Resolving them requires an understanding of both computer-based systems and ethical and moral principles.