An Interview with

Cuthbert C. Hurd

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Conducted by Charles R. Fillerup

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Charles Babbage Institute
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Abstract

Hurd briefly discusses his work with International Business Machines Corporation (IBM) before joining Computer Usage Company (CUC) in 1962. He outlines CUC's early projects with IBM and descirbes his leadership role at CUC. Hurd details his efforts to make CUC successful after becoming CEO and the strategies which he used. Dr. Fillerup, who worked with Hurd at CUC, compiled biographical information on Hurd that is presented in abbreviated form before the interview and in full after the interview. The original printed copy also contains biographical information on Fillerup.

Cuthbert C. Hurd

Born 05 April 1911 in Iowa; became a key leader in IBM and introduced computers into the Corporation; joined CUC as Chairman and built the Company to $15,000,000; subsequently became one of the industry's foremost entrpreneurs.

EDUCATION:

1932 B. A., Drake University.
1934 M. S., Iowa State College.
1936 Ph.D., Univ. of Illinois.

ACADEMIC CAREER:

1936-1942 Assistant Professor of Mathematics, Michigan State University.
1942-1945 Educational Officer and Lieutenant Commander, U. S. Coast Guard Academy.
1945-1947 Dean, Allegheny College; Chairman of the Curriculum Committee.

PROFESSIONAL EXPERIENCE:

1947-49 Union Carbide & Carbon (Oak Ridge U-235 site) -- Head of Technical Research.
1949-62 IBM Corporation -- Director of Applied Science, of EDPM, of Automation Research, of Control Systems.
1962-74 Computer Usage Company -- Chairman of the Board.

CONSULTING EXPERIENCE:
1962-85 IBM Corporation.
1974-78 Cuthbert C. Hurd Associates.
1978-86 Picodyne Corporation.
1984-89 Quintus Corporation.
1990-92 Nu Theta.
1992- Cambridge Associates.
1992- Vision/2000.
1995- Northpoint Software Ventures.

Details of Dr. Hurd's career, along with a more extensive curriculum vitae, are found at the end of the interview.

Other videotapes and telecasts :
Smithsonian Institution and AFIPS, Computer History Project.
BBC and the Royal Society, "Computer Pioneers."

CUTHBERT C. HURD INTERVIEW

DATE: 28 August 1995 INTERVIEWER: Charles R. Fillerup

LOCATION: Portola Valley, CA

[Background music: J. S. Bach, Brandenburg Concerto #6 in B-flat, S. 1041; Allegro]

FILLERUP: Good Morning. We are in Portola Valley, California, in Doc Hurd's home; and I am about to interview Dr. Cuthbert C. Hurd, one of the pioneers in computing -- and twice my boss! We will talk mostly about the intersection of our career paths in Computer Usage Company, the first software company.

But you had a lengthy and influential career with IBM well before Computer Usage was founded, Doc. Can you identify any IBM projects or developments that strongly influenced your direction of CUC during the early 60s?

HURD: At one time, forty -- or perhaps as much as fifty to sixty -- percent of CUC's business came from IBM. This is somewhat natural, because, as you may recall, software started in IBM with the 701, when I assigned a group of people to work directly with the engineers. (And, incidentally, two of our people became Turing Award winners.) But the point is that executives in IBM associated me with software and knew that CUC was partly in software development.

Now, I will not try to cover all of these services. But certainly compiler development for IBM, including FORTRAN [and] COBOL, was an important part, whether it happened in Poughkeepsie, or in any shop.

There are several large-scale projects, however, which come at once to mind. And I will not necessarily have them in the proper order of occurrence. But one, certainly, was in connection with the IBM 360 development. IBM had contracted with the Federal Aviation Authority to deliver a machine to share out ... air route air traffic control. It was a tight schedule.

I was asked to come to New York by Arthur K. Watson, one of two of Tom Watson Senior's sons, and who at the time was in charge of the so-called Electronic Data Processing complex, which consisted of engineering, mainly factory, and software development for the IBM company in their main line of business.

Arthur, who was known to me as Dick, discussed this project and asked if I and CUC would be willing to undertake it. After a meeting or two of further conversation -- including, I'm sure, involving Elmer Kubie and some technical person in the CUC office in New York City -- we agreed to do it.

Now, no 360 was running at the time. No 360 software was running at the time. The challenge was to prepare a JOVIAL compiler and an elementary operating system and have it ready for the delivery of the 360 -- perhaps a Model 40, more likely a Model 50 -- to go to the Federal Aviation Authority.

The methodologies were as follows: a group of people, I think headed by Ascher Opler, made contact with the Naval Research Center at ... somewhere in Virginia. ... WHERE? Can't remember! ... But [the plan was] to buy time on the STRETCH computer, the [IBM] 7030, which was installed at Dahlgren, Virginia.

CUC then wrote a simulator of the 360 -- including, of course, the instruction set -- and then wrote an operating system and a JOVIAL compiler, which also ran on the STRETCH computer. When the 360 started to run, this work was transferred to the 360, delivered to the FAA, [and] was a great success.

Speaking of the Navy at Dahlgren reminds me of another major project which I discussed recently with John Sheldon, one of the two founders of CUC in 1955. Indeed, in 704 days, Dahlgren was working on analysis of satellite data, and at one time had a model which consisted of two hundred harmonics, and a least squares procedure, and a first-order product moment matrix. This was worked on initially on the IBM 704. But the work was intensified at the time of the International [Geo]physical Year, when data from the satellite was to be captured and then analyzed at

Dahlgren, looking for better mapping data.

CUC was engaged to do the programming and to help with the analysis. I believe that, based on a conversation with Dr. Dean Brown, who participated, that sixty-five harmonics were used; consequently, a 60 [-th order] product-moment matrix was analyzed, with the associated Fourier transform. One interesting part of this analysis was the discovery that the city hall of Homolulu was incorrectly placed on maps by about one mile.

The third project which I will describe, because it is related to questions which I believe Dr. Fillerup will ask me later, is related to the TSS, Time-Sharing System 67, which [business] IBM had entered because of the competition with General Electric, which had placed a contract with MIT in a project called ... perhaps MULTICS? I'm not sure! It was a time-sharing system.

Anyway, some hundreds of people at the IBM Laboratory in Poughkeepsie were working on the software site, and CUC had been given a large contract to implement the command system for TSS 67. The chief competitor of CUC at the time was Computer Systems Corporation, headed by Fletcher Jones; and another version of TSS 67 had been contracted to CSC.

The project did not go well. A principal reason was that T. V. Learson, then a prominent executive at IBM, had been assigned, among other responsibilities, that of meeting this GE competition, which was very worrisome to IBM.

I think -- partially based on my introductions -- he had visited both Carnegie Institute of Technology and the University of Michigan, and had found out about their perceived needs in time-sharing. They conflicted. not only with each other but with the ideas from MIT. Now, the specifications for TSS 67 intended [to] and did incorporate both the needs of CMI [CIT?] and of Michigan; and I thought that this made the task almost impossible.

Now, concurrent with my perceived notion on this conflict, Gene Amdahl, a prominent IBM potentate (but not at the

time [any] longer associated full-time with IBM, but a research fellow at Cambridge), made a detailed analysis of TSS 67; and a very bright resident at Stanford, named Nielsen -- whose first name I don't remember -- had written a simulator of TSS 67 and discovered that it would NOT meet the expectations which IBM had hoped for, as [given] in the initial customer- determined standards.

All of this came to a head. Leason called me and said, "Doc, will you and CUC take over the TSS 67 project?"

I immediately went to New York, consulted with Elmer and others -- visiting Poughkeepsie, conducting detailed interviews, ... [I] told Kubie: listen; [and I said] that we would NOT be willing to take over the project; and that, in fact, we were concerned about its success.

I've now talked about three major projects between IBM and CUC, and [I] now await your next question.

FILLERUP: As founder of [IBM] Applied Science, you were prominent in the Corporation and also in the early computing industry as a whole. What prompted you to ally yourself with the very much smaller Computer Usage Company after IBM?

HURD: Two things. Number one, I had usually been successful in projects which I initiated in, or managed in, IBM. Beginning in the late 1950s, I thought -- as had A. L. Williams, the Vice President and Treasurer of IBM -- that the field of process control offered a promising, new, major application for IBM. As a result, I spent full time on this project for two, perhaps three, years, including negotiating major joint development contracts with Standard Oil of California, Exxon, Dupont, Inland Steel Company, Potlatch ([a] paper company), ... and perhaps one other.

We established a laboratory and designed and installed our new machine ... with very advanced analog-to-digital equipment, and digital-to-analog equipment, and then made a forecast of the commercial project.

The project lagged, primarily because of the difficulty of designing an analog-to-digital converter in the microsecond range. I became -- IBM became! -- dissatisfied with the project, particularly Al Williams, who by this time might have been President of IBM. He sent one of his close associates -- who had a reputation as a hatchet man -- out to San Jose, to me. And this man made a cursory exploration, without any technical background himself, [and] recommended to Williams that I be replaced, which was done. ... I was upset.

And I accepted my replacement, which meant -- as is customary in IBM -- I was put in the "refrigerator"! That meant: you were put there, you were given some kind of a temporary assignment and given a chance to cool off.

I spent the next year in a very pleasant activity, because, working with Emmanuel Piore, the Director of Research of IBM, I made a world-wide survey of promising ideas in computer architecture and software which might be useful to IBM.

It culminated in a presentation I made at the kick-off meeting for the IBM 360, which was held in the Westchester Country Club, at which time Al Williams presided; and the ideas which I put forth resolved on read-only memory -- which resolved into "caching." And, following that meeting, I was temporarily a member of the Architecture Committee.

I was then told that it was time for me to come back from California [and] spend time at headquarters. And Tom Watson told me that I could have any job in IBM, within reason.

But, number one, I really enjoyed California! And number two, the IBM idea of any job within reason -- including becoming corporate staff head for software -- did not appeal to me.

So, I got in touch with Elmer Kubie and John Sheldon, both former KEY employees in IBM, in former days; and we made an arrangement for me to make an investment in Computer Usage Company and to become Chairman of the

Board, but NOT the Chief Executive Officer.

FILLERUP: Thanks, Doc. It's very informative about how [you and] CUC came to be chaired by Dr. Hurd.

We did develop System 360 software, eventually. And our education subsidiary, Computer Usage Education (CUE), published a classic book, "Programming the 360," continuing those 360 developments. Some say that our numerous subsidiaries overloaded us with overhead. Which subsidiaries were the right ones for CUC during the early 70s period?

HURD: I think [that] if IBM ... I'm sorry..., I think [that] if CUC had followed its original charter -- in consisting of persons at the top of their profession in programming and systems development -- and had sharply reduced the number of branch offices, [so many of] which made control very difficult, they might have succeeded in a major way; and, combined with one other idea, might have been, in 1995, a multi-billion dollar corporation.

The other idea was that which was called, at the time, facilities management. This idea was most prominently developed by Ross Perot, whom I knew slightly in IBM -- an outstanding person and salesman in the Dallas office.

But after Elmer Kubie became ill and John Sheldon had elected to pursue other interests, I recruited Charles Benton, Jr., [who] at the time was President of the IBM Federal Systems Division, to become President and CEO of CUC. Charlie elected to follow the IBM pattern, recruiting the managers of several IBM offices; and [he] wanted to make a "salesman's," huge organization of CUC.

In a nutshell, ... it failed! And Charlie worked day and night to make it succeed but had a heart difficulty, and resigned. I was forced to become Chairman and President and CEO of CUC, and [I] tried to manage the organization from California with headquarters in Greenwich, Connecticut, and New York.

I did manage to cut down the overhead. I carried out extensive negotiations with Allstate, Sears, Minneapolis Honeywell, ... and perhaps one other, regarding a merger. And [I] also at the time had two long conversations with Ross Perot, who offered to buy CUC for ten million dollars in cash -- which was far below the publicly traded value of CUC at the time.

Morgan Stanley, the investment banker who had carried out the public offering, was naturally concerned, and was approached by Victor Bartoletti and a group of people -- mostly from IBM -- who had left IBM to form a facilities management company started by an aerospace company in Texas, ... again, whose name I cannot recall. They approached Morgan Stanley and said that, with CUC as a "vehicle," they could make a very large, successful company. Consequently, Vic Bartoletti became President and CEO of CUC, but with the office in Atlanta, Georgia!

Now, simultaneously, CUC was losing money, to my great disgust. And a series of events happened which returned CUC to profitability. And Dr. Fillerup will now ask some questions about that.

FILLERUP: Before we deal with each of these new associations, ... when our CEO, Charles Benton, abruptly resigned, you became Chairman and CEO perforce; [and] you embarked on a campaign then -- even before Mr. Bartoletti came into the company -- to acquire what we called "systems management" contracts which were at once successful. And profitable! Firemans Fund American was the first triumph for us, I believe. The agreement between FFA and CUC was
negotiated by you personally. How did you do that, the first time ever?

HURD: The answer -- as the answer to any of your questions about the other large and profitable contracts -- illustrates the importance of personal relations and trust, with a high degree of technical and systems capability.

Fred Merrill was the Chairman and Chief Executive Officer of Firemans Fund Insurance Company. I first knew Fred when IBM -- strange, at the time! -- thought [that] a computer would influence his interest; and I, as Director of

Applied Science, had the responsibility of supplying the technical backup for the installation of the IBM trial machine, a 702.

Fred Merrill was one of those interested, and I met with him several times. At a later time, having left IBM but having retained close association with Stanford University, I was asked by the President of Stanford University, and the Provost, to help in [the] organization of a Computer Science Department, under the direction of the famous numerical analyst ... whose name I cannot remember today! ... I did assist, and [I] then was called upon -- again by the Stanford President and the newly appointed Chairman of the Computer Science Department -- to form an advisory committee, not only to help the Computer Science Department, but to help Stanford generally take advantage of the new computer technology.

I invited Fred Merrill, a trustee at Stanford University, to be a member of that Computer Science advisory committee. He agreed; and [he] was a very valuable member during the next six years of my chairmanship.

Fred became impressed with what could be done with careful management and advanced technology. He was distressed by the progress of his data processing department and the failure to meet deadlines. He called me one day. He said, "Cuthbert, we are in trouble. I want you to come up and fix it!"

FILLERUP: And we did fix it. It was fixed. Can you describe those early days and how you were able to choose the right people from CUC to staff that Firemans Fund American project, to take over the entire data processing department?

HURD: I made a quick study. And I don't know if anyone from the Palo Alto office of CUC or the San Francisco office participated. I quickly decided that Firemans Fund could profit from major assistance, and so reported to Fred Merrill. Fred said, "Bring me a proposition." I then looked around [in] CUC to find persons who were most highly qualified, and available, and who might work together as a team.

Herbert Lechner, one of the persons brought in by Charles Benton -- and the former head of Applied Science in the Federal branch of IBM's business -- had done extremely well under adverse conditions as Manager of IBM Washington, including the fact that, in one calendar week, three principal project leaders had left a former company and taken the CUC contract with them.

I asked Herb to join me. Also, I knew that a successful project leader was necessary; and Jerry Sommerhauser, in Los Angeles, was at a temporary lull [and] could hire here. Also, a knowledge of IBM OS/360 and good management of facilities was necessary; and Mel Durao, of Palo Alto, was invited to join. And Mel brought with him a man (whose name I do not remember) who was an expert at record-keeping and the financial aspects of records. We convened in the IBM Palo Alto office. We talked for a day, including [about] the philosophy.

I was sure that Fred Merrill would remain receptive to a facilities management contract, under which CUC would be taking over all of Firemans Fund personnel, and machines, and [the] responsibility for a fixed-term contract. I thought that it would be injurious in the corporation, in the long run, to have such an important facility separated -- particularly because it would detract from higher management knowledge and emphasis on the data processing activity.

I therefore proposed that CUC personnel become employees of Firemans Fund, on leave from CUC; that they manage it, bring it to a fine point of performance over a period of three years, and then turn the management back to Firemans Fund.

We made such a proposal; Fred Merrill, on the spot, accepted the idea. I proposed, in addition, a fee (the fixed-price fee) of ten percent of the then-operating expenses, which turned out to be a million-dollar fixed-price fee annually for CUC; plus an incentive, under which Firemans Fund and CUC would share the cost savings, which turned out to be, in the initial year, another five hundred thousand dollars beyond the million dollars which was earned, ... which came

to CUC and also went back to Firemans Fund. We met -- and exceeded! -- that proposal.

FILLERUP: We were indeed very successful, Doc, in those and in other systems management contracts, which I want to ask you about. I want to [ask you about] two other projects, too. In particular, there were important projects in the late sixties with Texas Instruments (TI). When TI decided to build the ASC, the Advanced Seismic Computer, the concept of pipeline processing of vector arrays was entirely new -- what we would call "massively parallel processing," today. How did you persuade TI management that Computer Usage Company could produce a FORTRAN compiler -- an optimizing FORTRAN compiler, at that -- for so powerful a machine?

HURD: Again, there is the combination of long-term acquaintance and trust. I first met Pat Hagerty, the founder of TI, really, when IBM decided to build the first transistorized machine -- STRETCH, the project which I initiated. And I went to see him after Tom Watson had [seen him], because we needed a reliable source of transistors.

In the meantime, a classmate of mine from MIT (in the program for senior executives), Cecil Dotson, who was in charge of the Semiconductor Division, asked me to consult with him and with Jack Kilby, the Director of Research at TI and the inventor of the planar transistor (simultaneously with Robert Noyce); and I consulted on the notion of superconductivity technology and its importance for TI. In parts of this, I became acquainted -- reacquainted -- with Pat Hagerty and also acquainted with Mark Shepherd, the President of TI.

Now, Pat Hagerty believed that in every generation of transistors, TI should build an internal, general- purpose computer to exploit this transistor ... technology -- as maximum insurance! And, in connection with my consulting (all of which reimbursement, by the way, went to CUC), I was asked to look at the third generation of computers at TI and at the capability to [do] what we now call CAD, Computers In Design. And I became further acquainted with Mark Shepherd.

So, when the next generation of chips came out -- now elementary, planar transistors -- Pat Hagerty wanted to build a

machine to exploit the technology. And he and Mark Shepherd and Cecil Dotson said, "Well, we (TI), in addition to being a prominent semiconductor manufacturer, at the time process roughly fifty percent of seismic processing in the world -- both offshore, in ships, and onshore, in processing centers." They had a mission there and needed help.

Consequently, Mark Shepherd asked me to come to Dallas and make a proposal to assist. I assembled a group from CUC, most prominently, as I remember: Gordon Watson, George Trimble, ... Don Bavly from New York, and the man who actually wrote the optimizing compiler -- I can't recall his name -- and others. We assembled in a hotel near Dallas and spent a long evening and night preparing the proposal.

I can tell you one thing: along about eleven o'clock, people got sleepy. There was a restaurant across the freeway; and I suggested [that] we all go over for banana splits! We did. And Gordon, and ... Trimble, both had banana splits, as did I; and after the first one, I said to Gordon and George Trimble, "How about another one?" Which they did!

We then went right back to the hotel, worked till long after midnight, and, when people got sleepy, I said, "Let's do pushups!" And Gordon and George Trimble competed in the number of one-armed pushups they could do.

To make a long story short: the next day, I went to TI, made a verbal presentation to the TI executives, saying that we want[ed] to participate in the architecture of this machine, which was to be the first terminally oriented ([or], as Dr. Fillerup has said, pipelined) machine to be developed in a closed configuration with the fastest computer in the world; and we would assign the responsibility of participating in the architecture from a mathematician's point-of-view; and then implement the operating system, a FORTRAN, ... and (I believe) a COBOL or ... let me see, at one time, there were seventy or eighty remaining people on the project from ... Los Angeles, Palo Alto, New York, and perhaps Houston. ... A very successful project!

At one time, later, when I had invited Mark Shepherd to be the keynote speaker at a National Computer Conference, he told me that if we had pursued the subject, we could have become the system manager for TI in software as well as

[in] facilities management.

FILLERUP: We also seemed to acquire a specialty in minicomputer software. I recall developing math libraries myself for Viatron and Motorola. Did you actively solicit such clients, Doc, or did they come to us for minicomputer software?

HURD: They came to us. I knew a man named Fred Vuse, whom I first met in the process control days from IBM, when I negotiated with him a joint marketing arrangement with their Instrumentation Division, of which he was the head, in Houston. He wanted to have designed a compatible family of machines -- going from slight, elementary data acquisition and collection up through now what we call a microcomputer and a minicomputer device.

And Gordon Watson -- and then George Trimble, and others -- were starting this project in Houston. And I went there, too, obviously, and also prepared the final report. Fred Vuse later became President of TI, succeeding Mark Shepherd.

FILLERUP: By the late sixties, software companies were proliferating at an astonishing rate, Doc. How did we rank among our competitors, with respect to quality of the software and meeting time-and-budget constraints?

HURD: Well, initially, we were certainly number one because we were the only one! Computer Sciences Corporation became actively the principal competitor. They chose to centralize their very competent personnel, whereas CUC chose to spread them out, nationally. And then, quickly, other companies, too numerous to mention, got on the bandwagon and began competing in all areas of CUC involvement -- including, most particularly, Ross Perot, who took the leadership in facilities management, as is well known.

FILLERUP: There was a systems management contract even in the later days, in late 1972 all the way through [19]75. You negotiated a consulting -- or "study" -- contract with IBM to evaluate the effectiveness of IBM's use of their

own computers. This was in the San Jose and Bay area complexes especially. In retrospect, this seems almost audacious. Were you marketing aggressively, or was this simply an extension of CUC's systems management capability?

HURD: I presume I was marketing aggressively. I went to New York ... and met with Mr. Rizzo, whom I had known earlier in IBM, and who, at the time, was Chief Financial Officer of IBM (and may even have been Vice-Chairman of the IBM Board [of Directors]). And he had, under his general direction, internal IBM communication and data processing [functions]. I asked him how recently he had had an independent analysis made of his department. He then asked me to assemble a small team and make a preliminary analysis. I think I looked at the communication facility primarily by myself, working with a man named Bill Bradshaw, an early IBM member in Applied Science, who was now Corporate Head of Data Processing and Communication.

The communication portion -- including ... a new mini [computer] from an international network, ... with IBM 360, a specialized scientific machine, managing the nodes -- seemed to be in good order. However, it seemed to me that the data processing organization and management could be improved.
Dr. Arthur Anderson had most recently been head of the IBM data processing complex (all engineering, manufacturing, etc.) but had chosen instead to move to San Jose and be in charge of IBM's engineering and manufacturing worldwide, for tape and disk products. He and I were good friends.

We jointly agreed with Paul Rizzo that work would be concentrated in San Jose, partly because I lived nearby, and partly because Art Anderson was interested, and partly because we saw an opportunity to make of San Jose a flagship installation, which could then be replicated at other IBM sites, such as Endicott, Rochester, Raleigh, [... Paramus? ...] -- I don't know where all!

So, we ventured into a contract to do that, the principal task being to take the existing thirty-seven (37!) IBM facilities in and around the Bay area, under the general control of Art Anderson, and use the most modern, terminally-oriented,

communications-based facilities to achieve increased efficiency.

We entered into this contract and [worked on it] over a period of perhaps three years -- with Dean Morgan, Jack Halcom, ... and others, whose names I don't remember, being principal contributors -- with my having the assignment, along a monthly basis, to lead a project management review with all of the vice presidents at San Jose, followed by a quarterly review at which Art Anderson attended (and sometimes Paul Rizzo from IBM Headquarters).

[BREAK]

FILLERUP: We are back. I want to talk again about some of these systems management contracts. If we can go back to FFA: do you have anything to add about the FFA systems management contract and how it went, to how it ended?

HURD: The contract at FFA was very successful. It saved them lots of money, got them on their own in completing important projects -- on time, on th funding [target]. It was a three-year contract [to] which I deliberately added an extension agreement.

Howard Clark, the Chairman of American Express, and Fred Merrill negotiated a purchase of Firemans Fund by American Express. And Howard Clark became familiar with the success of CUC and Firemans Fund. And he and I had a meeting in San Francisco. And he said to me, if he uses CUC as management, "I want Herb Lechner." I said, "You can't have him! He is a CUC employee." So Howard said, "What do YOU want?" I said, "I want you to give CUC a systems management contract for American Express."

He was astonished. He said, "How can YOU? And just what do YOU have?" And I said, "You know!" So, he said, "Well, I'll think about it."

And some time later, I went to New York and spent a day with him, and his President, and whoever was in charge of

computing -- not in the same meeting -- and I said, "Howard, how about it?" "Well," he said, "I don't think you can bring it off. You don't have enough resumes to show me. And you live in California, and part of the success at Firemans Fund has been: you have been there once a week!" ... Which was true.

So, we made a ... an arrangement. (I possibly should say: a deal.) And he said, "You let me have Herb Lechner; then I will extend the CUC contract for another three years." And we shook hands on it -- which [agreement] then contributed substantially to continuing profitability for CUC.

In the meantime, a man named Ernest Loebbecke, Chief Executive of Title Insurance Company of California, was on the Firemans Fund Board. And Fred Merrill replied enthusiastically to him about CUC when Ernie Loebbecke called me and asked me to come out. And I made a preliminary survey and then a proposal, to TICOR, which was accepted; and [for] which I chose the leadership -- the technical leadership -- of Bill Sanders, and others.. And initially under ... Fred Connelly, we proceeded to show progress. We never met our financial goals, but we met our technical goals. And at the conclusion of the project, Bill Sanders, and perhaps others, remained employees.

Now the one other success in the Los Angeles area was Hughes Aircraft. I knew Hughes on the lower level but also briefly knew Ramo and Woolridge on the executive level, from earlier days in IBM, ... and then later, at the end of the program for senior executives at MIT in 1959, John Richardson, Senior Vice President of Hughes Aircraft and one of the three principal executives who were classmates. We liked each other, played tennis with one another. So, at one time, in the late 1960s, he telephoned (to me, in Palo Alto, from San Francisco airport) and conducted an audit. Believing that improvements could be made in their data processing [he asked,], would I come down and take a look?

So George Vosatka and I, and perhaps others, took a very quick look at Hughes [and] found out that there were at the time two principal record-holders: (1) the "parts number" numbering system was not only inconsistent within Hughes but was incompatible with the Air Force part-number system, which was managed out of [... ? ...]. The other problem [(2)] was the engineering change-order system. We made recommendations to rectify those [problems]

conditionally, which [recommendations] were accepted.

About two years later, I think, John called again and said, "Help Hyland!" -- the Chief Executive Officer of Hughes Aircraft and a member of Howard Hughes' three- member Board of Directors of the Hughes Medical Foundation, which owned Hughes Aircraft Company. He [Hyland] said, "Come down. Advise me." I went down.

I had a good time with Mr. Hyland, an immediate friend. He said, "Dr. Hurd, we make computers, install them on orders from all over the world." He said, "I don't think we USE computers very well. And, incidentally," he said, "Jay Forrester, Professor of ... a distinguished professor at MIT and the inventor of what we call 'industrial dynamics,' a procedure under which you could manage a company by solving a system of linear differential equations." He said, "Jay Forrester was here. I want to talk to you about that.

"But," he said, "what do we need to do to make Hughes Aircraft as important in managing/controlling computer technology as we do for production?"

So, I agreed to confer as Chief Computer Consultant, with [... Phil? ...] involved. And Mr. Hyland assigned the project to Gordon MacDonnell [MacDonald?], the Chief Financial Officer. And Gordon and I, and Steve Hagerth, -- with the Chief Executive of every operating division with Hughes -- interviewing them: when do you make the orders, when do you ship, etc. And having consolidated this, I made a recommendation to Mr. Hyland that we put in a set of executives that can stay at Firemans Fund [Hughes Aircraft?], for this purpose; and he and Mr. MacDonald agreed. And I made the same financial arrangement -- namely, a ten percent annual operating fee of their entire budget, but that the employees would be on leave from CUC and return to them after a period of three years, when the term was up.

We agreed. [Then we] had great difficulty. Mr. Bartoletti was unable -- due to changing schedules -- was unable to supply a manager. And so I reached into the former days for Carl Reynolds, [who] worked for me in IBM, then in

CUC; and Carl was a friend.

Not long into the project, two things happened. Gordon MacDonald was taken away from Hughes and became President of McDonnel Aircraft in St Louis. [???] The man with whom I negotiated was gone.

Number two: Carl -- in what had to be a self-serving act -- went to John Richardson and also to the President, Dr. Alan Puckett, and said, "I can do it cheaper. And instead of the CUC fee, I'll join you."

John Richardson called me. He was very embarrassed and said, "It is a fact that your fees are based on a different structure from what Hughes Aircraft imposes in dealing with the Air Force, the Army, etc., ... what are we going to do?" I said, "I can not contest."

So we made an arrangement that our retainer, sharply reduced, would continue for two years; that I would be a consultant, on a fixed-fee basis, in the former way. And that's what happened there.

My participation gradually decreased, because Carl did not call me. But I was, at one time, helpful to them in obtaining a contract -- a billion-dollar contract, which turned into ten billion dollars -- and I think they got their money's worth.

FILLERUP: They did get their money's worth, Doc. None of the CUC people who went to Hughes Aircraft actually decided to stay. Bill Sanders and Bob Umbaugh, for example, were with the team at Hughes Aircraft, and they decided they would not go with Hughes, after all, to work for Carl Reynolds.

However, we have to call these systems management contracts phenomenally successful and very profitable. And we did have many successes, but we also had some projects and attempted projects which were not so successful. I'm not sure why they weren't. Do you know why we did not get some of the projects we aimed for, such as our

attempt to sell systems management ideas to Sears, in Chicago? Or to the Greenbelt, Maryland, Manned Spaceflight Center? They would not accept that kind of bid either.

HURD: Well, frankly, that is a puzzle. In the early, early days of CUC, before I was a member, Elmer Kubie and others bid on a facilities management contract for an oil company in Manhattan and were not successful. Why? I don't know. As I have said, I struck out with Firemans Fund and American Express.

Also, during that period, I had an acquaintance and a friend -- the man who is, at the moment, Chairman and Chief Executive Officer of National City Bank. And I met with him in New York and persuaded him to visit Firemans Fund (when he was probably [Chief] Executive Officer of First National City Bank). And I attempted to get a systems management contract then. Now again: he said to me, "Fine. I know you. I trust you. Tell me who the people are." ... We did NOT get that contract.

Another one of these [was] the Greenbelt/NASA Goddard contract. CUC in the VERY early days had performed, under contract to Glenn L. Martin, one of the VERY early and very efficient, precision orbital projects. Then we had some "standing" at Goddard. But we proposed, essentially, to take over the whole operation: all their programming, and their operations -- upon equipment that must have been two IBM either 91s or 95s. And you [Dr. Fillerup] were present on that trip?

FILLERUP: Yes.

HURD: And, really, luck's an issue. And I know [that] someone eventually -- probably IBM -- got that contract, years later. [It] might have been] IBM, might have been TRW, one or the other. And I'm sure [that] that contract was spoken [for] before us.

I also said, ... told you, ... that we did not get a contract from TI. Apparently, it was out of our hands; we didn't realize

it.

I cannot, at the moment, recall any other ... Oh! ... North American Aviation. ... Now I don't know the new name: Rockwell, North American?

But after our initial success at Hughes, the Executive Vice President of North American, who had also had an audit for the Air Force, was talking to John Richardson; and John Richardson said, "Call Cuthbert Hurd" -- which he did. And we had another contract, a consulting contract, at North American. And, at a later time, I was unable to convince them to allow us to do what we were doing at Hughes. Again, we were very short of personnel!

And, finally, Lockheed was one of the first companies to install a CPC and a 701. And I got to know executives there, including the Vice President of Engineering, who managed the famous Skunk Works. Well, after our success at Hughes, I thought, well, let's try Lockheed.

And I first met with the General Manager of the Lockheed Missile Division, who was intrigued with the idea. And he and I -- his name was Anderson -- and he and I had an airplane ride to Los Angeles, and we went to see the Chairman of the Board of Lockheed. And I had two hours with him and the Chief Financial Officer to convince him that CUC should take over ALL of Lockheed ['s data processing?]. I did not succeed.

At a still later time, a former student and close friend called Z. William Miller (who later became President of Textron, and left Textron later to become First Secretary of the Treasury, and [then] Chairman of the Federal Reserve), ... at one time, while planning Textron -- which he owes me! [??] -- he came up with negotiations to acquire Lockheed.

And I said to Bill -- who was known as "Dollar" Bill, to distinguish himself from Dr. William Miller, Provost of Stanford, recent President of SRI, who was known as "Dr. Bill," because Z. William was "Dollar" Bill! -- I said to Bill: if you ... if you buy them, then I will assemble a group of people and we will manage the data processing for them. ...

Then the acquisition did not happen.

Now, I think [that] about half the time we won and about half the time we were unsuccessful. I think [that] if we had had the personnel, we would have been a multimillion-dollar company, because now this kind of thing is very popular.

Ross Perot knew how to find managers. He went to the Marine Corps; and he knew how to MANAGE managers. He knew how to get good technical people -- NEVER better than at CUC, but he knew how to do it. And now he's a multimillionaire.

Well, Chuck, let me say that I greatly appreciate your time, your energy, your thought, your willingness to come here. You and I have known each other and worked with each other, beginning with the 604, the CPC, the 701, and early time [with] IBM Applied Science; [in] CUC, your outstanding work in your CUC [work] with Control Data, and Texas Instruments, IBM. Many of these I haven't been able to talk about.

And mentioning Control Data reminds me that CUC Palo Alto developed a fundamental kernel for the CDC 6600 and 3800. And I went once to have an interview with Mr. Norris and tried to get a major COBOL contractor in; and [I] also tried to take over all of HIS data processing, on a systems management contract. And you know what Mr. Lawrence said? "Show me the resumes!" Thank you very much.

FILLERUP: Thank you, Doc. What does count, I think, throughout these stories you've been saying, ... you've been telling us about: PEOPLE are the ones who are important. I've been interviewing Dr. Cuthbert C. Hurd, one of the prime movers from the early days of computing. And he's still at it, now in his eighth decade. ... I'd like to be able to say that about me some day. I'm Chuck Fillerup.

END OF INTERVIEW

Cuthbert C. Hurd

PROFESSIONAL CAREER:

Union Carbide & Carbon (Oak Ridge U-235 site) -- Applied modern computational methods to the design of diffusion processes and commercial reactors, 1947-1949.

IBM -- Director of the Applied Science Department; led development of the 701, IBM's first large computer, 1949-1953.

IBM -- Director of the Applied Science Division -- managed development of the IBM 650 and 704; directed production of first software for users (Assembler, Bootstrap, SPEEDCODE, FORTRAN), 1953-1955.

IBM -- Director of Electronic Data Processing Machines; led development of first IBM high-speed printer, 1955-1956.

IBM -- Director of Automation Research; initiated Project STRETCH, IBM's first transistorized supercomputer, 1956-61.

IBM -- Director of Control Systems; participated in the design and manufacture of System 1701, 1961-1962.

IBM -- Consultant; advised on product decisions for System 360 and System 370, 1962-1985.

CUC -- Chairman of the Board; built revenue to $15,000,000 in five years; supervised software development for CUC's major clients (IBM, Texas Instruments); initiated large systems management contracts, 1962-1974.

CONSULTING CAREER:

IBM -- Advised on large development projects and on product decisions for System 360 and System 370, 1962-1985.

Cuthbert C. Hurd Associates -- Consulted to several Fortune 500 firms, including American Express; Cravath, Swaine, and Moore; and Rockwell Corporation, 1974-1978.

Picodyne Corporation (educational courseware and networks for minicomputers) -- Chairman of the Board, 1978-1986.

Quintus Corporation (acquired by Intergraph) -- Founder, President, Chairman, 1984-1989.

Nu Thena (CASE products for data processing systems) -- Chairman of the Board, 1990-1992.

Cambridge Research Associates (system simulator; real-time system laboratory for simulating avionics) -- Chairman of Science Board, 1992- .

Vision/2000 -- Chairman of the Board, 1992- .

NorthPoint Software Ventures -- Chief Scientist, 1995- .

AUTHORING & EDITORIAL CAREER:

"Asymptotic Theory of Linear Differential Equations Singular in the Variable of Differentiation and in a Parameter," *Tohoku Math. J.*, 44 (1938).

"Asymptotic Theory of Linear Differential Equations Singular in Several Parameters," *Tohoku Math. J.*, 46 (1940).

Seminar on Scientific Computation, November 1949; Edited by the IBM Applied Science Department, Cuthbert C. Hurd, Editor-in-Chief.

Proceedings of the Industrial Computation Seminar, Dec. 1949; Edited by the IBM Applied Science Department, Cuthbert C. Hurd, Director.

Proceedings of the Industrial Computation Seminar, Sept. 1950; Edited by the IBM Applied Science Department, Cuthbert C. Hurd, Director.

Proceedings of the Industrial Computation Seminar, Aug. 1951; Edited by the IBM Applied Science Department, Cuthbert C. Hurd, Director.

"Automatic Digital Computing in Engineering," *Applied Mechanical Review*, July, 1955.

"Computer Development at IBM," Academic Press, 1980.

"Early IBM Computers: Edited Testimony," *Annals of the History of Computing*, 3: 2 (April 1981).
"IBM 701 Thirtieth Anniversary, 1953-1983," *Annals of the History of Computing*, 5: 2 (April 1983).
Editor, *Annals of the History of Computing*, 6: 1 (January 1984).

"A Note on Early Monte Carlo Computations and Scientific Meetings," *Annals of the History of Computing*, 7: 2 (April 1985).

Editor, *Annals of the History of Computing*, 8: 1 (January 1986).

SOCIETY AFFILIATIONS:

Association for Computing Machinery (ACM) -- Board Member (1949).

The Institute of Management Science (TIMS) -- Founder (1954), Vice President (1954), Member (1954-1984).

New York Academy of Sciences -- Member (1954).

American Federation of Information Processing Societies (AFIPS) -- Member, Finance Committee (1955-1958).

Center for Computer Sciences and Technology, Institute of Applied Technology, National Bureau of Standards. (NBS) -- Member (1965-1968)

National Research Council -- Member, Computation Committee (1955-1958).

Advisory Council to the Departments of Economics and Sociology, Princeton University -- Member (1954-1958).

Institute of Electrical and Electronic Engineers (IEEE) -- Member of Founding Committee (1954) and Fellow.

American Association for the Advancement of Science (AAAS) -- Fellow (1960-).

IBM Journal of Research and Development -- Referee (1965-).

Annals of the History of Computing -- Founder, Member of Board of Editors (1965-present).

The MIT Press -- Referee (1985-present).

IEEE Computer History Project -- Referee (1990).

HONORS AND RECOGNITION:

Phi Beta Kappa (1932, 1936).

Phi Kappa Phi (1934, 1936).

Sigma Xi (1934, 1936).

University Fellow (1934-1936) -- University of Illinois.

Drake University Trustee (1965-1973); Hon. Ll. D. (1967).

Stanford University, Dept. of Computer Science -- Chairman of Visiting Committee (1965-71); Visiting Scholar (from 1982).

Massachusetts Institute of Technology -- Life Fellow (since 1975); Member of Development Board (1975-85).

IEEE Computer Pioneer (1986).

BIOGRAPHICAL CITATION IN:

Who's Who in America
Who's Who in the West
American Men of Science
American Academy of Arts & Sciences