An Interview with

WILLIS K. KING, Ph.D.

Conducted by Jeffrey R. Yost, Ph.D.

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Abstract:

This interview with Willis King discusses his early education, working at IBM Böblingen, doctoral study at University of Pennsylvania's Moore School of Electrical Engineering, and career as a computer science professor (at the University of Houston). He also discusses his research in areas including computer architecture, microprogramming, and memory, as well as his role as University of Houston's Computer Science Department Chair from 1979-1992. The bulk on the interview focusses on his service and leadership to the Computer Society. This includes early work beginning in the 1970s with leadership in Houston and the Southwest region, the Distinguished Visitors Program, his important role with the Computer Science Accreditation Board (CSAB), work with conferences, tutorials, publications, and his leadership to the society as president in 2002.

IEEE Computer Society

Yost: My name is Jeffrey Yost from the Charles Babbage Institute of the University of Minnesota and I'm here today at the home of Willis King. This interview is for the IEEE Computer Society's CS Leaders Oral History project. It is December 3, 2013. Willis, can you begin by telling me a bit of biographical information; telling me when and where you were born?

King: Yes. I was born in 1936 in Shanghai, China but I left Shanghai when I was only two so I have no recollection of that place. I grew up, really, mainly in Hong Kong.

Yost: Prior to college, can you describe yourself as a student, your interests at that time?

King: So I grew up in Hong Kong. The situation was a little bit unique in that as you might know, Hong Kong was a British colony so we had basically two parallel systems; one mainly Chinese and one following the British tradition. For the first few years of my schooling; it was during the war time, so it was not considered a very formal education. But then when I was, I believe, nine, this was after the war, I could go to regular Chinese schools. I don't remember exactly, but from about the fourth until the ninth grade, I was under the Chinese school system. After that, in 1951, I switched to the British system and graduated from high school there. The British system is also very interesting. They have the so-called school certification program that is certifying you as a graduate of the secondary school in the eleventh grade. And at that time, you took two years of what they called matriculation classes before you entered the university. And the British university has a three-year program; so basically, if you convert to the U.S. system, the first year of college is the second year (of matriculation class) in high school. After matriculation classes, I entered the Hong Kong University for one year, and then I was fortunate to get a scholarship to go to Germany. I left Hong Kong University and went to Germany and basically, I had to start over again because of the system differences and needing to learn a new language. I got my Diplom Ingenieur Degree over there.

Yost: Please forgive my German pronunciation, I do not speak the language. French is my only foreign language. You attended Technische Hochschule?

King: Yes, it's Technische Hochschule in Darmstadt.

Yost: And completed your degree in 1963?

King: Yes. The German education is somewhat different from the U.S. It's longer than what is in the U.S.; it's not the regular four-year program. You have to do a thesis before you graduate. So very often people equate it with a master's degree rather than just a bachelor's degree. Also, in Germany, the high school degree takes 13 years.

Yost: And what was the focus of your studies in Darmstadt?

King: Of course, at that time there was no computer science or computer engineering, as such. But the professors I studied under were interested in the digital computer. As a matter of fact, Darmstadt, at that time, had a professor in applied mathematics who pioneered some early computer design. And I was in what would you call the communication area, but that professor also was interested in digital communication and digital signal processing. So actually my thesis was trying to measure and analyze digital signals. There were two projects: one they call a Studienarbeit which is a bigger project that the student works over a period of two or more semesters. And then there is what is known as a Diplomarbeit, which is a project that you have to finish within three months. For my Studienarbeit, I was given a recording motor there that was used by telephone companies to send out recorded messages. It was a rotating cylindrical-type of a machine with a magnetic recording surface. My job was to come up with a system to imitate the magnetic drum. At that time, of course, this was in the early 1960s, the magnetic drum was the main technology for memory. So that was how I got into computer engineering, even though there was no specialty in computer engineering, as such.

Yost: What were you thinking career-wise at that point?

King: Well, I'm not sure but I think that this was a very new area; the whole concept of the computer looked very exciting to me. I don't think it was very clear, as far as I can recall, not a formal career plan that I will do such and such. But the computer was something that captured my imagination, captured my interest, so I got into that.

Yost: And you came to work for IBM's research laboratory in Germany, is that correct?

King: Yes. So after graduation, I got a job at IBM. They have a research and development lab there, so I worked there a little bit, less than two years.

Yost: Was that in Böblingen, the IBM Böblingen Laboratory?

King: Böblingen, Germany; the lab is set up out in the countryside. The largest town nearby is Böblingen.

Yost: Can you describe that position and what types of things you worked on at that time for IBM?

King: At that time IBM was developing what was later known as the System/360. System/360 has many models; and the German lab was assigned to build the smallest of the models.

Yost: Was that the System/360-30?

King: No, it was the 20. Actually, that machine was basically used to drive an input/output device. Remember, this was still the punch card era, so they had developed what they called a multi-function machine, which can read a card, punch a card, and print something on the card. So as the card enters these stations you can sequentially read the card, then you can punch, and then you can print something on the card. The computer was so small; I think the real purpose was to use it as a controllor for that multi-function

card machine. I was given the task of doing some logic design for the input-output system of the card machine. So basically, that was the job.

Yost: It must have been exciting; IBM's huge transitional product line at that time to create a compatible family of computers?

King: Oh yes. They announced the product System/360 while I was there; something like, in April of 1964, they announced it. And even though you are only designing a very small part of it, you have to try to understand the rest of the system. So I was also introduced to the concept of micro programming, which was a very new concept at the time.

Yost: At what point did you decide to return to school and pursue a Ph.D.? Can you tell me about that decision process?

King: It's very difficult to say. Although the job was very satisfying at the time, I thought that maybe I would have better opportunities if I went to graduate school and completed an advanced degree.

Yost: In making that decision, were you thinking about getting your doctorate and staying in industry or moving into academia?

King: Maybe in the back of my mind at that time I thought I might like to go to into academia, but I really don't think that was my goal at the time. I was certainly not opposed to continuing in industry.

Yost: How did you come to decide to go to Pennsylvania, and did Penn's Moore School of Electrical Engineering with its rich history in computing with ENIAC have any influence?

King: Well, a little bit. Of course, when you read about ENIAC, you read about Penn. Actually, when I look back, I was probably pretty naive and also ignorant about the whole process of applying to schools in the U.S. You know, I was there in Germany and I had no experience with this whole process. In Germany, you don't choose to go to graduate school, the professor chooses you to become his research assistant when you finish. The whole process in the U.S. was very difficult because every American school you applied to required you to have professors' written recommendations. At least at that time, German professors seldom or never wrote recommendations. Your diploma showed what you'd accomplished [laughs].

Yost: That makes it a tremendous challenge?

King: Is not easy to go to find three or four professors and then say please write me a letter of recommendation because they really don't know you. First of all, except for the professors you do your Diplomarbeit under, you really have no contact. You go to their lectures and they give the exam. That's it. So it's very difficult for them to say anything about you, more than what grade they gave you. So this whole process was sort of strange for me. I think I was just naïve enough to go through that; but looking back, it seemed to be almost impossible to apply for university here.

Yost: Who was your primary dissertation advisor and can you talk about the influence your advisor had?

King: Professor Gray, Harry Gray. And I actually had two professors; one is John Carr, and then Harry Gray. Harry Gray was my main advisor but I had two. It so happened that they had a joint research project and Professor Gray was more on the hardware side and John Carr was more on the software side. So coming from electrical engineering and given my computer hardware background, I naturally went toward the hardware focus with Dr. Carr.

Yost: You wrote a dissertation entitled, “Some Applications of Push-down and Queue Type List Memories in Digital Computer Design.” Can you briefly describe that research project and the funding?

King: [Laughs.] It was so long ago. Basically, at that time, that whole research project was exercising on John Carr’s philosophy in saying there is absolutely no difference between software and hardware. Anything you can do as a program can become a piece of hardware, and vice versa. Of course, you cannot have everything in software; you have to at least have the Turing machine or something to be a computer. But basically, the idea at that time was trying to design what was called the “growing machine.” You can “hang” devices on the basic machine, so they become a part, an integral part, of the machine, okay? Come to think of it, the numerous apps that people develop are special purpose machines installed in your basic computer called the smart phone. So every smart phone today is a growing machine. The pushdown is just a device that we studied and thought was useful to facilitate programming. Actually, to demonstrate the use of the pushdown concept, I got the patent for the pushdown device. But just because there was a patent didn’t [pause]

Yost: Didn’t mean it would have a large commercial application?

King: Right. [Laughs.]

Yost: As you completed your degree, can you tell me about your job search?

King: Again, I had no experience. I just came here in the US, to study and when I was done, I just wrote some letters and applied to some universities and some companies. And this was actually not a very good time to find a job. I don’t think there was a depression but it was not really a good time [pause]

Yost: That was in 1969, there was a recession in 1969-1970, which hit some IT industries harder than other industries.

King: Yes. So I got some job offers, some in industry, actually. One at that time I remember was Shell Oil, also in Houston; and the University of Houston offered good opportunities so I just took the job at the University of Houston. Again, it's sort of very interesting because at that time, people said "You're crazy, why are you going to Houston, it's so far South? There's nothing there." Maybe it was my upbringing because I thought you should take the job whenever you get an acceptable offer rather than wait for another few months to find a better offer. And I never thought that I would stay here forever, to tell you the truth. [Laughs.]

Yost: Did the University of Houston, at that time, have a computer science department?

King: Yes. It's sort of very interesting because the University of Houston did, at that time, already had a department, a fully functional department for two years.

Yost: One of the earlier departments of computer science.

King: Yes, and another thing was in my mind, at that time, I didn't consider computer science and computer engineering to be two different academic disciplines. In Germany, I studied at the Technische Hochschule, which is really is an engineering university, they have only engineering disciplines, but you also have mathematics and programming there. So there, everything is engineering. But in this country, computer science is often considered more science rather than engineering.

Yost: Among other important papers you published early in your career was one on output devices sharing by many computers. Can you tell me about that research?

King: I don't remember the paper. [Laughs.]

Yost: I have a copy of it.

King: What's the name of the paper?

Yost: I'm not sure I have the exact title; the subject is device sharing by many computers.

King: I don't quite remember the context, but basically you are trying to share expensive resources.

Yost: Output devices sharing the main computer system?

King: Yes. At that time, the beginning of the PC, output devices were projected to be so much more expensive than the central processor. It's typical of many computer systems that peripheral devices might represent up to 70 to 80 percent of the total cost. So it makes sense that many partners share the same output devices. That was the outcome of a master's thesis of one of my students.

Yost: Had you become a member of the Computer Society while you were a graduate student at Penn or did that come when you moved to Houston?

King: Actually, I joined the Computer Society as a student member. Even in Germany you heard about it. At that time, there was no Computer Society. It was [pause]

Yost: The Computer Group?

King: Actually, I wasn't aware of the Computer Group, but the IRE published papers related to computers so I was aware of the IRE.

Yost: There was both the committee or subcommittee of the IRE, as well as the AIEE.

King: Yes. And since I was in the communication side, I was more aware of the IRE than the AIEE. When I came to the United States, to Penn, there was a student branch so

I naturally joined it. Actually, I remember I was the computer student club vice chair of that chapter for two years.

Yost: And you became, in 1970, the chapter chair for Houston.

King: Yes. I came to Houston and that chapter was not active. I think the chair was held by somebody at Rice University and he was not really quite that interested or active with this, so basically I took over by default. [Laughs.] I thought that it was useful, if nothing else, to maybe invite some speakers to benefit the students.

Yost: And then from the mid-1970s to the early 1980s, you were the Southwestern Region Chair?

King: Yes. So again, I noticed an opportunity; I think it was pretty loose at that time. I attended some national meetings and got to know some of the people in those conferences. I think that, at that time, to help the administration, the society divided the world into regions following the same pattern as IEEE, so this is Region Five.

Yost: Can you describe the Distinguished Visitor Program of the Computer Society and your leadership of that in the early 1980s?

King: Yes. Well, I think Steve Yau was the person, if I'm not mistaken, he was the one that initiated the Distinguished Visitor Program and it was run by someone I don't recall now. And I used the program quite a bit; I would invite people to come here, give talk for the students, and also for the faculty to benefit. There was not much of a computer industry in Houston, so the chapter served mainly the academic community here, maybe also NASA. Then I think that the person who previously ran the thing departed, so for whatever reason, I was given the job to run the Distinguished Visitor Program for them and did this for a number of years. And because the Computer Society at that time was expanding rapidly, they had the resources so that we could expand the program.

Yost: As I understand it, you helped form the Computer Science Accreditation Board. Can tell me about the origin of CSAB and the role you had in it?

King: Back in the late 1970s, early 1980s, the computer science departments of the whole nation had the same problem of finding qualified professors to teach computer science. Computer Science was the hottest topic and so many universities without qualified faculty would just announce a program called computer science and offered degrees in computer science. And a number of us felt that it gave computer science a bad name. So at one point, we identified something like 200 programs over the country and they were all over the place - in business schools, departments of statistics, mathematics, electrical engineering — everywhere — and someone, I don't know who, pointed out if you looked very closely, some of them didn't even have any faculty with any background with computers. Of course, at the time this was still a very young discipline; people came from mathematics and engineering, they all tried to teach computer science; but still, we felt there should be certain reasonable limits. I remember, at one point — it must have been in the early 1980s — I had a conversation with Oscar Garcia and the idea was that we should have some kind of certification or "accreditation" to identify that a program is legitimate. We just had some talk about it without taking any action. But it planted some idea in my mind. Then other people started talking about it and naturally, I, servjng in the Educational Committee at the Computer Society, became involved. And then [pause]

Yost: Did you sit as a member of that committee for a while?

King: Yes. Well, that was in the early 1980s, and we essentially had a number of people representing the Computer Society and a number of people representing the ACM. And together they formed a committee and drafted the formal documents to form the accreditation board.

Yost: Did the people coming from the Computer Society and the people coming from the ACM see things largely in a similar way or were there some major differences?

King: I think; obviously, everybody has opinion, but I don't think that in those days there was clear Computer Society position versus ACM position [pause]

Yost: And obviously, some faculty are actively involved in both.

King: I must also say that before, in the 1970s, in the [Computer Society] Educational Board, there was Prof. [C. V] Ramamoorthy, and I believe, one other person, Taylor Booth; they came up with what is known as the model curriculum. But coming from Computer Society it was more engineering-oriented. At the same time, ACM also came up with a curriculum. So initially, there were two separate model curricula; but when we talked to ACM, there was not too much controversy in combining the two to come up with a common program, as I remember it.

Yost: As a process of combining the two curriculum models, were there any fundamental debates that went on in the early years of CSAB, among the participants, and if so, what were the natures of those debates?

King: Well, I suppose people only joined the group because they were for such a program, so I don't think there was any philosophical debate. I don't remember any. But there was a lot of serious opposition to the organization and, as a matter of fact, I think there were ten schools that the deans signed an agreement that they are not going to join the accreditation. Some of the schools took the attitude that "we are much better than what you describe as minimum standards so why should we join". So from the outside there was a lot of opposition, as I remember. But from the group itself, they stood pretty firm saying that we need that in order to distinguish ourselves from those programs that don't provide quality computer education. I don't know whether that answered your question.

Yost: Yes. But to clarify, am I understanding correctly, there was more opposition coming from some of the more established programs. For instance, not necessarily all of the Big Ten had firmly established programs, but certainly Michigan, and Purdue, and the

University of Illinois had done a lot of pioneering work and had substantial departments by then.

King: Oh, yes. Well, the Big Ten actively tried to really destroy us before we got established because they really felt that this was another thing that they really didn't want to deal with. Now maybe the universities you mentioned, they felt confident enough that they did not need to get academic accreditation. Maybe some other universities felt they might be pressured by such an organization; that it was yet another job that they don't want to take on.

Yost: Was there also some opposition from smaller, more marginal programs in smaller schools with less resources and less of a research profile that felt they would have difficulty meeting the accreditation requirements?

King: Well, the Big Ten schools really organized themselves to come up with an announcement saying that they are not going to participate. If others had any opinion, they never made it so commonly known, so we wouldn't know.

Yost: It would've called attention to their program, in a way that they would not want. What was the accreditation process in the early years?

King: Well, you see, engineering has always had accreditation so the Computer Society, being more from the engineering side, had many people who welcomed the accreditation process. In the early days, we actually hired a staff person from ABET to help us organize this thing. We also, I believe, rented some office space from ABET. I think it was where the headquarters of IEEE was. Anyway, we, tried to follow a lot of the guidelines from ABET, and their engineering accreditation process.

Yost: And the acronym is . . . ?

King: Accreditation Board for Engineering and Technology. Now, I don't remember the previous name, probably ECPD… ABET is their more recent name. After many years, eventually the Computer Science accreditation board merged with ABET.

Yost: You were president of CSAB from 1993 to 1995. Can you tell me about that leadership role and what were the challenges, and what were the accomplishments?

King: Everything was new, so they organized the Computer Science Accreditation Board, the CSAB, in such a way that there was a governing board. It was eight people; four from Computer Society and four from ACM. Beyond that, there was an executive committee, the accreditation commission, that actually administered the accreditation process. The accreditation commission consisted of a committee of six people and the idea was that the commission would train and send people out to be evaluators, to write the report, and approve or disapprove the school to be accredited. Now, the Board itself would be the last place of appeal. If some school disagreed with the process they would need to have an impartial organization to review. So the board would settle this separately from the details of that operation. So I was once chair of the commission, to organize the accreditation.

Yost: And so the appeal would be to the board?

King: So the governing board was just the highest entity to set the policy and things like budgeting, and assigned the detail work to committees. Everything was new at that time so first of all, we got a group of people and sort of trained ourselves to be evaluators and understand the criteria well and then go out to do the accreditation.

Yost: And you were leading this activity for three years?

King: Yes. Actually it was only two years, the terms straddle a calendar year, so it may look like three years. All these positions were big time-consuming jobs and have term

limits. So you can only serve so many years in any position, and so the natural thing was that after you served [pause].

Yost: By the, say, early 1990s, what level of participation was there among, say, the leading 50 or the leading 100 computer science departments around the country?

King: Interesting. It was very uneven. For example, M.I.T. joined very early. So did Berkeley. Now, later on, I think the State of California made it a requirement that everybody in the system had to join. Some of the deans were afraid that the State of California would make it a requirement so all of the UCs were accredited. Now, on the East coast, I don't recall too many prominent schools except for the one I remember is M.I.T., joined very early. So in the first year, we had a lot of people trying to be accredited and we knew that we cannot handle that many schools, so we actually delayed a number of applicants saying that we can only do so many a year — I don't remember the number — maybe 40 schools we accredited that first year.

Yost: Was it done entirely on the basis of lottery for fairness or were there exceptions?

King: I don't remember exactly but I think more or less; because you have to come up with a fair way so that people don't say why are you selecting this school to be accredited and not this school? I think we just did a lottery-type of thing, so it's a pool; some simple tables for categories of schools or something like that. You get a very representative mix; some bigger schools, some smaller schools. Some schools in engineering some in science and even some in liberal arts colleges; the accreditation process was that once you were invited to apply then you first of all, you volunteer — it's voluntary —to be accredited. Then we say okay, we will try to evaluate you. Then you have to answer a questionnaire that details the relevant information about your school and your program. And some schools, actually, after they went through that they said they didn't want to do it at this time, and so on.

Yost: And were; did the schools pay the fee to support the evaluation, was this a self-supporting program?

King: Oh yes, the schools paid a fee; the school paid a fee for the visit because we sent typically three people to visit a program and that had to be paid by the school. Actually, the school paid in addition to that, some kind of overhead.

Yost: Did that allow it be self-supporting, so that the CS and ACM weren't having to subsidize it at all?

King: No, definitely the first three or four years, or actually even longer than that, the Society and ACM subsidize the operation. Definitely. It's very difficult to operate without subsidy, you know, we had to have at least two full time staff and an office so there's quite a bit of expense even though all the officers and evaluators were volunteers and they were not charging anything. But still, you know.

Yost: Other than yourself, who were some other key leaders in CSAB, both on the Computer Society side and the ACM side?

King: Ray Miller. Ray Miller, when this whole thing was organized, I think he represented ACM; later on, he was more involved with it in IEEE Computer Society than ACM. I think Taylor Booth, who unfortunately died suddenly, was prominent in the Computer Society. I think Tom Cain was another person I remember. Mike Mulder, Computer Society. I'm very bad with names. I just thought of one name in ACM and now I forget. I will come up with it. [Laughs.]

Yost: Did you see CSAB as fundamentally influencing how computer science was evolving by the late 1980s, early 1990s?

King: I believe so. I think the craze of studying to become a computer scientist died all of a sudden because of the collapse of the dotcom bubble. So in the 1980s and 1990s,

there were more computer science majors than we could ever handle. And this was not just my personal experience, it was true all over the country. I think accreditation really had an impact on the demise of some of some of the less legitimate programs. And even though some people insisted on not going to accreditation, they might still look at our documents and check to see if their program was more or less legitimate. Now, that's my view and I could not give you solid evidence on that.

Yost: Obviously, with Computer Society and ACM behind this, it's the most important accreditation body. But where there other competing accreditations in computer science?

King: No, there were none. There was--I don't know the name or the acronym now--the national accreditor of accreditation bodies. And I remember we finally got accepted by them; being recognized by them made us even more legitimate because now we were accepted by the accreditor of the accreditating bodies.

Yost: In 1999 you published on computer science curriculum and an intercontinental project, essentially a student exchange project. Can you tell me about that project and its significance?

King: Well, what happened was that the group grew more ambitious by saying "can we have some kind of international accreditation?" We had witnessed initially the engineering parallel, which is called the Washington Accord, you might have heard about it. The Washington Accord was designed by a group of international engineering programs. And they were signed by six English-speaking countries, including Canada, Britain, Australia, U.S. — I don't know who else — but six countries. So they agreed that if you graduated from an accredited program in one of these countries, you could come to a different country that, under the accord, you would also be considered accredited. So what we wanted to do was to do something similar to that. I got some NSF funding to have three schools here in the United States, and three schools from Germany, and three schools from Britain; no, I'm sorry, not three schools. I got three schools total, one school in Britain, one school in Germany, one school in France, and three from United States, to

come up with an exchange program so their students could go across the Atlantic to take classes and get recognized as equivalent credits so that they would not lose time in their study. This provided evidence that our programs were similar and eventually we could have mutual recognition of accreditation. So I think that that's what is referred to. We, in the United States had three schools; one is University of Houston, one is Connecticut, and one is Towson. By the way, the ACM person is Doris Lidtke.

Yost: Thus far I have tried to focus a lot on your CS roles. Can you talk a bit about your research in the 1970s and 1980s? What were you interested in?

King: Well, basically, I came from what was a computer engineering background, so my area is computer architecture. So I did some research in microprogramming. I was also very much interested in the issue, which is sort of software/hardware issue, of trying to do automatic program translation. You run a program on one machine and now when you have only the object code, how can you run it on a different machine. This is actually a major problem for the industry, but is a very, very hard problem. For example, some companies, including the Department of Defense, had written programs in COBOL and ran for years on one machine. Now they have to move that program to another computer. But their source code may no longer be available. All they could do was to simulate the original computer on the new computer, which is very, very inefficient but they dare not change anything because it's working. If they change something it's bound to have problems. So there was one issue that I try to address; I actually wrote some papers on that. I had a student working on that.

Then later on, the memory issue. You know, how are you going to use different levels of memories and make the computer more efficient and things like that.

One year I got to know a person from IBM and he invited me to his research lab in San Jose. At that time, we were interested in the Chinese language computer. The input of Chinese language is a major problem; was a major problem. So I did some study on that. These were the types of research I was doing.

Yost: You were chair of the department from 1979 to 1992. Can you tell me about that administrative role and the strategy for evolving the computer science department at the University of Houston?

King: Well, the chairmanship really consists of a three-year term and is elected by the faculty. And one year, the former chairman decided to take a leave and the dean appointed me to be an interim chair for that year. And the department was, at that time, very small. I think we had only nine faculty. So after that year I got re-elected several times and finally I thought I had enough of that, I don't want to do that forever. [Laughs.] So in the first three years or so, as I mentioned before because we had more students than we could handle, the focus was to solve the heavy teaching load. We could not recruit enough faculty. Even though we were given positions we could not find qualified faculty. Also being a state university, the admissions process was basically out of our hands; the department could not specify a separate admission standard; so we would have two thousand students in a beginning class. It becomes a big headache for the chairman. So basically, one thing was to recruit faculty; the second thing is convince the university to give us special privileges in admission standards, in order to manage the system. Then accreditation helped me. I wanted accreditation in particular so that I could use it as a reason to ask for resources and ask for limitations on student admissions, and all that.

Yost: To provide supplemental admission of majors [pause]

King: Yes. But you see, the faculty were required to teach undergraduate classes. But these same faculty were evaluated on their research; getting grants and all that. So it becomes a very difficult problem. On the one hand, you cannot simply dismiss all the students. Secondly, you have to provide the faculty members the opportunity to do research so that they could be promoted.

Yost: What was the standard teaching load in your early years here?

King: Well, initially, it was three classes. I taught three classes per semester. We were the new kids in the college, and we were having so many students [pause]

Yost: Some very large classes.

King: Yes. So in a way, we became some kind of cash cow for the college. So finally — of course with approval of the administration and all that — we reduced the teaching load and taught two classes per semester. But still, it was quite a bit. As the chair, I got some more reduction in teaching load but then the other type of interruptions more than make up for that…. Finally, we did manage to increase our faculty to, I think by the time I stepped down from the chairmanship, we had something like 22 faculty members. But it was still too small given our student load.

Yost: Prior to becoming the President Elect of the Computer Society, besides CSAB, were there other fundamental roles you had with the CS; obviously, the regional organization?

King: When I got involved with the CSAB operations, I did not really participate too much on Computer Society activities, because for obvious reasons; they understood that I was busy. Since CSAB was being supported by the Computer Society, we had to report our progress at every Computer Society Board meeting, in this way I still kept in touch with the society. Only after I stepped down from CSAB did I actively rejoin the Computer Society activities.

Yost: You didn't really have time when you were doing CSAB.

King: [Laughs.] Yes. So I think I went back and became the vice president for educational activities; and there was also the time that I initiated the Model Curricula 2001. It was in 1997, and I thought we needed to immediately start having a new curriculum because I knew that it would take time for the two societies to get together, to get the people to agree on certain things. But still, it took much longer. My aim at that

time was to get this thing published in 2000, but it was still delayed and finally, it was under Carl Chang, when he was Vice President for Educational Activities, that the curriculum was officially published. I held that role for for two years, then I switched to be the Conference and Tutorial Vice President for two years.

Yost: What years were those?

King: If I remember correctly, 1997-1998 I was Vice President for Educational Activities; 1999-2000 I was the Vice President for Conference and Tutorials. But I think 1999 I was elected as the Second Vice President, which is an elected position but you also are given a portfolio to do something. In 2000, I was elected as the First Vice President.

Yost: And as VP for Conferences and Tutorials, what kind of initiatives did you launch or focus on?

King: Not really many new initiatives of my own. At that time, I think the Computer Society ran something like 150 major conferences every year, and every conference you have to present a budget, program, and this has to be approved by the vice president. So this is part of the routine that you have to go through. There would be new conferences initiated by the volunteers and you have to negotiate to see that everything is in order. But a lot of the work is done by the staff—we had a good staff, who had experience in looking at the budget, and so on. The main issue with the conferences was that we had so many conferences, but most of them did not make money. Now, we are not a for-profit institution, but we do need money to run the rest of the program. The real source of income for Computer Society is publication, which is maybe 80 percent of the income that we got at the time when I was involved. And the conferences, maybe 20 percent.

Yost: And where did membership fees come in . . . ?

King: We don't really get any money from membership. The money we get from membership basically, is given to IEEE. If there's anything left, it's so small that it's really negligible; at least at that time, that was the situation. So we basically ran our operations based on the publications and conferences. The conferences have their own problems. At any particular period, there were some hot topics and the conference became very, very successful; and later they became sort of dominant. Now, usually it was okay, but sometimes some volunteers become irritated and complained that "I generated all the money and you just took it from me. Why can't I retain the money and do what I think is better for my discipline? "They certainly have a point; it's valid in some sense, but also, initially, they needed the name of the Computer Society to organize the conference and attract people. Once they got established, they are known by themselves and may have no need to have the stamp of the Computer Society and usually when something like that happened, it created problems.

Yost: Were there attempts by some to move a conference outside of the Computer Society?

King: Yes. There are famous examples. For example, I think in the 1970s, one conference was very, very successful--a very large database conference. The very large database conference (VLDB) became so successful eventually they moved on and established their own organization. Among all the conferences, usually only a handful that were prominent and you really have to take care of them to make sure that [pause]

Yost: And exciting new areas that are just getting started, there's perhaps a need to, for a short time, subsidize until they reach a critical mass.

King: Yes. But some conferences after a while went the other way, because they just don't have enough interest from the membership anymore but most conferences are successful. Actually, many conferences are annual conferences that are running, you know, 30 years, 40 years, and so on.

Yost: The conference we studied a bit at the Babbage Institute, because we're doing an NSF computer security history project is the IEEE Security and Privacy Conference. That started quite small, but has become a very influential and has been sizable for a number of years.

King: Oh yes, for obvious reasons now it has become large.

Yost: So that's an example of something that was insightful and important for CS to fund in the very beginning and give time to grow.

King: Yes. We do that because we have good volunteers. They see the need and they invest their energy to make it work. For example, there's one — now you have interviewed Carl Chang — so you probably heard about the software conference, Computer and Software Applications Conference. It's a very successful conference. I think Carl Chang handled it very well. One important conference when I was involved in as the VP was the international testing conference. From the monetary side, it's very, very successful; but the conference itself is also technically a legitimate, important conference, no doubt.

Yost: Can you tell me about your decision to run for president and what your goals were?

King: Well, there, of course, is the nomination committee, and when you are nominated, it's not typical to say that I don't want to run, okay? So they nominated me for Second Vice President, and to my surprise, I won the election. Then they nominated me the next year First Vice President; I won again; and then they nominated me to be President-elect and at that time, I used to say that it's an honor that you don't say that I don't want to, unless you really feel that you cannot do it.

Yost: Of course. In addition to the nomination process and the honor of it, there's also putting forth, of course, presenting a vision for people to decide between candidates. Can you talk about the vision you had for the Computer Society as president?

King: Well, actually, it's not this way; once you know you've been nominated then you try to say what you would like to do to help the Computer Society to advance. At that time, I think the most important thing for the Computer Society to serve its members was to provide career education. So I emphasized that particular point; I said that because the field evolved so quickly, all of us need continuing education and Computer Society is in the unique position to provide this kind of low cost, worldwide education; and that's what I emphasized.

Yost: You became president of the Computer Society in the aftermath of the dotcom collapse. And that, of course, had an impact in the field of computer science and the broad IT industry. I assume, it had an impact on, to a certain extent, membership and activities and possibilities of the Computer Society. Can you talk about how you handled that challenge?

King: Actually, the membership issue was a delayed action, so I remember the year that I was president the membership reached a peak of over 100,000 even though there was a market collapse in 2000 and then the dotcom collapse in 2002. This was the year I was president. So the membership decline was after my year but the real challenge to me, and to my immediate predecessor, was the Computer Society really underwent an internal crisis at that time. In 2000, the executive director, Michael Elliott retired or was asked to retire, basically. And I don't know, when you interviewed Carl Chang, did he mention this? I don't know who else [pause]

Yost: That's come up in several interviews and I've also done research in the archives, so I know that there was a conflict with the executive director of the CS and the leadership of the IEEE.

King: Yes. So he, Michael, was a very strong and effective executive director for 18 years. So the year that I got nominated; when I got elected, before I assumed the job, I was President Elect, he retired. So that was a big crisis for the Computer Society and we had only an interim executive director, who is still staff at the Computer Society today.

Yost: And that's Anne Marie Kelly?

King: Anne Marie Kelly, yes. So my predecessor, Ben Wah, and I basically had to take on much more of the internal workings of the Computer Society than most presidents typically do. In my case, we hired a new executive director, November the year before I became president. So he was completely new and he needed to be trained and to be briefed on all these things. So I became much more involved, as the President Elect and then as President, in the internal operations of the Computer Society than I believe almost all other presidents.

Yost: Important transition time after a strong, long term executive director, is that right?

King: Yes.

Yost: Can you tell me about the origin of the Total Information Provider project and what was accomplished with that during your term as president?

King: We were very ambitious. The idea was that we were going to come up with a portal so that all information related to computer and computer science can be searched digitally through this portal and hopefully we can create discussion groups people can use to exchange information. The digital library was in its infancy and we wanted to expand it. The Total Information Provider is sort of a catchy name, though some people didn't like it. But I don't think we accomplished all that much compared to what we visualized. This is a much bigger problem than we visualized. I think maybe I was naïve in thinking that we could make our digital library very accessible. The key problem at that time was the search engine and I spent a whole lot of time trying to push to improve our search

engine but my naiveté is that since this digital library, we have all the key words, we have all the titles, we have year, we have authors, it's a limited amount of information, it should not be that difficult to search through that database to retrieve the information you need. But it appears to be much more complicated than that and, of course, Google took over, so we wasted a lot of effort trying to accomplish that.

Yost: I think many organizations had ideas of portals and learned how difficult that really is, to develop effective tools to truly optimize search.

King: Yes, and as I say, we were ambitious, we were also naïve I think.

Yost: You wrote a short President's Report that was published in *Computer* and mentioned that there was a substantial decline in reserves and this directly constrained the ability to fund initiatives. Can you elaborate on that?

King: I mentioned that during that period the Computer Society was facing some crises. One crisis was the retirement of the executive director. The second crisis was a direct result of the market collapse in 2000. The collapse of the market of 2000 resulted in a substantial loss of money for the IEEE. IEEE had an investment committee that advises them how to invest and they lost a whole lot of money. Now, the Computer Society being a unit of IEEE, our property; we don't really own any property. It belongs to the IEEE. So IEEE out of desperation basically took all the societies' resources for them to continue their operation. So all of a sudden, we lost a lot of money. Not directly, not because we had any direct investment, but nevertheless it was a big loss of resources.

Yost: On the publication side, there were a couple new publications that were launched; *Transactions in Mobile Computing*, and IEEE *Pervasive Computing*. Can you talk a little bit about those?

King: Those, actually there's another one that I was more involved in than those – Security and Privacy. They use a rigid, a very careful screening process when

publications are approved. Some volunteers have to write a proposal to justify why this publication should be there and you go through the publication board, and then you come to the Board, the highest governing body of the Computer Society, and it is voted on. So basically, you have to come up with the budget justification, and usually you have to come up with seed money; you know that in the first few years you are going to lose money. That's always the norm. So as long as we can come up with the budget and we feel that it is a legitimate proposal, we approve it. My influence when I was president might have impacted the decision of the board, but I view this as rather minimal because I think the credit should go to the proposer who sees the need for that magazine. They are the ones that come up with the idea, come up with a good proposal to convince us that it is a good thing to do.

Yost: What aspects of your presidency are you most proud of? And alternatively, and you may have already addressed this with the financial challenge associated with the IEEE, also the leadership challenge, but what did you find most challenging about being president?

King: I think there were challenges that are really left unsaid and unseen. To me, it's sort of unique in that even though I had a new executive director who was new and did not know all the personalities involved, I was pushing for the digital library, and not only the digital library, but to digitize all the publications. Because my view at that time was that this is coming whether you like it or not. We better be the leader rather than the follower. Okay? Now, the publication office is on the West coast. The headquarter is in the East coast. Before I stepped into the scene, the previous executive director established an IT division, and the director of the IT division was responsible to produce a digital library. Now when I was pushing to convert everything to digital, initially there was some misunderstanding from the publication side that maybe we are going to take away the publications from the pubs to give to the IT people. And I don't know if it's me or there was already probably some turf war. Now I don't know whether this should be on the record or not, but between the IT and the pubs, even before I was there, the publications people believed digital library should belong to publications--why should it now be done

by somebody else? And then the fact that I was pushing everything to be digital made it worse because people misunderstood. I needed to make sure that they understood that publications still handles everything from submittal, getting a paper reviewed, etc and whether the final product is digital or print is immaterial. So I spent a lot of time trying to calm them down, and things like that.

Yost: What were you most proud of in your accomplishments as president?

King: [Laughs.] I don't know what I'm particularly proud of, but I think we survived, the fact that we survived is [pause]

Yost: Leadership in a challenging time, that's a major accomplishment.

King: Yes, because it's more than just the reserve was taken away; more than just the executive director has resigned; our financial model also became drastically changed during that period. Up to that point, everything was in print form, and the formula for publication was that IEEE agreed to reimburse the society's publication based on the number of editorial pages published. Now, with the digital form of distribution, the digital library, they could look at the number of times that your publication is being accessed, and the statistics came out quite differently from the number of pages printed. And that's a new battle that we had to fight, seeing to it that we maintained our income source.

Yost: It is an algorithm the IEEE uses for apportioning funds to the publications.

King: Yes.

Yost: In the years immediately following your presidency, what was your goal for the Computer Society? I believe it was 2007 you became History Committee Chair, which I'll ask about in a minute, but prior to that what CS activities were you involved with?

King: Well, the executive director that came the year I was president was basically fired. Maybe around 2005 -- I think he was there for five years, which might not be unusual because I think that that's an average tenure of executive directors. But anyway, I was not involved with these issues, but that demanded that we needed to hire another executive director and I was asked to be the chair of that committee to recruit, so that took me some time. And then there are other issues in there as well, basically, related to the tech issues that I continued to get involved with, through work in committees and so on.

Yost: And can you tell me a little bit about your leadership of the History Committee from 2007-2010? What were some things that you worked on in that time?

King: Well, I inherited that committee from Mike Liu, who was the chair for many years. And at that time, I was trying to document our accomplishment in standards; I thought that the Computer Society has done a lot of work on standards and the standards are being used universally. And the Computer Society is not sufficiently recognized for doing that work so I was trying to focus on trying to find information on that and documenting it. For example, one standard — I don't remember the number now, 754? — the floating point standard was universally used in computing. But that was relatively easy because there were plenty documents on that. The other standard I thought was very important, again, universally used, was standard 803.11 for wifi, for internet, you know, all these. The Computer Society played a major role in getting that standard established. And I tried very, very hard to find the people that were involved in that but essentially, I gave it to my successors to continue to do that. I know that [pause]

Yost: Dave Walden began working on that.

King: They are still working on that. [Laughs.] Because I worked on it long, but I just could not get the [pause]

Yost: I think Dave, is planning on putting together what he found and making it available on our site.

King: I thought he was because he knew some of the principals. Finally, I checked on it and they told me that there was this DVD or something like that, of the 30th Anniversary or committee celebration, and they talk about the experience. Somehow, I could not get hold of the disk and I really wish that that project could be done.

Yost: I think it will get some attention. I probably in part to blame as I recruited Dave to work on this interview project, which he has contributed mightly. Our project to do some background research on past presidents and conduct these interviews.

King: But before that, and we were just trying to document whatever we come across; we extended the line of the Computer Society history and put it on the web because these things empower us. You know, sometimes reading it makes people think of something, and then they add to it. I hope that that is still on the web, that people can access and hopefully it can be extended beyond.

Yost: Yes the timeline is available. And with Susan Land, you co-published an important short article on the history of the Computer Society.

King: Yes, actually; I was invited to publish something on that anniversary so I just asked if anybody wants to join me and she said okay, I will. [Laughs.]

Yost: There hasn't been much published and it is a very useful article. Finally, are there any topics I haven't brought up, questions I haven't asked that you'd like to discuss before we wrap up?

King: When you approached me I thought well, what can I say about this thing? This seems to be very difficult and I'm sure that there are things that were very important at that moment but that I've already completely forgotten about it.

Yost: That is always true, for all interviewees. Well, this has been extremely useful and I thank you very much for your time.

King: Thank you for taking the effort. I hope it's useful. The years went by very, very fast. The thing about being a president is that some people said that there are only three meetings, and after the second meeting you are already done, everything's already set; there's not very much you can do about it after that. I was sort of fortunate in that I was advised by one of the previous presidents that you really need to start as a president elect. If you wait until you become president to start to do things, then it's too late. And I think that is a very important message for the future presidents. You really should spend time to organize what you want to accomplish. If you don't do that then there's no hope that you can do anything. There is so much travel that you have to do that takes up a lot of your time. And there are the meetings that you have to go to, so I was lucky I still delivered more or less my election promises. Anyway, I thank you very much for your patience. I don't know if I give you what you want.

Yost: Thanks you, this has been very useful.