An Interview with

STEPHEN WALKER

OH 409

Conducted by Jeffrey R. Yost

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Computer Security History Project

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Stephen Walker Interview

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Abstract

Steve Walker, a computer security pioneer and entrepreneur, began his career at the National Security Agency, before becoming a manager at ARPA's Information Processing Techniques office in the first half the 1970s. He later served in the Office of the Secretary of Defense as an expert on computer security and organized key early meetings of some of the nation's foremost computer security experts that were held at the National Bureau of Standards. In the early 1980s Walker's career took an entrepreneurial turn as he founded Trusted Information Systems. This company became one of the earliest and most important computer security services and software products firms – producing Trusted Xenix and pioneering the firewall area of the computer security software industry. After TIS was sold, Walker worked for a number of years as an IT venture capitalist. Walker discusses his days at NSA, ARPA's IPTO, OSD, and his leadership of Trusted Information Systems in this interview.

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Yost: My name is Jeffrey Yost, from the University of Minnesota. I'm here today in Glenwood, Maryland at the home of Stephen Walker to conduct an interview about your career in computer security history. This interview is part of the National Science Foundation sponsored CBI project, "Building an Infrastructure for Computer Security History." I'd like to begin with just a few biographical questions. Can you tell me when and where you were born?

Walker: I was born in Chicago, Illinois on October 14, 1943.

Yost: And did you grow up there?

Walker: No. That was in the middle of World War II; my father was in the army, actually. He was called up in the army on December 6, 1940, for one year of service. And of course, December of 1941 we were at war and so he didn't get out of the war until after 1946. Anyway, he was working in the narcotic bureau of the different branches of the government. I grew up in; my earliest memories are in Kansas City, Missouri because that's where we were living then. And when I was in the sixth grade, we moved to Boston, to South Weymouth, and he was the head man in that branch of the narcotic bureau. Now, in those days the narcotics bureau checked the signature on the pieces of paper and all. There was not a narcotics problem at all there. But I remember going into his office and they just had stacks and stacks and stacks of these prescription things and I thought wow, this is nuts! What's going on? Anyway, that's just an anecdote. When I graduated from high school in Weymouth, Massachusetts I had decided I wanted to be an

electrical engineer. I don't think they knew anything about computer science, at that point. But I just loved it.

Yost: What led you to that interest?

Walker: My uncle in Montana had a ranch at that time and he invited the kids in the family to come out for a couple of weeks or a summer or whatever. I was there for eight or nine weeks. I can't quite remember the year; and I remember just realizing things that were happening. For example, you look at telephone poles and they've got wires. Okay, well what is all that? When you're out in Montana and it's 30 miles to the next ranch, you see these poles and you see these thick wires and you see the thin wires. Well, what's the difference? What's going on? Well, one of these is for electricity and one of these is for telephone. Oh, okay, well that's cool. And it suddenly it just sort of bloomed in me, you know? Well, later when I went to Northeastern, I think they had five or six different engineering schools. The one that I wanted was the electrical engineering school, and I got it. It was the toughest one there. And I enjoyed going to school at Northeastern but Northeastern is a cooperative education school. You go for the first three semesters full time, and then they ask you where do you want to have your co-op job? And I thought about it for a minute or two and I thought well, I would rather; I'm living at home, anyway, going to school. So I'd rather go somewhere else. That was the gist of the first interview. The second day they called me back and said would you like to go down to Washington, D.C. for an interview? Sure. Actually, I'm not even sure they said that. Would you like to go down to Washington, D.C. for the weekend? And so they flew us

down; four of us. And we had a great time; I'd never been here before and all that. That was good. A year before, friends of ours; a mother and two daughters were going down to Florida where her husband had moved. And they wanted me to come along just to have another person come along. And I drove through the tunnels in Baltimore and down past; through Washington and on down; and I didn't think much of it. It was pretty cool. That was in 1960. In 1961, they put us in this bus from the hotel, and we were driving north and I remembered it was the Baltimore Washington Parkway, and all of a sudden we turned off and went over, and as far as you could see, the trees were gone and dirt was being moved. I realized that's the beltway; that's going to be the beltway. Just silly things like that. Well, I went up there and we spent three days being interviewed and all, and it was crazy. And they got us into some of the crazy stuff. Anyway, I had concluded they were not going to pick me 'cause, whatever, I don't know. But they did so starting in the summer of 1962 I had my first co-op session at NSA. I didn't have a full clearance so I could only go to one room and they had more oscilloscopes in that room than they had in the electrical engineering lab at Northeastern. And so that was an introductory thing to this. And then I had seven or eight more co-op jobs here, and by the time I'd had the third one I was; boy, I love this. I mean, because nobody else is doing this stuff and it's really neat. And what they had was all these different segments of things. Some of them were dealing with encryption, and all this other stuff. Well, the beauty of it was the programming; I just loved computer programming. I'd work at it all day and I'd go lay on my bed at night and think about it. And I just loved it. And so I had four years then of NSA as a co-op. Then I was accepted at the University of Maryland to get a master's degree, so I had two years more for that. But then I still had to do my two years in the

army, and that was; well, I don't know; we were in the middle of the Vietnam War. The army was just about to send me over to Vietnam. Well, when my friends at NSA heard that they said no, no, no, no, that's not going to happen. So I spent two years as a second lieutenant at NSA. I've never; well, I fired a gun on a rifle range but I never fired at anybody else. And then, when I got out of the army, I was looking around for things and NSA was beginning to think about how they were going to network their computers together. NSA, like a lot of organizations, they know what they want but they don't know how to get it and so they'll buy one of anything or three of anything just to see if it works and if it helps and so there were so many different kinds of computers at NSA. The people in charge were thinking well this is great, but we ought to be able to link these computers together because we could do a better job if we could (pause). Right. Well, it was about that time that I realized that it probably wasn't best for me to stay at NSA forever, I need to do something else. I was invited into the Information Processing Techniques Office of the ARPA [Advanced Research Projects Agency]; well, it was really the ARPANET program. DARPA. Well, it bounced back and forth, ARPA/DARPA for a while, and then it clearly became DARPA. And I thought I can probably do more and learn more by going to DARPA than I can staying at NSA. And so I did. And it was five years — seemed like a thousand — it was just wonderful. And basically I was in charge of the ARPANET. Then it was a very flimsy little tiny thing in those days.

Yost: What years were those?

Walker: 1973 to 1978.

Yost: So to move back briefly, what types of work were you doing with those co-op positions at NSA?

Walker: Well, that was anything because they were very good at picking five very diverse things. So there was one, they had sound rooms and they were doing voice stuff. I don't know why; I mean, I guess I do know why, but; there were others that were doing encryption stuff; they were doing just about anything. They didn't know what they were doing either. I mean, I shouldn't say that but they were willing to throw stuff at let's see what we can get from this. And it was like in the second or third one of these that they gave me some computer programming stuff and I just fell in love with it; it just resonated with me. I'd go home to our apartment and we'd lay in the bed for a while and I'd think yes, that's how that works; oh yes, okay. And so; but it was almost anything you might think they might be interested in. I got involved in five or six of them and I was totally sold on what I was doing.

Yost: Anything in the cryptography side?

Walker: Yes. Well, that's a big piece that'll come along in a little bit because I was at NSA and finally, the guys that were doing the computing; you know they had two or three of every computer because they didn't know which ones were really going to pan out. And they had the problem that we all had once they tried to link these together that

these things were being built by electrical engineers who wanted to maximize whatever they can get out of this computer. And so if you try to link them together, well, one guy's first bit is on one end and one guy's first bit is on the other end, and we used to have these fly offs all the time, just to try to figure out how could we get everybody to talk together because this is the only thing I know how to do, and you're not doing it, and I can't work with it. And that's where the ARPANET nodes came in and they solved a bunch of those problems by taking from whatever computer it was and putting it in their format and passing it out to whatever computer it was, and it didn't matter because those were incidental things on the end, they weren't being mushed together. And you had three, or four, or five lines between each one of these things, no less than three. So it was a massively redundant thing. One of the things that I — this happened a bit later on when the DCA [Defense Communications Agency] decided to build a nationwide center network — they had seven centers in the country. In New England, in Fort Detrick out here, and they were all; this was teletype stuff and they had all these wires going between there. You could pick up a phone and say something; it was a phone-based system that they used for teletypes as well. But there was no redundancy to it at all; there was nothing to keep it; if one thing went wrong it was over. And so, I remember in the mid-1970s giving talks to people about what they were going to do. They were going to put this center at Fort Detrick out here. Just about that time they were widening Interstate Highway 270; it had been a very simple little road; and I said you know, they don't need to put concrete down for that, they can just drive on the wires that they're going to have because there's going to have to be a line for every place out to Fort Detrick because it was the only place close to Washington, DC! And you had to have it redundant because it

had to go to Oklahoma, or whatever it was, and I said guys, this just isn't going to work. It doesn't make any sense at all and what you really need is to have a very small computer that sits in the facility and has at least three lines out. And if you have that; and then you can send them through wherever they go to get to the place, and if it breaks then they pick it up and take it somewhere else and get it there. I mean, it was the first time we had any redundancy of that sort. They were thinking telephones and it's like no, it's never going to happen. We had 50 kilobit lines, which were fast. They were hard to get but we had 'em.

Yost: And this is early to mid-1970s?

Walker: Yes; 1973, 1974.

Yost: Moving back a moment, you mentioned you did a master's degree at University of Maryland. Was that in EE or computer science?

Walker: Double E [Electrical Engineering]. Computer science didn't exist in those days. I mean, it was the electrical engineering department. Computer science started in the mid-1970s.

Yost: Were you doing computing and programming as part of that degree?

Walker: Yes. Well, let's see. Yes.

Yost: I think Purdue and only a few others schools had designated computer science departments that early.

Walker: Yes. I think Maryland was getting it but; while I didn't know whether Maryland was very good or not, it was easy to get to and NSA paid for my master's degree and all that. So I just did it and it was fun. I decided I didn't want to go for a Ph.D. And I was completely wrapped up in what was going on with DARPA. There are a million stories of that.

Yost: How did you make the decision and get the opportunity to become part of the ARPA information processing techniques initiative?

Walker: That was Steve Crocker. Steve Crocker was at DARPA in those days, and that's where we met, and he recommended that I come down there. I'm not a purist, computer science guy. I'm a guy who, oh, you want that done? Okay, I'll get it done. And my job was to make sure that the network ran. And when it didn't run, well, what's wrong? I was great friends with the guys at Bolt Beranek & Newman [BB&N] in Cambridge, MA, and shoot, I've forgotten a whole bunch of other ones; but this was the first time that a really intelligent system was created. So I was at DARPA for five years.

Yost: And when you arrived, had J.C.R. Licklider come back for a second term?

Walker: Yes, he was there for most of the time. I forget who the follow on guy was, but yes, Licklider's just wonderful; he's absolutely great. What an incredible bunch of people.

Yost: It must have been fascinating.

Walker: Yes, it was. I lived here. I had a house right over a little ways here and I had to be on the road by 6:30 but that was okay; and I got home at six o'clock, or seven o'clock or whatever it was; but it was just well, it was probably the best job I've ever had. But you're supposed to move on and after five years, the folks at DCI asked me to come over because I had been working on computer security as well as networking stuff, and they needed both of those.

Yost: What was your first experience working with computer security?

Walker: Well, it was derived from the ARPANET and it was originally just to make sure that the links were; we weren't encrypting the links but we were thinking about doing that, and what it would take to do it, and what the problems would be. But when I; I set up a bunch of seminars at NBS/NIST [National Bureau of Standards/National Institute of Standards & Technology] talking about security and how we're going to have to put security in this stuff because certainly for classified stuff, but also for your own stuff, for crying out loud. We had a bunch of seminars out at NIST, I guess we did it once every eight [months] or so for several years; just bringing people in from all over; bringing

people in from Europe; and just get people to talk about this because nobody talked about it. They didn't know how to do it and so they didn't want it to get in the way of what they were doing. And then there were some breaches that were not very good and some of them were very bad. And so that was still in the time that I started the — what the heck did I call it? — anyway, it was a seminar on network security and it was so primitive that we (pause)

Yost: Do you recall what year that started?

Walker: I was at the Pentagon at that point; it was 1978, 1979. Don Latham was my boss, and he basically; Don Latham was the deputy undersecretary, or whatever, and then there were five offices under that. Mine was computers and networking. That was it. And I had two other people working with me. So we put on these seminars and I think they were the first time that people actually thought that there was hope to do something with this because we can't just be shooting this stuff out into the wind and hope to have other people not pick it off. So there was a lot of encryption stuff needed in there and there was — for that — but you really had to have the basic network working before you even started any of the rest of that. You can encrypt the lines, but; and so, I held a bunch of seminars at NBS about that in the late 1970s. And because I was from OSD [Office of the Secretary of Defense] at that point, rather than from DARPA, but everybody knew I'd been at DARPA, it was a useful situation. But still there were people; the people in DCA, the Defense Communications Agency, they didn't know anything more than what they had and they had I think eight sites across the country. So if you were going to use their

system, you had to get your stuff to them, and then off at the other end. At one point — I'm jumping ahead here a little bit, perhaps, but maybe this is the most important part of it — there came a struggle between the DCA folks, who thought that there had to be eight nodes in the country, and everything had to come to those nodes. And those of us who knew that that would never live had to figure out another way to do it. I put up a challenge to DCA. I said, you guys bring in your best stuff, and I'll bring in my best stuff, and we'll see what happens. Don Latham was the C3I [Command, Control, Communications and intelligence] guy and I worked directly for him. He said a couple days before this big battle was supposed to happen he said Steve, the folks at DCA aren't comfortable with where they are in this and they've asked if you would present both sides of the story. I laughed, but of course; I mean I'm not sure if they even knew what their system was doing and so well, don't throw me into that briar patch. (Laughs.) So I said I'll do it, and I did. I gave an honest and straightforward set of statements about their system, that they've had since good God! I don't know, the 1950s? I mean, the originations of it was in the 1950s and whatever those; Cheyenne Mountain and all that. I spent a whole bunch of time in Cheyenne Mountain. What a crazy place. And then I talked about the value of packet switching. You can get so much more out of it because these things are happening in there and you don't have to dial up or do anything, it just happens. Well, at the end of the meeting, it looked as if I had lost because; I had this feeling that who's this whippersnapper here doing this stuff? (Laughs.) But Don Latham called me in afterwards and he said okay, figure out how to make this work because we're not going to go their way, we're going to go the ARPANET way. And that's what we did. I mean, there's still stuff like that around that they have, I'm sure. They had some

very primitive early computers that just did simple things. But the ARPANET and its successors became really what the whole thing was. And I remember just felling really, really good about that; that we could do that (link all those computers together). Now, that brought me back to NSA because the NSA crypto people; boy, they didn't; I mean, if I'm going to let something go out of my secured building it's got to be encrypted and I've got to get it to something that's going to decrypt it and, you know, we can't afford to have all that stuff. It's crazy, guys. You know, I think it was a healthy situation. Let's see, Bobby Inman was the director of NSA in 1978, 1979, maybe early 1980, and I got a call to go see Bobby Inman. He said I keep hearing about all this stuff and I can't quite figure out what it's all about. Can you straighten it out for me? I had a conversation not unlike we're having right now and he said ah, I understand. And he, I mean, the people at NSA in the COMSEC world — I'll always remember this — (pause) I'll always remember it, but now I've lost it. The DCA guys were so religious to their system and they couldn't see how anything else could work. And we were showing them that this stuff works perfectly, and it works everywhere, and it's the only thing that's going to carry all of this critical data. And, you know, they never did catch on. I don't know where they are now; they're managing the systems now; but it was a terrible struggle to get them to even acknowledge that there could any other way to do it.

Yost: So a lot of tension between the COMSEC and the COMPUSEC side of NSA?

Walker: Yes. It was this; they finally formed a computer security system group at NSA. Oh gosh, I can't remember his name, but they didn't have anything to do with crypto at

all. I mean, it was just; they were up at DWI and another group had their own building down there, S group and all that stuff. Eventually it's worked out and I'm hopeful it's worked out very, very well. But it was in 1981, that I first got the twinges that I don't want to work at NSA; I was sitting in a meeting one time with six, eight guys much older than I was, and this guy said I don't care what they do, they can do anything to me for the next 10 years, I can make it alright. And I'm thinking, I don't ever want to be in that kind of situation. I mean, if you hate your work so much; but OSD, at the ranks below high muckity-mucks, is really a place you put people until they retire. And that's a terrible thing. I mean, not all of the people did that but a bunch of them did and I realized I was sitting in a room with a whole bunch of people that were just; couldn't wait to get out 10 years from now. And I'm thinking ooh, I don't ever want that to happen to me. I started thinking about it and I finally said to myself okay, the crypto stuff is going okay, and the computer security stuff is going okay — different, but they work together — and I said maybe this is the time for me to do something else. And so I started looking around, and I talked to a bunch of folks, and I created Trusted Information Systems.

Yost: Before we get into TIS, I understand that in 1975 you founded the Message Services Group. Can you talk about that a bit?

Walker: Yes. We had a bunch of seminars out at NBS talking about all this stuff and how it should work. Yes, we were doing that. I can't remember how many of those we did but it was great; it was a bunch of good stuff. But a lot of the people who weren't attentive to this didn't care. The funny thing about that was — and I could've gotten in

trouble I guess with this — we had a; NST would provide the auditorium. That's great. But that was a great set of meetings. I don't remember how many we had; six, seven, eight nine; I don't know. And, you know, had people come and talk about it. I think a lot of people caught on from that. Hey yes, this is a different world and we can do something significant about it.

Yost: Was there a connection between those meetings at NIST and what had gone earlier with the Air Force research on computer security?

Walker: Roger Schell, yes.

Yost: Roger Schell and the MITRE folks.

Walker: Yes. As far as I was concerned, they were all tied together. Now, they may not have necessarily thought that. I was in a good spot at OSD in that I could talk to anybody. They might not have wanted to talk to me but I think that was an important part of the progress we made because people wanted to come to those meetings. They wanted to understand more. I forget how many we did; eight or nine, I think; but I'd forgotten all about that part.

Yost: So some of those folks like Schell and Lipner and others attended some of these, do you recall?

Walker: Most of them were attended by most of those people. If they weren't it was because they couldn't come for some reason. Yes. And we used to pretty much fill the auditorium there at NBS/NIST.

Yost: Can you estimate how many people?

Walker: Well, I would say 150. I mean, it wasn't packed, but it was; I used to go around. I went to the Navy, to H.O. Lubbes, I worked with the Air Force. It was for me, a wonderful experience in bringing good people together that need to know about this and not forcing it down anybody's throat, because that doesn't work. But then we'd have projects going on from the Navy or from the Army even, the Air Force, and from NSA and that was the only time they ever talked to each other. That was probably the most important thing was that people actually; oh, you guys are doing that too? Oh shoot, well let's talk about it. Yes, that was; I don't know when some of these things started and when they ended but I turned them into a series of meetings.

Yost: So it was in 1978 was it that you moved from IPTO to OSD? How long were you at OSD?

Walker: Five years.

Yost: Can you tell me your recollection about how the DoD computer security center was initiated, what became the National Computer Security Center?

*Revised to correct spelling of H.O. Lubbes, p.17, 21.

Walker: Okay, yes. I remember the whole thing, but I don't remember the exact dates. But anyway, I remember being asked by Admiral Inman, the director of NSA, to come out and explain to me what was happening. And I thought okay, you're either going to get fired or whatever, I don't know. Well, they can't fire me from OSD, but they can make it messy. So I went out and it was late in the afternoon; and I went in; Admiral Inman's got a room bigger than this room, and he said Mr. Walker, can you explain this to me, what we're doing here? And I told him just what I told you. And I said, now, the problem is that the COMSEC guys at NSA are really cryptographers and that's wonderful for having good encryption but if you're going to use it on the network there's a whole lot more that's got to happen. Oh, oh, there's another piece to this because the thing that pushed me to go to DARPA more than anything else was within NSA, I was proposing that we build an ARPANET within NSA and connect all the NSA networks together; all the computers together. Well, the computer people, C Group at NSA, well, that's fine; we'll do that. I said well, but you haven't done it and you don't really know how to do it, and we already have a model in the ARPANET where you take these boxes and you link them together as redundantly as you can, and then you — and you encrypt everything, if it needs to be — and then it just works and it's not; you know, you're not building a huge computer next to this other computer, you're building this little — I forget what the devices were — what were they? Hewlett Packard something or others or something. Anyway. I guess they were thinking I was going to usurp their turf because I was in the R&D side and they were in the operational side. I said, I don't want to run this stuff, you know, I just want to see it work. Goodness gracious! I realized; I remember mowing the

grass one afternoon thinking I'm never going to win this battle with NSA because it's just me and I'm an R&D guy and who cares? You know? Well, Kay Spireman was the head of the NSA computing group; and there was another really neat guy that was the head of research and it finally got so hot, not by my trying to make it hot but it was a turf battle and I was just one person. And they had this huge organization and I realized, you know, maybe the best thing for me is to go to DARPA and carry this torch from there because I can't carry it within this organization, it's so warped in how it believes things work, or should work. And so, yes, I thought, you know what, I'm going to go to DARPA. What the heck, I don't need to do this anymore. And I'm so glad I did. I was the only one who really had background in any kind of an encryption background at all at DARPA. So they basically put me in charge of making the thing run and growing it and doing all this other stuff. I said well, how many nodes on this thing do we have now? Originally, there was four. Then there were eight. And well, I could see 20; I could see on the list that there were going to be 20 and everybody else wanted to get on it, too. As it turns out, the way that Vint Cerf and the other guys had set it up, it was eight packets of eight bits that made up a message. And the header of that told it whether it was a short message, a medium message, or a long message, because the bandwidth was very valuable. And so when I went to DARPA I became the person who fought this battle; from a different place now than NSA; but there was this whole NSA COMSEC organization there and all they cared about was encryption. They didn't care about how the system worked because in the early days of this whole thing it didn't matter, you just needed to get it there. But now you want to get it so many places. I don't know if those guys ever caught on and, of course, I haven't been involved in this stuff for quite a few years. So part of what

happened to me was a realization that okay, I have the computer security stuff going pretty well at NSA and I have the networking stuff going pretty well. I'm at my OSD level, at that point. I thought, I can stay on here for another 15 or 20 years; in fact, I was sitting in a meeting, I was 38 years old, I was sitting in a meeting and these guys were saying, you know, they can do anything they want to me, I can last for 10 years. And I decided I'm getting out of here; I don't care. Don Latham was my boss and I worked on it for a long time; finally wrote the letter; and I mailed the letter. Then the next day, I took it in and I had it in my hand, and he said — he looked and he said — oh no. You're not leaving. I said, well, yes, I have to. He said, well, you're doing the right thing. Because it was very clear to me I was going to be one of those Pentagon bureaucrats and, you know, they just crush you down into mush, and whatever. And so I left and I started Trusted Information Systems. I don't know whether we've covered enough of the pre stuff, at this point, or how much you want.

Yost: I think moving on to TIS makes sense. When you started, were you thinking I'll be a consultant, or were you thinking I want to grow a firm that I manage?

Walker: I did not have illusions of growing a company. It was me. And actually, for a year and a half, it was me. I mean, I had eight or nine clients and basically, they just wanted my advice. And sometimes I thought it can't be doing you much good, but whatever.

Yost: There can't have been anyone else with the experience with the ARPANET as well as within the Secretary of Defense's office . . .

Walker: OSD, yes.

Yost: . . . and your diversity of experience and contacts.

Walker: It was a wonderful time and I remember very well when I went to OSD. I had already cultivated people like H.O. Lubbes (Navy) and in the Air Force; I can't remember anybody in the Army, but anyway, it became a group that was working toward something, each within their own organization. I thought, you know, this is great; this is how things happen even if the high muckity-mucks don't even understand it. And it's the kind of thing that has to happen here because you can't have dedicated lines to all these places, it's just nuts. And so, yes, that was the neat part of the whole thing. When I went to OSD I was able to gather these guys together. I was able to put on those seminars and invite people in from all over. And I kept thinking I'm going to get in trouble one of these days, I'm going to step over some rule or something. But I never did. I never made any money and so [interrupted]

Yost: Were these seminars the primary means for different branches of the Department of Defense that were doing computer security research, for them to come together? Or were there other coordination mechanisms for the Navy, for the Air Force, and the Army to collaborate and share knowledge?

Walker: Internally, in the services, they had their own groups but the first time that any of them all came together and talked — to my knowledge — were those seminars. And, you know, Roger Schell (Air Force) would talk, and H.O. Lubbes (Navy) would talk, and somebody would always talk from the Army but I can't remember who it was. But, they were coming together and they weren't being forced to [interrupted]

Yost: Carl Landwehr, was he involved, from the Navy?

Walker: Carl Landwehr. Yes, he was. I know there were smart people throughout this, and they didn't have ways to get together. I think this provided that mechanism and it really pushed this forward pretty fast. Now, did we have the technology to do it right? Well, no, but we gotta understand the whole picture before you; you know, it's not just encryption keys, it's a whole lot more than that. And so for about three years we had those seminars at NBS [National Bureau of Standards – later, National Institute of Standards and Technology, NIST]. NBS was great giving us access to it and all. I mean, I'm not remembering a whole bunch of things that I may remember later on, but (pause)

Yost: The one other thing that I can think of now that I'd like to get your perspective of, before TIS, is did you have any role in the first years with the DoD computer security center and the work in developing evaluation criteria that led to the Orange Book?

Walker: That was after I had left the government and so it was part of my consulting at NSA as TIS.

Yost: The Orange Book came out after that but the earliest work in trying to figure out criteria within that center, I think, was occurring by 1981.

Walker: Yes it was. And it went on for quite a while. And it got better and better. Who was the head of that in the early days? I can see him; I can't remember his name. Gallagher. His last name was Gallagher. Pat Gallagher. He was the head of the first version of the computer security evaluation center at NSA.

Yost: And then Schell became his deputy director.

Walker: Yes, and that was wonderful. It was another one of those you-couldn't-have-brought-them-together otherwise, but once they were together you got smart people, and you got people who were willing to go out and make a lot of noise. And that's good. Yes, that was; gosh, I've forgotten a lot of this. (Laughs.)

Yost: Long time ago.

Walker: Right. Well then, I didn't get out of this at all; I mean, I started Trusted Information Systems. Didn't know what it was, but; and I had a bunch of clients that I'd go around; and then (pause)

Yost: In those first years, can you go through some of the clients you had in those first couple years?

Walker: Oh boy. I'll try. I can't do it right now. They'll come to me. I consulted for BB&N [Bolt Beranek & Newman in Cambridge, MA], I consulted for Sperry, — what was that in Minneapolis? —I'll think of a bunch of them but these were folks that I had known and that knew me and that wanted to know were they doing the right thing. And I said this is good, but you've got to worry about that. I got kind of tired of that after, I think it was about two years. What was happening is people like Martha Branstad and a bunch of others who I had known at NSA wanted to join me. I remember thinking in the middle of the night, I don't have enough money to pay her. (Laughs.) I'm in the classic problem of getting started but that turned out to be not a problem and suddenly, we had five people, then we had 15 people.

Yost: Other than Martha, do you recall who else in that first five people joined?

Walker: I have documentation somewhere that I can find and I'll do the best I can. We quickly grew to about 15 and we needed a place to be.

Yost: This started, as I understand, just out of your home or out of your garage?

Walker: Out of this place. This was my house. Now, it wasn't like this. That wall is the back wall of a house that was built in 1830 and it's that area that goes up three stories is the original house. The rest of this happened after I sold TIS and I thought what the heck, I want to …

Yost: Expand it a bit?

Walker: Yes. And it got kind of crazy, but it's a comfortable place to be, and it's quiet, and it's peaceful. I'll try to remember names as we go through here. I can give you names later on; I have a couple lists that I can check off. I was invited to come back to; NSA created a group; within that network security group, they invited me to all their meetings, and the Orange Book started to happen. That was an interesting process. That was a very interesting process and it was not perfect, but it was, boy, a whole lot better than we ever had before. I became interested in what a B2 system was. Because at that point, I didn't think it was possible to build anything better than that and so, we actually took UNIX and made a B2 version of it. I've got cards around that still talk about that. And I thought, wow. Really I was just experimenting with it; I wasn't sure what was going to happen. We never did sell a huge amount, but we did sell a bunch. And as time went on, people wanted B3 and then people were trying to do A1, which we didn't know what that was either. But you know, enough people, smart people were looking at it saying well, wait a minute, that makes sense being at this level or at that level, or whatever. I think we made pretty good sense of that.

Yost: Was the fact that this evaluation criteria was being developed and that that would give industry some guidelines and incentives, did that boost this consulting enterprise, realizing that it would be a growth area?

Walker: Yes. Nobody knew how to do it at first. And, you know, the way the COMSEC guys did it at NSA it was either everything or nothing. Well you're really never going to get everything so we had to have criteria that grew. It took a long time. I have no idea of what it is now. I have no contact with anyone in the agency, for the most part. But I decided to build a B2 version of the UNIX operating system. We would do that ourselves, and just see how does that work?

Yost: And was that Trusted Xenix?

Walker: Yes.

Yost: So Xenix was acquired from Microsoft, correct?

Walker: It was a version of UNIX, I think. I'm scratching my head at this point. We called it Trusted UNIX and then we called it; oh, Trusted Xenix was completely different thing.

Yost: I believe Xenix was a version of UNIX, but I think Microsoft was experimenting with it and then abandoned what they called it, and then with TIS it became Trusted Xenix.

Walker: That's right; that's exactly right. Yes, you've got it better than I remember it.

Yost: And David E. Bell, he joined and worked on that, didn't he?

Walker: Yes. Wow, goodness gracious.

Yost: When you started TIS were you aware of other consultants that were essentially making a go of it? Did you have any models for your business; I know that James Anderson had run a consulting business.

Walker: And he was very good at that and he had specific clients that were very loyal to him. And that was good. He was the guy that put me over the top. I mean, we used to have lunch every now and then in the Pentagon cafeteria and we'd talk about it. I don't think I would've done it without his advice. Maybe I would've been better off. (Laughs.) But maybe not. At first; well, we got a contract from NSA to do something, and I remember the struggle it was to get it because we'd never had a contract before and we were then down in that little building down there that was later a nursery for children, and is currently empty. But that was the old gas station that we fixed up a little bit. And then we were building the main building and we had to put some construction trailers in. We

ended up with three giant construction trailers. We had about 35 people in the company at that point. And then eventually in 1987, we grew [interrupted]

Yost: So you'd purchased enough land around your home that [interrupted]

Walker: I purchased 11 acres here and three of them were commercially zoned. I mean, it was already there, and it ran across the front here. Well, this is a marsh so I went back to the county and said I would rather switch this so that this piece is; because I can go back pretty far up here because it's not wet; I can't do anything down here. So I switched it around. They were kind of like why are you doing that? But everybody wants frontage. No, I don't want frontage. And so that turned out to be that — the whole parking lot and everything — that was the TIS building and then the rest of this is mine. And the little piece that goes up behind is mine too, which is never going to used for anything but that's okay, I don't care. And I remember there was some crazy thing about getting permits. I guess there were a bunch of those. That was a very difficult thing but we made it. Then we just started growing. Then people from around the country wanted to be part of it and we had people from California, people from Minneapolis, people from all over the place that were employees of TIS.

Yost: Were offices actually set up in those cities?

Walker: In Los Angeles, there was an office; there were eight or nine people there. Steve Crocker was there, and a bunch of others. They had significant damage from an

earthquake at one point, and I remember thinking hmm, I don't want to be there but if you guys want to be there, okay. And then we had just people around doing things. I mean, I figured if you're good at what you do, I don't care where you do it or anything else; and keep going. We had group meetings and all that together, but (pause)

Yost: In those early years, who were your primary competitors, do you recall?

Walker: I don't think anybody was trying to build a rated system, a computer security rated system. We were the first ones. And we modified UNIX to make that work and we worked with the NSA folks to make sure they understood what we were doing.

Yost: Steve Lipner was leading a group at DEC. It never was completed but they were seeking to build an A1.

Walker: Right. Yes. And I knew; gee whiz, I knew Steve Lipner way back in the early 1970s.

Yost: He was at MITRE.

Walker: Yes. He had a time out in Hawaii, at the whatever that was up on the hill there. Boy, hard to dig back in the; I can see it but I can't remember what to call it. Anyway, we did a lot of work for people who wanted to do it right. CSC and others; some of them had a chance, some of them didn't. And then we did Trusted Xenix; and then we (pause)

Yost: Were you able to just kind of bootstrap to grow it or did you ever get venture funding to expand?

Walker: That's what it was. Okay, good; glad you brought that up. I put my own money into it for a long time. I sold stock to employees. I remember vividly the day we were sitting there. On Monday morning we have our staff meeting, and I'd say alright, we've got enough money to go two months. What are we going to do now? And we'd just keep doing it, and it kept growing and it kept moving along. I had gone to a whole bunch of venture capitalists — 10, 15, I don't know — and they all loved the idea. They didn't really know what to do with it or didn't think they wanted to be part of it.

Yost: In this area or Silicon Valley?

Walker: Silicon Valley, Boston, everywhere. All the major corporations. I was really pretty good at a pitch and all that stuff. It was in March of 1996; another group was coming by. Okay, I get out my stuff and start; "Steve, hold on, we know who you are and we know what you're doing. We're not here to sell to you;" no, I'm sorry; they said basically we want to take you public. That had not been in my windshield, I mean, it wasn't there. I never even thought about it. I figured I've got to grow a lot more before I can go public. It was J.P Morgan that did it.

Yost: So there wasn't any venture funding that went in to it before it became public.

Walker: That's right. So they showed up and we talked about it, and that was in March, 1996, we started working on it. And in June, I think; maybe it was July; the market did a hiccup and [whoop], unh oh, we got a problem because we put a lot more money into it now and so I said look, we've just got to motor on. I mean, this is going to happen. And we started our road show in September. Stupid; the first thing they did was to fly us to England and up to Scotland. I guess they said it was to; you know, it wouldn't be bad if we messed those up and we were honing our whole thing. The thing I remember most about that was flying on the Concorde. We left London at 7:30 at night, London time; came up out of the clouds and suddenly there was the sun. And we landed in New York at 2:30pm the previous day. (Laughs.) So, whatever. Anyway, that was neat. Won't forget that one. And then we were on the road for six, seven weeks. It was pretty crazy. They didn't know how to categorize us because we weren't a lot of things, but we were a lot of other things.

Yost: It started as a contracting services business.

Walker: Right.

Yost: But you also sought to develop products.

Walker: Yes. And it was the product stuff that was the stuff that carried us.

Yost: Can you talk about that transition from being just a services business, and how you evolved to become both a services and a product company?

Walker: And a research company, because we were doing research, too. It was a great bunch of people that worked together. One of the neatest things that we did was when we built the building, the second part of it, was — have you been in the building? It's right down here.

Yost: 3060? Yes, I did.

Walker: There's the big open atrium there.

Yost: Yes.

Walker: I specifically made the back of it like that and had a cafeteria, kitchen, and all that. We made lunch; I mean, we gave everybody lunch. We got into trouble with the IRS, so we had to pay taxes on the lunches, but okay, I don't care. Because the best ideas happened at lunch, and for me, I could go around and talk to 8 or 25 people that I could never get together at the same time.

Yost: Ahead of the times in doing that, because a number of Silicon Valley IT companies do that today.

Walker: Yes. I mean, it's very important and you gotta move fast, and you gotta get the; now what are you talking about? And you can't have these people sit around in meetings all the time doing that. Yes, that was great; that was just terrific. We served meals free and the biggest problem with that was it was so far to go to have something to eat, if you didn't bring your lunch, had to do that. So we even did it in the front building, before the back building, in this one area. Eileen Mayers and her wonderful people came in every day and just made lunch. And then we just made it into the whole routine of the company, and it just seemed like a good idea. So. What more is there? There is what happened at TIS, I guess.

Yost: I've got a few more questions.

Walker: Sure, this is your stuff.

Yost: With Trusted Xenix, do you recall the process for getting it certified as a B2 system? What did you have to go through to (pause) . . . ?

Walker: Well, we were working with the group at the agency and Sheila Brand was a key person. I don't know if she was "the" person; she was an evaluation person, but she was the one who really wanted to make things happen so she was in all the meetings, which I was very pleased with because you can get into esoterica very quickly and wait a minute, this isn't really the most important thing here. And we had meetings for a long

time in the early 1980s; and we got B2 rating in 1985, I think. I can't be sure of that date, but it's right around there. I think 1985.

Yost: I believe at that time, only Trusted Xenix and MULTICS were B2 systems.

Walker: Right. And then we were doing lots of stuff; bunch of which I probably didn't even know about, but that was okay.

Yost: Did the work that went on with MULTICS and the security principles that were developed with MULTICS influence you and your thinking about computer security at all?

Walker: I'm sure it did. I don't know . . .

Yost: Specifics.

Walker: Yes. We worked with Xenix, which is a much simpler operating system and we tried hard trying to make it just as solid as we could and B2 was the best we could get. But that's better than anything else right now.

Yost: When it came out do you recall some of the first customers to use it?

Walker: Wow, I should, but I don't. I don't think it was ever a big seller. But it was a thing that got rated and something for people to look at and see oh, okay, this is what it takes to do this. We did sell some of them but it was never; it wasn't a flood of stuff. But we were also involved in helping other people get their systems evaluated. So we were in the middle of all that and I don't know what it was that finally kicked us over in the eyes of securities guys as to why they should take this company public. I mean, we struggled with that for a good while, but we kept growing.

Yost: Was there any sense of some of the tension in terms of whether to push products or services because in creating something like Trusted Xenix, you're creating a B2 product, but you're also contracting with competitors to try and develop rated systems and maybe, eventually, another B2 product? Or was there a sense that there's enough business to go around?

Walker: I think there's enough business to go around, and there weren't that many that thought about B2, even. I mean, Roger and his guys were talking about A1 all the time.

Yost: Roger, and Steve Lipner at DEC.

Walker: I'm just trying to figure out what allowed us to go public because that was a big thing. J.P. Morgan was behind us all the way. I mean, they came in wanting to do this. I didn't realize it until halfway through the meeting. (Laughs.) Gee whiz, that was crazy. Wow, a lot of crazy stuff.

Yost: Do you recall anything about Trusted Mach?

Walker: Yes. Who made that? Did we?

Yost: Yes, it was a TIS product.

Walker: (Laughs.) That's embarrassing. I don't remember much about it. Why did we do that? Although there's a Mach operating system and we did a trusted version of it, I guess.

Yost: I understand that TIS was really a pioneer with Firewall technology.

Walker: Yes. That was really the big thing that pulled us over; the ability to have a product that was a firewall and that could keep other things out. Whatever you wanted to not be there, I think that was really the most important thing. I gotta get back to my list of people. (Laughs.) Fred Avolio and his group of guys from DEC did the Trusted; anyway. I'll go back to my stuff and get some of these names.

Yost: Okay. Do you recall how you got into research and development work that led to firewall technology at TIS?

Walker: They were actually doing it; Fred and Marcus Ranum — they had already been working on it at DEC and they came with lots of ideas as to how to do it. They went very, very far with that. I don't know what's going on now, but they were the leaders in building firewalls and that was a huge boost to our company to be able to do that because nobody else really knew how to do it.

Yost: So they left employment with DEC and continued their work at TIS. . . ?

Walker: Yes, they left DEC and Fred just lives up the road here and Marcus Ranum — he was really the technology wizard in the trusted firewall stuff. Wonderful guys. We just had a bunch of clusters of people that were just; they were doing their own thing. I'd wander around and see what's going on.

Yost: You mentioned that in the early years, people would just ask to join on.

Walker: Yes.

Yost: Was there also recruiting efforts that you conducted?

Walker: Yes. If we saw somebody that we really wanted, we'd try hard to get to them. But our reputation was such that [interrupted]

Yost: I looked at a few of the names I came across in passing; Steve Crocker, David Bell, and it's kind of a dream team of pioneers in the computer security field. Many of them at one time, for a number of years, were part of the TIS team.

Walker: Yes, that was true. And it was so much fun. And we had a Los Angeles office, and I don't know; I can't remember how many offices we had.

Yost: Did you do business overseas, as well?

Walker: Yes, I spent a lot of time in England working with them. I loved going to England and what's the name of the outfit on the west side of England? GCHQ. We worked with them a lot and we did a lot of seminars in Europe. That was just a wonderful time; just amazing.

Yost: Was this the same scenario, where there had to be; were there any export controls on the technology? You're obviously talking about allies of the United States.

Walker: Right. And I think that was the way it was. I don't know whether it still is or not, but I presume so, because this is really for the good of everybody. That was a wonderful time and I tried to keep it as civil as possible. Sometimes there were arguments of this and arguments of that and I'd come in and say well now look guys, what's the best output from this whole thing and everybody would; okay, well we'll do that. It was a very

busy time and you couldn't just stop for a while, you had to stay on top of it. But I loved it. I think that was probably the best thing I ever did.

Yost: Was the decision to go public difficult? I know in many cases, it changes the level of scrutiny with quarterly performance and what were your considerations in making that decision, and how did that change TIS in the next couple years before it was acquired?

Walker: Most of the people at TIS weren't affected by it at all because we had all these little clusters of things happening and they were building this part of this, or that part of that. We did have a group of people in Europe, in Germany and U.K., and that went very well. We had good sales over there. And we had a good reputation so; but I remember not very long after we went public that I'm not the right person for this in the long run, for sure. And then it became well, what's the long run? And then there were; and I, well, okay, this is a negative thing and I don't know whether it should be; it became clear to me in the first six months or so after we went public that there were a number of previous employees who basically got together through some broker and said if the stock price ever gets to this point, we're going to sell all our stock. Now, all their stock wasn't a huge amount of stock, but it was enough that it would really hurt. I think a lot of small companies get into this type of a bind. Nobody was going to raise the stock price because if they did, they were just giving away that money because somebody else was going to bring it back down again. And I understood that. And there was some set of former employees who basically were telling people that's what they were going to do. And at that point I realized I don't know if I have any options here. I mean, I could keep going

along like this, and that's okay, but if I'm ever going to get anything real out of this, I better do it pretty soon because it's just going to get worse. I mean I had no idea that in the end, the company was worth $360 million. That's not a bad thing. (Laughs.) And I own a chunk of that. It wasn't a huge chunk, I was pretty liberal with giving out stock. But I realized that this can't go on with this overhang, they call it. And so I started pushing hard and we talked to DEC, and we talked to a whole bunch of; we talked to five companies about buying the company. And it was; I had his name earlier; well, the company that bought us.

Yost: Network Associates.

Walker: Network Associates. Right. The guy was pretty arrogant and I, well, okay, I don't care. I'm going to come out of this okay. And that's what happened and I'm really glad it did. I was getting really tired of a lot of this stuff. I loved the people, I loved what we were doing, but the publicly traded company is not a fun thing, especially if you're not really focused on just that. I mean, I'm really focused on technology and making a company. So I just walked away from it.

Yost: Do you have a sense of whether Network Associates was more interested in acquiring the people, the talent you had, or the products you had, or was it a combination?

Walker: I never really knew what — I can't remember his name anymore — he tried to pull some tricks at the end and I basically said no, I don't want to do that and he backed off. And I didn't take any money or any bonuses or anything like that. Other people did, and that's okay. And so then I went off and formed Steve Walker & Associates and started doing early stage investing in technology stuff, and have been doing that ever since. It's down, now, to one company. I mean, we're effectively no longer functioning and that is a sad story from the Small Business Administration, SBIC, world. The SBIC people in the government were nasty. They were as; they couldn't help you at all. And so I'm glad to get out of that. It's funny the things that you remember last are either the best or the worst. (Laughs.)

Yost: You talked about one challenge of being a public company, and the past employee stock ownership issue. Before that, what were the greatest challenges TIS faced in the first 12 or 13 years?

Walker: Well, you always need more money. But we were able to survive and do well. My job was just putting out fires. They weren't big fires, but there were fires. We had several offices that had different views about things, and so; I found myself being a referee a lot more than somebody that's out there trying to figure out what the next big thing is. But I had a wonderful bunch of people and for the most part, I want to say there were 10 or 15 people that left and were a problem, or didn't leave and were a problem out of — what did we have? — we had 300 people. That's pretty cool. I had no experience in that at all. It was all pedal that bike as fast as you can. I never dreamed that this would

happen. I mean, here I am, like I'm a government employee for 22 years and geez. It's funny now because my brother, who lives in Virginia, in the mountains in Virginia, was a government employee his entire life, and this young lady that I'm; well, she's a little younger than I am, but we're going out together; she's been a government employee all of her life. I keep finding myself in situations where, okay, you guys are government employees; I mean, it's exactly the Obama thing, at least from my point of view, at this point; and yet here we are. We don't need more government. We've got so much government, now. Trouble is we don't know how to get rid of the bad stuff and keep the good stuff. So it's just going to keep on. It's somewhat depressing. On the other hand, I don't think Romney really had a chance anyway, so it doesn't matter. I didn't mean to get off on that. (Laughs.)

Yost: No problem. Government jobs, once they're created, tend to stick around.

Walker: Yes. It's hard to get; and so they'll find more things to do. Okay, there's a whole lot of stuff that needs to be regulated but also excesses; we'll see what happens. Let's see; what else. I'm happy to talk as long as you want to. I hope this is helpful to you.

Yost: Yes, it's very helpful. Did TIS have to actively engage in much marketing or was it through word of mouth and you just knowing people, and others that worked for you knowing people and effective networking, was that enough?

Walker: I distinctly remember, for the most part, people who I respected highly coming to me and asking if they could join TIS. That wasn't everybody. I did go and try to hire some people. In the beginning we needed people and I tried to get them, but my recollection is that we; there was always a list of people that wanted to join us and I felt like that was pretty good. And as a small company that is not publicly traded; well, I mean, for the first hundred people I was astounded that there were people that would want to do it. But after a while, you know, people wanted to be with other people. It was going to be here, but then it couldn't be just here, and so we had to have offices in other places. And that worked, and people figured out how to make that happen. If I think back to college days or before that, I had no clue how to run a company but I did have wonderful help and it was a lot of fun. I guess, like in so many things, at some point it's better that you get out of the way. Let people do what they can do best. I mean Fred Avolio and Marcus Ranum did the firewall business. Now, we had a big firewall business but they were the ones that brought that and made it happen.

Yost: And that, the Firewall segment, through name changes, as I understand it, has its legacy with McAfee, is that correct?

Walker: Yes. They bought the company and that's probably the main thing they wanted it for. I don't know what else has happened. I mean I run into; well, I guess I do. There's a whole bunch of people in the Columbia area that are in three or four different companies that are doing well. So, yes, it was a good thing that McAfee came along when they did.

Yost: At the time you sold to Network Associates, did you immediately start your venture company or did you work at all for Network Associates?

Walker: No, no, no, no; McAfee didn't want me around. (Laughs.)

Yost: That's often the case.

Walker: Well, for the best. I mean, because good Lord, either I would be miserable or he would be miserable or we both would be miserable. And I realized that and, you know, I didn't even take a bonus. Everybody else did. I figured you know, look, I got enough out of this I don't need to and I don't want to be beholden to anybody going forward. So I, within two weeks, I had five or six people that wanted to work for me in the back row of the building here. And we did that for 10 years or so. Just recently we became a virtual company in the fact that we don't go to work, we just talk to each other and do things that we need to do. And that's ending. I mean, we're not trying to do any more of that. Gina Dubbe is off doing other stuff, and that's fine.

Yost: You stopped doing any kind of computer security contracting work, it was all venture funding?

Walker: Right.

Yost: Did you concentrate exclusively in the security space?

Walker: No, we went after a bunch of different things. Some of them were great, and some of them were not. But we're fine.

Yost: Can you talk about some of the stuff that worked out and some that didn't work out?

Walker: I'll have to go back and get a list. (Laughs.)

Yost: Well Steve this has been very helpful. I really appreciate you meeting with me for this interview. Thank you very much.

Walker: Sure. My pleasure.