Interview of Jerry Mulvenna

Interviewed by:
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James Pelkey: Given that we've talked a little bit about what I'm interested in, when did you get involved with X.400 activities?

Jerry Mulvenna: I worked at the Department of the Navy building a message switching and message processing system, based on JANAP 128 message format running on the AUTODIN network, and I joined NBS in 1980 – for the first several years, spent time as their representative on the X.400 standard. I have also spent a year working on the development of the standard for the virtual terminal protocol, but in 1983 or 1984, the focus of activity, at least in the United States, seemed to change from standards development into standards implementation. We started our workshops – the purpose of the workshops was to put the finishing touches on the work of the standards community, because the standards that had come out of the standards committees needed more work done, more specification before they could be useful to build vendor products. I moved away – in general NBS realized that, although we still have people working in international standards committees, we have significantly less people now because of the focus of activity changing. So I came back here and, I guess about two and a half years ago was appointed manager of a group which evolved into this group, the Network Applications Group.

Pelkey: Let me go back to 1980. In 1980, was the X.400 CCITT group already formed?

Mulvenna: Yeah, the group was formed in 1980. In 1980, some early work was done in IFIP, and the model that they used was created in IFIP, but the group developed the electronic mail standard between 1980 and 1984.

Pelkey: So Ian Cunningham was --

Mulvenna: He was the rapporteur.

Pelkey: Did he come into being roughly the same time you got involved?

Mulvenna: That's right. He was also the chairman of the IFIP committee which preceded that.

Pelkey: Do you recall more precisely in 1980 when that first meeting happened, CCITT?

Mulvenna: I think the first full meeting was in the Hague in March of 1980.

Pelkey: Approximately how many people were at this meeting?

Mulvenna: I would say 30 to 40 people were at the meeting, and it grew from there. The first meeting there were 30 to 40. I know we all fit in one room.

Pelkey: And these are people who represented the PTTs and the European --

Mulvenna: That's right, there were about six or seven members of the US delegation. I know AT&T had representatives; I know DEC was there; we had our contractor, BBN, as a

representative. We were more relying on contractors then than we are now. We had more money then. So I was there, but in my first meeting ever in an international standards meeting.

Pelkey: Must have been an interesting introduction. You say that BBN was there with you or at NBS's behest?

Mulvenna: That's right.

Pelkey: And you had contracted with BBN to define your view of what an X.400 should be?

Mulvenna: That's right. The X.400 standard -- we had some problems in the early days with CCITT. Actually, they developed in 1982. The early days were very much cooperative efforts, and we put out the equivalent of a message format standard. This message format standard was -- we had our own message format standard. It went through the normal processes --

Pelkey: Released in 1982?

Mulvenna: I don't remember the date, but it wasn't that early. What happened was, we were in the process of developing a message format standard which dealt with some aspects of the equivalent of what they call 'a user agent,' not the message transfer system. This standard was passed through the United States, and we got comments from all the people in the United States, all the vendors who were impacted by electronic mail, and all these people were all so new to the electronic mail area also. They were new in terms of dealing with the international standards. They all approved it. They said: "This is a good idea," and we were, I think, very heavy influencers of what -- the way things were done. We were a major contributor to the work of CCITT in the early days. It took many of the ideas from our message format standards and incorporated them into their standard. What happened in 1982 --

Pelkey: Hold on for a second. How did it come about that you went out and contacted -- did organizations come to NBS or did -

Mulvenna: No, no, we published this. We published this report --

Pelkey: A suggested format?

Mulvenna: Yes, it was a document that was released to the public. I don't know the exact method by which it was done. It may have been published -- because it was a federal information processing standard, I think you had to publish it in the Federal Register, you had to invite comments, we had to evaluate all the comments.

Pelkey: Do you recall why NBS got into this active role of doing this? You wanted it for the government?

Mulvenna: We wanted -- and for the United States. The comments that we received back were both from users and vendors in the United States, companies like DEC, for example, who was very supportive of the work we were doing and commented favorably on the work. I joined NBS

about this time, and this work was in progress at the time that I joined NBS. Also, there was this group, IFIP, meeting, and the CCITT group had not yet been formed, had not yet had its first meeting. Its first meeting was, I believe, in March of 1981. Not 1980, because I didn't join here until November of 1980.

Pelkey: Ok, so the first meeting was --

Mulvenna: 1981, not 1980. But there were IFIP meetings going on at that time.

Pelkey: So I'm clear, Robert led me to believe that some of the motivation during this period of time was that NBS wanted to encourage the commercial community to develop standard products that would be acceptable to NBS and hence to the government, purchasing from the commercial sector, in contrast to the DOD model, which was spend a lot of money and get what you wanted, but without multiple vendors for it.

Mulvenna: That's the correct impression you should have.

Pelkey: Therefore, NBS was taking this kind of active approach in trying to get agreement and cooperation and so on and then act as the agent to go carry this message and these arguments into the international bodies.

Mulvenna: That's exactly what happened, and we were successful also in carrying these arguments into the international bodies, even though, at the time we started, the international bodies hadn't been formed. A lot of the material that we used – and we were, perhaps, in the early days, THE major contributor to the work of CCITT. We had, for the most part, the comments that we received back when we published this as a proposed FIP – the process goes: you propose something as a federal information processing standard, as we're doing with GOSIP; you invite comments on it; you resolve those comments in the best way you can; and then you make a decision on whether it should be promulgated as a federal information processing standard. What happened is that I think we were premature. Looking back, we were premature in this process. There was also ISO working in this area too. ISO was developing a standard for electronic mail. I think we've learned a lot in the last five or six years, that rivalry doesn't do anybody any good, and that cooperation is important, because one group pretty much grabs the lead and the others are, even if they don't want to, forced to follow suit. What happened was that we published this as a Federal Information Processing Standard after resolving all the comments, and we assumed that – at the time we were reasonably confident that -- at the time that we proposed and published this as a federal information…

Pelkey: Which is roughly when?

Mulvenna: 1982. What happened was concurrently, CCITT was deviating from -- deviating not so much in the services they were offering, but in the syntax. You can send the same information in a variety of ways, and to my mind, one way is almost the same as the other, but the X.400 group had decided -- I don't know when they decided to do this -- but what they decided to do was to take -- the people who were developing standards at the transport layer and at the session layer had used their own syntax, invented their own syntax, one for the transport

layer, one for the session layer, one for the internet protocol, and at the time that CCITT was developing its standard, it was the first application layer standard to be developed, and their were no standards at the presentation layer at the time. That's why they don't use the presentation layer. What happened was, they said: "We're going to develop our own syntax. We're not going to use NBS's syntax," even though we had been led to believe by BNR specifically that they were going to do that. I even still have what I thought was going to be a proposal made by BNR for the use of the NBS syntax, but they changed their mind at the last minute.

Pelkey: Now, when you say "BNR" do you mean Ian Cunningham?

Mulvenna: Ian Cunningham, right. Some standard groups work differently than other standards groups. Some groups are truly open, so that when you go to a meeting, you really don't know what the result of that meeting is going to be. Other groups were that most of the important work is done between the meetings, between certain groups, and very little room is left for real dialogue at the meetings. The CCITT meetings were the second format. I certainly do believe Ian Cunningham was an effective rapporteur, in that he got what he wanted, and he got an electronic mail standard developed in four years, but he did it in a way that left a bad taste in some mouths because it wasn't, I believe, a truly open forum. But we made mistakes too at NBS. We should have recognized that work was in progress in CCITT in the international standards area, and we should have waited until we had -- not promulgated the standard until we were sure we had not only national support, but also international support.

Pelkey: Being more precise, this is the work that Jim White and Doug Steadman?

Mulvenna: Doug didn't come along until later, he came along mid-way, but Jim White was maybe THE major contributor to the work that eventually got developed. He was certainly a major contributor to the syntax, and he was also a major influence in the work that CCITT was doing. To be fair, he did object to the syntax in his comments back, our syntax, but we felt, at the time, that it wasn't -- what the syntax was wasn't important, so it wasn't our job, within NBS, to resolve all comments favorably and make everybody happy, just to resolve -- and our resolutions to those comments were put in the public domain also. So what happened was that this message format standard that we developed, which dealt with the user agent aspects, had to be recalled at some time later, I don't know when. It was in 1983, 1984, and the vendors also made mistakes too. They should have realized that work was in progress and not supported us to the extent that they did. We weren't acting just on our own. It was a mistake because we were early in the development of the standard --

Pelkey: This is the first time out of the chute, playing this role - -

Mulvenna: That's right, so we know -- and I know that we have learned at NBS now not to try to jump too far ahead of the field. We're working very closely -- we have an X.400 C. Once we realized that the standard was going to be truly an international standard, we at NBS supported it vigorously. We have an X.400 SIG right now. We work very closely with all members of the X.400 community, including people like (unintelligible) who -- there weren't any personal -- it was, from our standpoint, a 'not invented here' syndrome on an arbitrary issue that caused certain frictions in 1982 or 1983.

Pelkey: In my conversation with Jim, he recollects that there was one meeting, relatively late in the game, at which there ended up being two proposals being put forth: one was the proposal that he and Doug had been working on, and the second one was the proposal of NBS, which BBN had been putting forth, and there was a woman named Deborah from NBS and a woman from BBN?

Mulvenna: Debbie Deutsch. I may even have six weeks before what was a critical meeting -- Debbie Deutsch and I went off and we were handed a contribution that BNR said was going to be their contribution on the syntax at the meeting that was going to be held in September, six weeks later.

Pelkey: September of '84?

Mulvenna: '82. That contribution never appeared at the meeting, from BNR. Other contributions, including Jim's contribution, appeared, and BNR people fought vigorously for his contribution. This is where I mean the work being done before. I have somewhere here, because I've saved it, a copy of BNR's paper they gave us that day, which never appeared.

Pelkey: That must have been quite a surprise to you.

Mulvenna: That was a surprise, and for example, we were told -- this meeting was in the United States. It was in McLean, and we were told -- in retrospect, some of the reasons have left a bad taste in my mouth personally because we were told: "Don't bring any US -- let's cut down the number of US delegates." In other words, people who would be logically supporters of ours, we were told -- but we didn't think we needed them because we thought BNR was going to bring -- Now you can say: "Why all this trouble about the syntax?" I don't know. Jim, as I said, was a major contributor and one of the most brilliant people involved in standards set-up that I've ever met, but that did happen. We couldn't see at the time why, at least, they weren't more open with us in their intention. What I do believe is that their intentions changed in those six weeks. I don't believe they would have given us this document if they didn't believe that in early August, but their intentions changed in those six weeks, and because we were just getting involved in standards at the time, this was sort of a learning experience for us too.

Pelkey: So in September of '82 you had the meeting in which the proposal got voted on, which is the one, I gather, that was advanced by Jim White?

Mulvenna: Yes.

Pelkey: It got voted on and that got approved.

Mulvenna: And this is only the syntax, remember, this is only the syntax.

Pelkey: Then there were subsequent meetings around X.400.

Mulvenna: There were subsequent meetings. I didn't attend all those subsequent meetings. At one of the subsequent meetings which my manager attended, there was a compromise reached that was between the US delegates and -- what we did was try to compromise, and I think even Jim White agreed, was a representative, and carried that compromise to Paris, but it was disapproved. Now, I think one of the reasons it was disapproved is because I believe people began coding based on the original agreements the day after the agreements, and work was in progress already, and the ship had left and there was no way to pull it back. Again, a lot of the work is done between meetings. I know that my manager found, for example, when she went to a meeting, the minutes of a private meeting that had been held among various countries, specifically between Canada, Japan and I think one other country, outside of the normal meetings, at which certain decisions were made; that this country would support this if this country would support that. She just found the minutes laying on the desk.

Pelkey: And your manager during this period was?

Mulvenna: Shirley Watkins. So, it was a question of styles of conducting meetings, whether things are open and free flowing or not, and I don't believe they were in this, but perhaps that was the reason that work got done. I think this was the first time in four years that a full standard was developed from scratch within CCITT. A lot of it had to do with the initial work done in IFIP, so they were able to get a running start in getting it done. What evolved was a good standard. It's true that one syntax -- I believe, still, that one syntax is no better than another. Ours was simpler, it was -- still people have a little bit of trouble understanding. I have a tutorial now which I give on this new -- I have a tutorial, now, which I give on what is now called the ASN-1 syntax, because that's ISO's terminology for it -- but it was more human drama than anything else. The technical issues involved were not that real. We supported, and always have supported, the intent of the standard. As I said, we were major contributors to the early stage, and by the end, certainly by 1984 or 1985, we were working with the same people in developing a directory services standard that was going to evolve as a result of the X.400 standard.

Pelkey: When did the X.400 standard finally get approved?

Mulvenna: CCITT approves their standards every four years, so essentially no work gets done in presidential years. They finish later the year before, like they finished late in 1987. There aren't any major CCITT meetings this year. Sometimes during the course of the year, there is a plenary, which is just a rubber stamp. Occasionally what happens, though, new groups may get formed, and those new groups might meet during the 1984. I think the directory service group started meeting in 1984, even though they weren't officially tasked, they weren't officially constituted as a CCITT group. They were sort of an ad hoc group that expected an official blessing from CCITT, which they got. They developed their work in four years, and I think there's a way of getting something developed in a two years cycle, but it's hardly ever done.

Pelkey: So in 1980 -- X.400 was approved in what year?

Mulvenna: 1984. Most of the work had been done by 1983.

Pelkey: So at the end of '83, the work had been done, and then in the plenary session of 1984 it was formally rubber stamped. Somewhere in there, there was this recognition of the need for what we now think of as X.500, the directory services -- did that kick back to IFIP?

Mulvenna: What happened was that, about 1982 or 1983 there was real pressure to get this standard developed in four years.

Pelkey: That pressure was coming from the vendors or the international community?

Mulvenna: No, from the people working on the standard. I mean, internal pressure.

Pelkey: What was the source of the pressure?

Mulvenna: Well, I suppose that the pressure was that the people who were working on the standard were representing companies who really wanted to market products, and they wanted to begin to market these products at the earliest possible time. They recognized the fact that this four-year cycle began, and they recognized that, in order to develop a full-fledged directory service, they couldn't do that and finish up in 1984, so they did two things. First of all, they developed what you would call an ad hoc solution to the directory service problem. Normally, the directory service problem you can define as going from what I normally know about you into what the computer needs to deliver a message. They look at a name as a collection of attributes which, when sufficient in number, will distinguish you from anyone else, the address being your corresponding place in the computer network. Well, what they said as this ad hoc solution is that these attributes might not be as user friendly as they would be following the implementation of a directory service; that they would have an architectural flavor to them, so that, for example, I might have to know, in the interim, what mail system served you, or, if you were a private message system attached to a public message system, what combination of public and private message systems served you, until a full blow directory service can be implemented. They felt that they could implement and sell message systems, particularly since these message systems wouldn't be truly global in the early stages. Maybe one or two message systems would be connected together, but they recognized that you wouldn't have a fully global message system until you had a fully global directory service. It was a very sensible, correct solution for them, and you're right, they did throw that back. The IFIP group continued to meet, and it was really an arm of BNR. BNR chaired it, and Jim White chaired the directory service group when Ian Cunningham left, and we did some preliminary work on directory services and the directory service was formed -- I think it did have meetings in 1984. It didn't wait until its formal approval, and Doug Steadman was the chairman of the directory service group.

Pelkey: Did you attend any of the IFIP meetings?

Mulvenna: I attended the IFIP meetings that dealt with directory services. I never attended any of the international standards meetings for directory services. I was attending the IFIP meetings through 1983 or 1984. Useful work was done -- the idea to get a running start on the work that was being done.

Pelkey: So now it's the end of 1983, and NBS -- you and other people -- have had your eyes opened up. You realized you had to get a little more sophisticated.

Mulvenna: And it was about that time that we formed the workshops. The workshops started in 1983. It was clear sometime in 1983 that, to me, personally, and to other people at NBS -- there was also this Modus work going on within ISO, and they had different points of view also, legitimate points of view, but there really was only going to be one international standard, it was going to be the CCITT international standard --

Pelkey: Of OSI.

Mulvenna: Yes, an OSI electronic mail standard. We stopped attending those meetings within ISO at that time because we felt they would only be a marginal influence --

Pelkey: Versus going from (unintelligible) to CCITT.

Mulvenna: Right.

Pelkey: Also, during this period of time, OSI gained momentum. The X.400 is really associated with OSI, although it doesn't have to be on some level.

Mulvenna: No, it is synonymous. It's bound to OSI. They even mandated the level of session layer that they wanted to use, and the class of transport they wanted to use, so it is bound with OSI.

Pelkey: So there was a recognition during this period of time what OSI was starting to come on. It must have been different for you, having come from the DOD side of things, where TCP/IP, which was the outgrowth of Arpanet --

Mulvenna: I actually didn't work with TCP/IP when I was working at the DOD. I was working in a very secure system which -- the TCP/IP world is not for the "go to war" messages or whatever, so we worked in our own little community, which was based on none of this, so I was only casually aware of TCP/IP and the Arpanet community when I was working with DOD.

Pelkey: So were you aware of this momentum under OSI when you joined?

Mulvenna: No. It was just starting. I was hired, I think principally, because I was working on a message switching, message processing system, and although it was a totally different form, there was an electronic mail standard being developed, and they wanted somebody to work on that. It was the kind of work I was doing, rather than the lower layer technologies.

Pelkey: Now, you indicated that, early, before the FIP came out, that there were three areas of activity of yours. It might help me understand how the TCP/IP and GOSIP weaved in -- now that you're on board, you've been working on X.400 and presumably you working on other things as well, since these meetings don't happen that frequently.

Mulvenna: As I said, I stopped going to the meetings. We pulled back because, around 1983 and 1984, in NBS, all the work was done in transport and the internet protocol, most of the work was done in session. X.400 was a standard, and what was done between 1984 and 1988 was maintenance of that, or implementations based on the 1984 standard. Real work was being done in file transfer, and we had -- one of the people that works for me was attending the file transfer standard, and work was being done in network management and security still. We pulled back, in terms of percentage of people going to international standards meetings. John was one of the major contributors to both the internet and transport standards, but even by 1980, 1981, 1982, that was well in progress, and he was attending some meetings. That real work probably stopped in 1982 or 1983 in transport, although he can tell you more about that than I can. The base was built first, then the application layers were being built, and then more work had to be done toward organizing the vendors to write the necessary implementors agreements. I think one of John's geniuses was to recognize that that work needed to be done, and to start the implementors workshop, to make that happen. I came back here and worked on the workshops, and I also worked on the VT standard, the virtual terminal standard, for a year. Then John asked me to manage what evolved into this network applications group. This is where the National Science Foundation report came out.

Pelkey: Which was when?

Mulvenna: Two or three years ago, '85, '86. I'm not sure when. John may know the date better than I do. It said, and I confess I've never even read it from cover to cover, but what I've been told it said is that DOD should not ignore what's going on in the commercial sector, should move toward adoption of the OSI protocols, which in fact, they are going to do. It's interesting that DOD was a major contributor to GOSIP. You would think that, of all the government agencies, they would have the most at stake in the status quo. That may be true for some of the people at the lower levels, but there has been a recognition by some of the higher people in DOD that OSI is the way to go. I'm going to read you from a memo that was issued by Mr. Latham -- I don't think he's with DOD anymore, but he was an Assistant Secretary of Defense. He published something last July which said:

"Now [as of July, 1987] these OSI protocols may be specified in addition to, in lieu of, or as an optional alternative to DOD protocols, in cases where the current DOD protocol applicability statements apply. They are designated as experimental because of the limited operational experience currently available with the OSI protocols, and the limited operational testing in a security environment concurrently defined in GOSIP"

Then it goes on to say:

"It is intended to adopt the OSI protocols as a full co-standard with the DOD protocols when GOSIP is formally approved as a Federal Information Processing Standard. Two years thereafter, the OSI protocols will become the sole mandatory inter-operable protocol suite, however, a capability with inter-operation with DOD protocols will be provided for the expected life of systems supporting the DOD protocols."

So they were major contributors to the writing of the GOSIP document, major because they were more informed on the issues than perhaps some of the other government agencies, and they realized the services that the OSI protocols would provide them, because of their work with the TCP/IP.

Pelkey: When will GOSIP FIPS be released?

Mulvenna: It will be released sometime this summer. We just had a meeting two weeks ago. I'm the chairman of the GOSIP advanced requirements group. What we did was we proposed it as a FIPS last October. We got the three-month comment period. The comment period closed in January. Comments dribbled in through March. We had our meeting in April, and we reviewed all the comments, and we made whatever changed the whole group thought was required. We had 25 government people here, representing probably around 20 government agencies. They approved the FIPS, and we will now have to get it through our lawyers and OMB, and whatever the bureaucratic process is, and don't ask me to tell exactly what it is, I don't know. All the technical work has been done, and it will now -- when it's promulgated as a FIPS this summer -- I've been saying June, maybe it's July now, I don't know -- it will mandate that, under certain circumstances, federal agencies acquire and use the OSI protocols, rather than any vendor specific or proprietary protocols. What it says, essentially, is that if it does satisfy your needs -- it admits that it doesn't satisfy all your data processing or even all your data communication needs -- but where it does satisfy those needs, you have to buy them. You can even buy others, but we expect that the two years cycle -- the mandating clock doesn't start ticking until two years after it's promulgated as a FIPS. That means that up until the summer of 1990, agencies can do what they want, but we're also encouraging federal agencies to acquire and use this technology before then. Also, it's being issued now so that agencies realize that this is something that they have to plan for. So factor it into your plans. Even if you don't want to use it right now, be aware that it's coming, be aware that you'll be impacted sometime in the future, and make the necessary decisions.

Pelkey: Implementors workshops: were you involved in the first one?

Mulvenna: No, I was not involved. I got involved -- the workshops started in 1983. I think Robbie chaired the first few of those, and then John came in. I was involved in about the eighth or ninth one.

Pelkey: Did John report to Robbie?

Mulvenna: Oh no, just the reverse. Robbie reported to John.

Pelkey: And you reported to John as well?

Mulvenna: I reported to John as well.

Pelkey: And did John replace -- who was it, Kathy, the woman you mentioned earlier that was your supervisor?

Mulvenna: No, at one time, John and Shirley were coequals, and then John became the division manager, and he was the division manager before Kevin, who is my division manager now, Kevin Mills.

Pelkey: So the workshops were in progress, and now you start to get involved in the workshops. My sense of it is that the momentum was building behind these workshops. You were getting more and more participants in these workshops, and they were starting to become quite successful.

Mulvenna: What happened was in the early days, the workshops were more -- it was a slow start. A lot of tutorials, because a lot of the vendors hadn't been to the international meetings. So we had a lot of plenary, and not a whole lot of time, maybe only forty or fifty percent of the time, devoted to the special interest groups. We had only three special interest groups, I think, at first. We had one for X.400, I think we had one for EPCAM, we had one for the lower layers. That was early. Now we've gone from three to 10, and the number of people has increased dramatically. Also, the kind of people being sent are different. A lot of people came because they wanted to find out what's going on. Now, this is not a place for people who are casual observers, because the various companies send their experts to work on some aspect of OSI. We have meetings going on -- ten special interest groups meeting this week, then they get together for a plenary only on the last day. We had a lot of plenary in the early days, and that degenerated into practically nothing, because more real work was getting done.

Pelkey: You commented early with contracting as the example, you had been using BBN in the early 1980s. You inferred that the amount of budget dollars you had prevented you from using contractors as much, and now you're starting to play this role more of facilitator/coordinator and making this philosophy of getting industry to develop things that were usable -- that was the approach you had to take. Was there any specific event that caused that change?

Mulvenna: No, our budget got cut -- and BBN was very useful to us, and we found them a very good source of talent and people who --

Pelkey: -- but I'm trying to enlarge it from using contractors in general, not specifically BBN or in this project -- was it the early 1980s that there was an awareness that budgets were being cut, or was there a specific year in which a budget got cut.

Mulvenna: You'll have to talk to John more about that, since I was not at a level that was dealing with --

Pelkey: But philosophically, there was a cultural shift within the organization?

Mulvenna: Within NBS? Yes, within NBS there was a shift away. First of all, the staff was much smaller when I was here, so we were expanding our own staff, so we were hiring the kind of people who could do the kind of work that we had been contracting out for. The staff has more than doubled since I joined in 1980, and a year before that, 1980 was a big hiring year for NBS. I came at the tail end, and there were a lot of people who were just hired a couple months before me. What happened was that there were three major focal points of activity of our

workshop, three major phases. The first two revolved around demonstrations of the OSI protocols. Both in 1984 at the National Computer Conference, and 1985 at Autofact, the vendors got together and they wanted to demonstrate, but certain shortcuts were taken because, for example, certain layers weren't used, the session layer and transport -- session layer and presentation layer weren't used. The presentation layer didn't even exist at the time, so certain shortcuts were made to show that OSI could work, but vendors found they couldn't sell products based on this. They tried, feebly, but no one wanted, quite reasonably, to buy products when they knew something conforming to the international standard was going to be available in short order. So then ENE was the third major focus, to develop product specifications. That began in 1985 or 1986. They turned their attention from demonstrating OSI, to building products that they hoped would make them money. I think the ENE is seen as the launching effort for that phase. We did two things: we started the workshops and we also started OSINET. Now, I was not involved in the very early stages of either the workshops or OSINET. I was off attending the standards meeting when the workshops were formed. OSINET, I did attend the meetings, but we've had a series of chairmen before -- there was a technical committee at first. There was a technical committee and a steering committee. First the technical committee, then they said: "Management people need to get involved, so we'll have a steering committee." There are still the technical committee and the steering committee, and we've had several chairmen of the technical committee, and John was the previous chairman to me of the steering committee, and his boss was the chairman before him, Bob Blye. What we also did was we found that, in the process of demonstrating, the vendors were gathering together in one place, and they found that there was a lot of time wasted, because nothing ran on schedule. Things wouldn't work as planned, and a lot of very competent people were sitting on their hands, waiting for somebody else in front of them to get through, and this happened here at NBS in 1984 when we were testing transport. We developed test systems, also. We developed a test system for transport for the NCC, and a test system for the internet protocol, which were used in both cases to test out the implementations of transport and the internet protocol; transport 1984, internet protocol prior to Autofact in 1985. So we were a major producer of these test systems. I was in charge of the group to develop the internet test system, but not the transport test system, because I was still attending standards meetings at the time.

Pelkey: I want to be sure I'm clear. The test systems that NBS was building has now, at some level, been presumed to be assumed by COS?

Mulvenna: Ok, yeah. There are two types of testing. There is conformance testing -- conformance testing says that a protocol conforms to the standard. It doesn't say it performs it efficiently, just that it conforms to the standard. This conformance testing is generally layer by layer. What you do is start with the seven layer model, you test one layer at a time, and you use the lower layers that you've already successfully tested as a base to test that. You can build a test system on top of those lower layers that have been successfully tested which is like a reference implementation, but it's really more than a reference implementation, because in addition to sending valid data, it can send invalid data, and measure the implementation under a test, how it reacts to invalid data and valid data. This work was done by us for both the transport protocol and the internet protocol. Yes, in a certain sense, COS has taken over that work. We didn't have the budget, nor was anybody anticipating that we could have the budget, to do all the conformance testing that was necessary for us to be able to develop and work on -- we just didn't

have the budget, nor was it planned. All the applications, all the upper layers needed conformance test systems, and we just didn't have the budget. What we are emphasizing now, here at NBS, is that we have developed a test system base on what is called a 'formal description language' called Estelle. I can refer you to another manager if you want to hear more about it, but it's, I think, going to be a very useful test system because this language is developed to specify a protocol, so basically it says: "When I'm in this state, and I get this input from an external source, I take this reaction, I do this processing, and then I go to this next state." That's simplifying it, but it's base on that. It's very easy to understand, and we've written -- we've translated that language into C code, and can build test systems base on Estelle, but we're not producing production oriented test systems right now, as COS is -- conformance test systems.

Pelkey: What was the relationship between NBS and COS at this time?

Mulvenna: COS didn't exist at that time.

Pelkey: How did it come into being and did NBS play a role in that?

Mulvenna: I don't know whether NBS really played a role in it. We recognized that we couldn't do it ourselves, and there were various discussions. John will be able to tell you more about this than I can, but there were various other solutions talked about. One was to take this whole group private, but there was resistance to that among a lot of . .

Tape Side Ends

Mulvenna: . . . it happened in 1985 or 1986. It was after Autofact or around the time of Autofact. I wasn't involved in those discussions. I never seriously believed we would go private. Exactly what the genesis -- exactly how the forum COS was formed, I just heard one day there was going to be a COS, Corporation for Open Systems, but there were other solutions being discussed. I'm not sure of all of them, but one of them was us going private.

Pelkey: Coming back to the issue of GOSIP, the momentum towards GOSIP was in place before you got involved in those activities? Were the workshops intended to say: "We're going to do this, therefore we're starting to educate you," or did the fact of GOSIP come out of the interest?

Mulvenna: GOSIP started late, not until 1986. The purpose of GOSIP is for those people who are acquiring and using OSI protocols. It's for products. It's meant for the procurement people, so it would be premature to worry about procurement of products until those products are available, so GOSIP fell out as a need to stimulate the user to acquire and use products, and to educate the user to acquire and use products that were in the user's best interest. GOSIP didn't really have a relationship with the workshops. It fell out as a natural offshoot of work being done at the workshops. We reference the workshop documents in GOSIP because we want the implementations that the vendors -- we want the federal agencies to acquire, not only implementations based on international standards, but implementations based on international standards that are also augmented by our workshop agreements. This is not controversial because they are going to be the implementations that are being produced in this country. There

isn't any competition. There is no other workshop in this country that's competing, and because all the vendors are here right now.

Pelkey: How did GOSIP come about?

Mulvenna: John is a better person to answer that. I know that there were MAP and TOP specifications being built also, and MAP and TOP were meant for the office automation --

Pelkey: Did they precede GOSIP to your knowledge?

Mulvenna: Their work preceded GOSIP, but it's different than GOSIP, because what MAP and TOP are doing is that they're saying: "This is what this community wants the vendors to produce." What GOSIP says is: "This is what the vendors have produced that meets government needs," so it's not a forward-looking document. I'll give you some slides before you leave which will summarize a lot of what I'm saying because I give a presentation. This is it, a presentation that puts GOSIP in context. It's meant to say: "This is what agencies have produced that meet government needs. You should acquire and use these products." It's not a forward-looking document. It's not a document which makes policy, it reflects the work that's being done. It makes policy in that it will mandate that federal agencies acquire, but it's not trying to be controversial.

Pelkey: It's not a de jure policy, it's a de facto --

Mulvenna: Right, exactly.

Pelkey: So you're now involved in this GOSIP process that is getting this document -- taking the stuff from the workshops and --

Mulvenna: This is an old version of GOSIP. It's very big. You can see that the MAP and TOP specifications are -- you can have that -- are thicker than the Washington, Virginia and Maryland telephone directories combined. This is a very simple document, and it references heavily other documents. We are also going to put out a GOSIP user's guide, which is going to place material in this document in less technical terms, for the federal -- the non-technical people within the federal agencies.

Pelkey: It's your responsibility to help create this document, and I presume, therefore, the document you just alluded to.

Mulvenna: That's right, and I have somebody working on my staff doing the latter.

Pelkey: So the implementor workshops are on-going. You take the output of what's happening in these implementor workshops and increasingly get that document so that, I assume there will be further revisions or versions of GOSIP that will incorporate on- going --

Mulvenna: There will be version issued approximately once a year. We put out a stable version of the agreements document. This came out last December. This is Stable Implementors

Agreements Document, and I think they're going to issue these once a year. We'll probably be issuing a version of GOSIP corresponding to a version of the Stable Agreements document once a year.

Pelkey: And GOSIP would reference this?

Mulvenna: Reference the next version, right.

Pelkey: Is one of these the internet or the transport?

Mulvenna: No, this contains all of them, FTAM, X.400, Internet Transport, all the work being done in our workshops that's stable, that's not likely to change in the next year, it goes into this one document.

Pelkey: Now, when this process began, if I understand correctly, originally, it was really meant -- at least at the transport level, it was something of an outgrowth of NBSNET, and the work that they had been doing in terms of your motivation to have an internal network. Now, it's broadened so that it supports more than CSMA/CD sorts of nets. This one does token ring.

Mulvenna: Right, there's three local area network technologies in GOSIP. There is 802.3, 802.4, 802.5; CSMA/CD, token ring, token bus, plus X.25.

Pelkey: When did all those get -- when did the other three get subsumed as well as CSMA/CD?

Mulvenna: 802.5 just got into the workshop agreements last year. I don't remember when 802.3 or 802.4 -- they got in in that order: 802.3, 802.4 and 802.5. Robbie would be a better person to know.

Pelkey: .3 was the one you had in house?

Mulvenna: Well, we had 802.4 in house now too, but this was -- again, we don't control what goes on in the workshops in the sense that, there have been several things that we wanted to do in the workshops -- we wanted to start an ISDN SIG, for example, in the workshops -- and we didn't start a SIG, although the work functions were subsumed into the lower layer SIG. We were only one player at the workshops. We manage and administer, we act as a catalyst, but we don't really say: "Here's how it is, guys." We can't do that. We found that out repeatedly.

Pelkey: Now is there a steering committee of corporations or the major players, or do they just come with equal vote with small companies?

Mulvenna: There are rules for voting, and I'm not sure what they are. They change from time to time. Basically, it's a totally open organization. You can come. I think you're not expected to vote unless you are knowledgeable about the issues.

Pelkey: Is it like the IEEE approach where you come and vote as an individual?

Mulvenna: No, you come and vote as a company. There's one vote per organization.

Pelkey: And the organizations that vote are the ones that attend the meeting, or do you have to become a member of something in order to have a vote?

Mulvenna: No, you don't have to become a member of something. What Robbie says is that he is reluctant to approve something unless it is close to unanimous. He likes to get consensus before the fact. He doesn't like to bring controversial issues up for a vote, because it doesn't do any good for the workshop if something passes 31 to 30. It means half the people are -- so he looks to build a consensus beforehand so there aren't controversial votes. Anybody can come. If your organization wants to get involved and hasn't been involved, you can just come to the meetings. You can't vote at the first meeting, you can probably vote at the second meeting, particularly if your knowledgeable about the issue and you attended the SIG meeting, but it is not rigorously enforced. The voting is not rigorously enforced.

Pelkey: Is that process documented anywhere?

Mulvenna: Yes it's documented, but I don't know where it is. Robbie has the voting regulations. He's in charge of it. I haven't attended the workshop meetings in about the last year, since I got involved in GOSIP. He has taken over in that time. He's been running the workshops for the last year, year and a half.

Pelkey: And you ran the workshops before that?

Mulvenna: No, I didn't run them. John ran them. I sort of took the minutes and was involved in it.

Pelkey: So now Robbie is responsible for the workshops, and you're responsible for GOSIP?

Mulvenna: And for OSINET.

Pelkey: And GOSIP, you took that over from John?

Mulvenna: Yes, I took that over from John.

Pelkey: I guess in those days these things were a lot smaller. They've all fragmented and gotten bigger and bigger.

Mulvenna: That's right, GOSIP was just getting started. John left after the draft of GOSIP was produced. He and two DOD people were the principal contributors to developing the document, he probably the most, I guess. He probably --

Pelkey: Sounds like 10 or 15 people have taken over the responsibilities that John once handled?

Mulvenna: Yeah, that's true. He did spend an awful lot of time. The work has expanded, but it's true, he was a principal contributor to GOSIP, and he was a principal contributor to the work of the workshops. He ran the workshops.

Pelkey: OSINET, what is OSINET?

Mulvenna: OSINET is a network -- first of all, it's an organization that uses an X.25 network as the backbone to test and demonstrate OSI protocols. It arose out of the need, in 1984 and 1985, when the vendors were getting together in one place and saying: "There's go to be a better way of at least running the interoperability testing of our products." So what we did was, we went out to various X.25 suppliers and said: "Are you interested in providing X.25 services?" ACCUNET and WangPac said they were, but Wang's costs weren't as competitive as ACCUNET, so everybody essentially signed on to ACCUNET, and we have something like 33 organizations that are members. Some have just joined, so they are not attached yet. It's both vendors and users, and the vendors are doing this because they want to be able to simulate the real live environment in which their products are going to be marketed, and do this without having to go together in one place to do it. So what we have here is vendors, who will be selling competing products in the marketplace, cooperating with each other, because they realize it's in their own best interest to do this, so we're all attached to this network. What we do is we develop a set of interoperability tests that the vendors can run to make the process less casual than it would otherwise be. We're mostly interested in testing the applications. We've developed interoperability tests for X.400 thus far. We're in the process of developing interoperability tests for FTAM. We will be developing interoperability tests for other protocols as they are implemented and marketed by the major vendors. We expect to have these tested on the network.

Pelkey: Protocols being session and presentation protocols?

Mulvenna: I mean whole protocol suites, I guess. When we're doing interoperability testing you're not testing one layer at a time, you're testing the whole ball of wax, from the application layer down.

Pelkey: So OSINET is more than X.25, because X.25 would be just --

Mulvenna: That's right, it's the whole OSI protocol suite.

Pelkey: So you can be over on an 802.3, running TCP/IP interoperability over to an OSI suite --

Mulvenna: What we have here at NBS is -- we have our end systems attached on 802.3 or 802.4 networks. The system that's attached directly to OSINET is just an intermediate system, just to the internet protocol, just up to the internet level, and it routes. All it does -- it never gets up to the application layer -- if just routes to the appropriate end system. Other systems could have their whole configurations -- the application layer, the processor that contains that application layer -- directly attached to the X.25. We don't do that here. Each organization can have their own separate local configuration, but the important thing is there is an end system that contains an application which serves and application layer user. That application can be FTAM

or X.400, currently, and those users can correspond with systems built by different vendors around the world. We have nodes in Australia now, we have nodes in Europe, we may even have a node in South America before the end of the year. All of them will be testing different implementations to make sure that their implementations interoperate correctly with other vendors implementations. We are also going to make some use of OSINET, we believe, in connection -- we're going to be writing a test policy document for GOSIP. We're going to give guidance to federal agencies, recommendations to federal agencies how, in the acquisition -- in the testing aspect of the OSI products, and we're going to recommend to them that the vendors be able to have their products certified that they interoperated with some number of other vendors products. OSINET is a logical candidate for such a network for this work to be done on.

Pelkey: In terms of it being the medium by which you certify interoperability?

Mulvenna: Interoperability.

Pelkey: In the commercial world, there's things called routers and bridges and gateways. It sounds to me like what you're talking about is able to provide, just like GOSIP does for a protocol suite, standards for routers, bridges and gateways.

Mulvenna: No, what I'm saying is that there will be -- we have an X.25 backbone network and we have n systems containing the full OSI functionality, from the application layer on down, hooked up to each other through some mechanism, either directly or indirectly, and they're all OSI applications. That's what I was saying thus far. We also have developed our application layer gateway here at NBS, which will transform from the OSI protocols to the DOD protocols. That's another experiment that will be done on OSI. So we will have people who are attached to the DDN, we can have a DOD user come in and send a message --

Pelkey: -- through the suite of protocols, ie X.400, or FTAM that have been --

Mulvenna: Our (unintelligible) processor, the way the application layer gateway works is that there is one processor that's located here at NBS, and this processor contains both sets of protocols on it. It contains, on one side, the DOD set of protocols, and on the other side the OSI set of protocols. So the DOD user would send their message in here, but they wouldn't reach another SMTP implementation. We'd be modifying the code here, and then we'd be sending it out the X.400 side. So we would go from the ASCII text, which is the syntax for SMTP, to the syntax we were talking about that X.400 developed, X.409 or ASN.1, and there is also a difference in services. The services don't map directly, and we have to make design decisions based on that. We've already done that for electronic mail. We expect to exhibit this in conjunction with DEC, who loaned us a MicroVAX II in order to do this work. They provided us with the lower-layer software that we needed, we just wrote -- and a company called Network Research Corporation provided us with the DOD software. This is another area of government/industry cooperation here. There are also other areas of cooperation we have. When we developed this internet protocol for the test system for the Autofact, we did this very quickly, and we couldn't do it. We didn't have all the in-house resources to do it, so three companies, Intel, Honeywell & NCR, sent us people to work here full time at NBS for four or five months, to develop the test system that we needed to test out the internet protocol at

Autofact. So, there's lots of examples. This place is flooded right now with people who are here from other countries -- temporarily, we have a person even from ICL across the way right now -- who is working on directory service with us, and he's been here for the better part of a year.

Pelkey: (unintelligible)

Mulvenna: We can augment our staff that way. Some people come part time and then go back, some people stay for a while, for a year.

Pelkey: So the TCP/IP work, you indicated earlier, that the TCP/IP work, is it primarily as it relates to the OSINET?

Mulvenna: Yes, it's to help the TCP/IP world move toward and work with the OSI world, to push them, gently, in the direction of OSI. We feel that it's important for them.

Pelkey: And to OSINET as a medium by which that can begin to happen.

Mulvenna: That's right, because the gateway will be available to both the DOD users and the OSI users on OSINET.

Interruption in the Interview

Mulvenna: When I present GOSIP and other developments that are occurring in Open Systems Interconnection, and I start off with why do we have standards -- all the vendors and users are both looking for it -- and I give them a little tutorial on OSI, explaining, a little tutorial on the various standards organizations that are involved, the non-standard but important groups that are working for the development of MAP, TOP and COS. We talk about the implementors workshop. [leafing through some papers] These are the SIGs. This is just information about the various applications that are involved right now. We have five applications to have SIGs at our workshop. Then, talk about the gateway. Then, talk about OSINET, what our objectives are and future projects. Then, I say: "This is the work that's being done now. This is why we believe all this is being done right now began 10 years ago. It's appropriate now to be issuing GOSIP as a Federal Information Processing Standard." State various things about it, including its differences between MAP and TOP and what network technologies is supports, say something about conformance testing and interoperability testing, list the companies, state what's going to happen in the future. So you can have this.

Pelkey: Jerry, I much appreciate your time. You've been very helpful. Speaking as one citizen, I appreciate what you're doing.

END OF THE INTERVIEW

