Reflections on Our Future
by Douglas C. Engelbart

Well, thank you. I have an interesting association with ASIS. The very first professional paper I published was with ADI [forerunner of ASIS]. I guess it was about 1959, and related very much what Gary was saying. The theme of it was, “Hey, you librarian people, etc., the producers of your information, that world’s going to change a lot with the computerization of its generation. And the world of your users is going to change a lot. And you can’t sit there in the middle of that thinking you’re going to just be monitoring the same kind of freight and storage as you used to.” It was a fun paper to write, but I think there was one review and it focused on my example of edge-notched cards as a primitive example.

Then in 1969, we were lucky enough to be able to put on for ASIS a live presentation and a video-projection of what we were doing and proposing. On that system we were showing hypermedia interaction, viewing people from our laboratory, their faces would come up and they would be showing what they’re doing and we could interact on the screen. I was trying to give a picture of what we viewed was going to be the future. We’d done that a year earlier at a computer conference, and those were, for us, just big hopes. But, they made a little bit of a blip and then nothing. Similar things in the coming years really began to teach me about the term paradigm. And that is, what is the prevailing way in which people perceive their world and the future. And if that paradigm, which often is narrow enough just to be practical about coping with the days in the world we work, if that paradigm doesn’t expand far enough to take care of the imminent future, then your ability to plan for that future and deal with it is very much inhibited.
Well, digital technology has been changing so fast that the way in which our society has dealt with its evolving paradigms just isn’t up to being able to include even the near future. And now it’s not even being able to include what’s here, technically. So it became clear to me that that was a dominant problem in the world.

Another relationship with this conference that really struck me is the term complexity. What triggered me into taking this very divergent career path in 1951 was realizing the world’s problems are becoming more and more complex and more urgent, and they need dealing with – the serious ones need dealing with collectively. And man’s collective capability to deal with complexity and urgency wasn’t evolving and maturing to keep pace with the complexity and urgency of the problems and the challenges. Helping and contributing in any way to improve that capability was and is something that I could invest my career in. So that’s what I did explicitly. Quitting my job, taking my new bride, going up to Berkeley to study computers, etc. That picture’s been dominating me for all the years since.

And as I experienced more and more, the paradigm issue and problem became clear to me in the 50s. Because I was interested in computers becoming cheaper and faster and more available, I did a study on how the scaling down of electronic components would probably be done. And that introduced me to a world of people studying the impact of scale change on environments. And everyone sort of knows that a scale model of an airplane is not likely to fly, because at different scales physically, things operate differently. The design of you people would be very nice for the five- to six-foot model, but if you were fifty-foot models, your design would just not work. You couldn’t even stand up. If you were the size of a mosquito, you could probably flap your hands and maybe fly. You get surprises when scale changes beyond a certain point, change beyond where your intuition would guess.

So when I looked at this tool-system, human-system thing, I said, “The scale on the computer, the digital stuff, is just going to erupt, and if that happens the adaptation of the human-system side is going to have all kinds of surprises.” And that just stayed with me all this time. Trying to tell the world about these surprises doesn’t do you much good, because trying to tell people the paradigm isn’t right, just doesn’t work. It’s sort of like becoming a political radical. People see you coming and they move or change the subject.

So we were very lucky to get money from ARPA and others, starting in ’63 and ’64, and we actually could build a system. I said, “Hey, one of the surprises that’s very important from my point of view is, if you’re going to be more collectively capable, we want to improve the intellectual capability of harnessing your brain, especially collectively.” So I looked and thought, “What’s that going to be like? And I considered externalizing your concepts. Oh, great! You do it on hard copy, but what’s the advantage you will get in putting it into a computer?” It’ll be easier to get there and the computer structure could actually model the conceptual structures in your mind.

The first thing we built had hyper-linkage, structure, all kinds of optional viewing for once you’re in there moving around and collaborative capabilities. We had all that working in 1970 when I volunteered, because I was in the ARPA community, to be the online information center for the network. So they made me the second node. And what happened is we had that hypertext stuff all available for usage, and hypertext electronic mail, that could interlink, etc. And we could not get any of the other participants in the ARPA community to use it. Everybody just said, “That editor is horribly complex. We [especially the AI people] will make our own editors.” But, it’s more than an editor.

By the mid-70s we actually got judged to be going very much in the wrong direction and lost our research money.
The only way to survive with the system we had, which was supporting customers at the time, was to be moved out to the commercial world. The whole organization got sold to McDonnell Douglas, which was building an information systems group. We insisted that we work and use the system ourselves, so our source code is hyper-structured and inter-linkable and on and on. We had our own library system, in which you submit something and it stays available and can be cited from any of the 20 servers around the country, and it has a name of a journal and its journal number, and there’s cataloguing and you’re guaranteed to get back what you authored, at that time. And you could interlink to any object in there. So, it proved by experience an immensely valuable thing. But all of that died because the paradigm couldn’t accept it. If IBM, Hewlett Packard, McDonnell Douglas and DEC weren’t doing it, it’s suspect. It just became clear that only experiences can shift paradigms; it doesn’t do to tell people – you’ve got to give experience.

So we worked up this system that we called bootstrapping, and you guys in ASIS are part of the scene. We at the Bootstrap Institute say the world has one category of people who are operating and another category of activity that’s improving the capability to do that work. So we called the first part the “A” activity and the next part the “B.” The “B” is that which is busy trying to improve how capable you can be at “A.” Because we have significantly more challenges coming, we must get a more effective “B” going to cope with that change. To improve the capability for doing “B,” you obviously have to add a “C” to improve your capability to improve. We already have a lot of “C” activities. You guys are embedded in it right now. Well, the “C” world is usually a community of people operating. Can you fix it so you can augment communities? Of course, that’s what we really pushed in the collaborative, distributed work by being on that ARPA network for some important work. So, what we’re telling people today is, “Look. It’ll be very important for the ‘C’ activity people to say, ‘Hey, we better start doing what we’re preaching.’”

So why isn’t ASIS really busy augmenting its own capability, because its way of working in the future is going to be a lot different. And if it stays the way it is now, pretty soon we’ll have an empty room, because who wants to go to all the trouble of travelling to get together. While once in a while it’s important to have that personal bonding, more and more the importance of what ASIS can do, can be done a lot more effectively if you really get a network going.

We find that we really love going out to organizations. It’s a very different thing approaching and saying, “Let me tell you what you ought to do.” They look at you and say, “Don’t you do heavy knowledge work?” “Oh yeah, but I’m here to tell you ...” “No, why don’t you show me how you’re doing it?”

So you as individuals and ASIS as an organization are going to be in that position to go out there and tell the world what they ought to do and they’ll say, “Ha! If ASIS is really going to do that, why isn’t it an example of that different institutional way of working?”

In the Bootstrap Institute we’re really trying to get that word out. We’re saying, essentially, “team work is very different, so let’s try to get an open sort of environment of teams of teams.” And a very important category of that is professional and trade associations. So, we can knock on your door and say, “Why don’t you guys make an interface to this Bootstrapping thing?”

We’re getting some government and corporate deals going, and it’s the challenge. Either that or figure out for yourselves how you’re going to do it. But our kind of bootstrapping proposes having a central thing that societies can belong to that would help teach societies how better to become professional societies by merging your experience and being a society in itself. So that is the central kind of bootstrapping I see.

You guys would be an extremely important segment of that, because you’re a rarity among all of the already existing “C” communities in the nature of what you’re dealing with. And you can shift a little bit away from information toward knowledge as the core. The center of all our future activities will be a dynamic depository of knowledge packages, based in the document. The new document of the future is going to be the knowledge-carrying thing that evolves and directs. And it’s going to need some really careful thinking about what the standard form of that future document is going to be. It’s clear that it’s going to be hyper, and it’s going to need some other things to become a really effective generic, widespread, inter-operable, knowledge package system. So, that’s part of the challenge.