Fredkin discusses Project MAC:

"I think MIT is one of the strongest universities in the world, in terms of the kind of research we do at MAC."  

---Suhas Patil, Assistant Director of the Artificial Intelligence Laboratory at MIT

"It was very expensive and difficult project and my feeling is that it will turn out one of the best investments the government ever made."

---Prof. Edward Fredkin

Project MAC was started about ten years ago to both develop and exploit time-sharing. This was a new technology and many early experiments were in progress, and the early system, CTSS (Computer Time Sharing System) was beginning to function. That preceded MAC.

Oh yes, Project MAC was set up not only to further develop the ideas and to exploit them. It existed quite a while before it had the name, MAC, and while I wasn't in MIT I happened to be on what was called the Steering Committee, which met every week, and one of the things we passed over was the name.

There were lots of proposals: one I remember particularly was "Plexus". Doug Ross wanted to call it Project Plexus or something. He had a name for proposed. I suppose.

So, in my case, MAC was chosen as kind of an arbitrary name, but the letters had two interpretations. "Machine- Aided Cognition" was one, and "Mass Access Computer" was the other. "Man and Computer" was something someone thought of later. Once you have an acronym you can think of what it stands for easily.

It was called a project in order to encourage participation by people who had other laboratory associations. In other words, in the early days, they wanted people from other laboratories to come in and thought if they called it a laboratory, they might exclude people from different laboratories. Since then, it's kind of evolved into a laboratory; it's now considered a standard MIT interdisciplinary laboratory.

Two questions: First of all, what is the emphasis, hardware or software, and second, who were some of the pioneers of MAC?

For your first question, the emphasis has always been on software and systems. Now, lots of hardware ideas got thought of, in the sense of modifications to computers to make the software possible, but the emphasis has been on software.

The other question: in my view, there are two pioneers of Project MAC, and they're both here, Professors Licklider and Professor Fano. At that time, Licklider was not at MIT, but was at the Advanced Research Project Agency (ARPA) part of DOD, and Fano was at MIT... Project MAC was started by MIT in request to an initial probe that came from ARPA; in other words, the idea that time-sharing was an important re- search area and should be supported by the government really came from ARPA, Government support of time-sharing is due to Licklider, and when he became director of that office he started looking into time-sharing. He brought the idea of some large project to MIT, and MIT responded by creating Project MAC.

What have been the major achievements of Project MAC?

CTSS existed as a developmental and experimental thing before Project MAC was started. But, what MAC did was to make it a real computer utility, the likes of which could run all the time without people watching it and people could trust it. Also, many problems were handled later on by MAC, even in terms of CTSS. A good example was the file system; they started out with a very simple-minded file system, and redesign turned out to meet the demands that time-sharing imposed.

How about the AI (Artificial Intelligence) Lab? Are they talking to competitors yet?

Let me just say a little historically about the AI Lab; it's really much older than Project MAC, by far. It existed in BRL for a number of years and a program was headed by Professors Mac and McCarthy. Then McCarthy left, went to Stanford to form the Stanford AI Laboratory. After Project MAC was formed, it seemed the natural thing for the AI Lab to be part of its budget, more natural than otherwise. So it became associated with MAC in that sense, and a couple of years later it became an independent laboratory. All we [have] mentioned [so far is] CTSS, and that was seven years ago, if that was our only accomplishment, things would be very bad.

Multics was another really enormous job to bring off, and while people felt it was almost like a white elephant, maybe wasn't so successful, it entered an era of bad feeling. What seems to be very clear is that the ideas in Multics are sort of the leading of the way in the minds of those people designing tomorrow's new systems. What are those ideas? What distinguishes Multics from CTSS?

Well, a whole host of systems, ranging from protection and security issues to the idea of having all kinds of programs written in different languages being able to communicate with other programs in other languages, the idea of virtual memory... Is that original with Multics?

I think that about half the things were mentioned or done in some-simplified manner before, but were never brought to a point of real time-sharing. There are many original ideas in Multics; I think the "rings of protection" is an example of an original idea in Multics.

There are many original ideas in it, and another thing is, if someone comes up with an idea or demonstrates it in a quick and dirty demonstration on a little computer system somewhere, it's very different from integrating it into a usable, workable utility, like Multics. As a matter of fact, it turns out that the test of getting all these ideas to run in the same computer at the same time is much harder than it is to do any one of them by itself.

How long did Multics take? How many years?

How many man-years, may I? I don't know how many man-years, but it took a total of seven years...

It was a very expensive and difficult project, and any feeling is that it will turn out one of the best investments the government ever made. The government paid for Multics, why? Honeywell selling parallel.

[Patil]: That's very complicated project, and any feeling is that it will turn out one of the best investments the government ever made. The government paid for Multics, why? Honeywell selling parallel.

In other words, when Honeywell sold this for six million dollars, they had it not knowing how they brought it to us so it is just from their government, but because their predecessor GE was co-developer of the technology. Right. Now, if Multics ended up being a very popular thing and as useful a system, I don't know how it could check into this, but I believe that MIT could come into some royalties on it.

It's a million-dollar pro- gram he be popular? First of all, it's not a pro- gram that is, are hundreds of six-million-dollar systems around. The JPL's, present IBM installa- tion is very expensive -- I don't