

My AI Foray

Around 1985 it was becoming clear that LAMPF (the acronym for the Los Alamos Meson Physics Facility) was on its decline as a “meson factory.” The Department of Energy had eliminated funding for what it called “Medium Energy Nuclear Physics,” which it had created to support the building of and exploitation of LAMPF. Since my major rationale for coming to work at Los Alamos was to provide liaison between the laboratory’s theoreticians and the LAMPF experimentalists, this was something I worried about. Should I start doing something else?

It was about this time that LANL began to show an interest in AI, i.e., artificial intelligence. AI had been around for several decades, notably at MIT and Stanford, but a recent development in AI was what came to be called Expert Systems. LANL management was apparently concerned that many of their staff who had been involved in the development of nuclear weapons were on the verge of retiring, if they hadn’t already done so. And thus the expertise of these scientists and engineers could gradually disappear. So, an energetic fellow, John Marinuzzi, convinced top management that it would be worthwhile to set up an intensive four-month course on Knowledge-Based Systems, a subset of Expert Systems. The small group of students who were to take this course were to come from many different parts of the Laboratory.

Hearing about this course, I signed up to participate. Perhaps it would be a way to segue into something different from medium energy physics. And it was, as I will describe below. The course was essentially a full-time endeavor in which I learned a lot more about computer science than I wanted (or needed) to know. My use of computers up to that point had been mostly in writing FORTRAN programs for my physics projects. One of the more fun things I learned was how to use the LISP coding language. But perhaps more useful was my introduction to object-oriented programming. There were 14 of us who “graduated” from this course in October, 1986.

We graduates were expected to diffuse our KBS knowledge through out the Laboratory. I did, of course, return to T-5 and continued to work on medium energy problems, but I also spent time in other Laboratory Divisions doing what was called Form-B work. Which had the advantage of providing some funding for T-5 at times when *its* funding had gotten tight.

My first job “away from my T-5 home” was with the Accelerator Technology division. They brought me and David Schultz, one of my fellow KBS graduates, in to see if an expert system approach could help with accelerator control. I don’t think we got very far on that, but there were two conference papers we presented on AI as it might apply to accelerator control.

A later Form-B job I had was with D-Division (which might stand for Decision Applications.) Working mostly with Chris Hodge and his colleagues we tried to apply object-oriented concepts to the processing of nuclear materials, such as plutonium. That was the closest I ever came to doing classified work at LANL. This project became moot, however, when the DOE closed down the Rocky Flats facility.

It was also about this time that Steve Jobs, recently fired from Apple Corporation, formed the NeXT Computer Corporation and started producing their one-cubic-foot computers, black of course. I went to a demo and became enamored with them. And, besides getting one for my use (at the office, of course), I talked a few of my colleagues and the group secretary into also getting one. So, I became the group go-to person for NeXTs. I also participated in the on-line discussion group and published four papers in the NeXT User's Journal. The cubes were pricey and thus not a big hit in the consumer's market. So, NeXT wisely translated the NeXTSTEP operating system to the Intel chip that allowed it to run on regular PC's. I was then able to buy that OS to use on my desktop computer at home. In fact, several years later, that home NeXTSTEP computer was used to make the prototype demo we developed for WhistleSoft's first-phase SBIR grant. But that's another story, to be written about separately.

For what it's worth, the NeXT corporation gradually faded away when Jobs returned to head up Apple.

By now you may be wondering why you don't hear much these days about Expert Systems projects. Frankly, that's because it isn't easy to develop one of those projects. Not only do you have to pick the brains of at least one expert, you have to arrange things in a way that can bring the expertise across to the non-expert person using the system. This branch of AI has, as far as I know, died out and been replaced by the deep-learning neural-net systems that today can beat world champions at chess and understand human speech. I never decided to go that route, and my interests in AI have abated.

Before closing, I should mention one other fallout from the KBS course – which was LISP. The language was developed at MIT back in 1958 specifically with AI in mind. Around 1988 Tom Williams and I began thinking of using a form of LISP that could run on a PC computer to do algebraic manipulations to automate angular momentum re-coupling computations. I had to do many of these by hand throughout my career as a nuclear physicist, starting already with my thesis. These calculations are also needed for many atomic physics calculations. We found we were able to convert the graphical techniques for this Racah Algebra invented by physicists at the Bureau of Standards in the 1970's into a fairly compact LISP package. This work resulted in a nice publication, but, to be honest, it did not receive as much recognition as I thought it would or should have. On the other hand, it turns out I haven't had to do many of these re-coupling calculations in recent years.