Extra curricular activities in BBN Division 6, circa 1971–1978

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This text was mostly written in about 2003 as we began the work which became the book A Culture of Innovation. *A lot but not all of this content appeared in Chapter 5 ("The Way We Were: Aspects of the Culture of BBN") of that book.*

I remember lots of extra curricular activities in the Computer Systems Division of BBN (Frank Heart's division, Division 6), especially before about 1975 when we moved from the 20 Moulton Street building to the new 10 Moulton Street building that had replaced the Superior Laundry processing plant. (Of course, while the new 10 Moulton Street building was being built, watching its construction was an important activity. The six concrete floors were all poured at ground level and the jacked into the air on the I-beams that provided the vertical strength of the building. The jacks on each I-beam were hydraulically run with lots of hoses running from a central pumping station. The individual jacks on each I-beam had to be carefully controlled so they lifted the concrete slabs uniformly. This hydraulic "control system" was fascinating to us "computer control" people.)

Early on in this period, a bunch of us were playing postal chess. Maybe the Fisher-Spasky match in Iceland stimulated us. I remember at least Will Crowther, Bernie Cosell and me playing, and I am sure there were others. We each had several stiff paper chess boards, three-hole punched to go in a notebook, with flat plastic pieces that slipped into slots in the squares of the board. We were playing at different levels in the national postal chess organization and a lot of time was spent looking at the games at work. Frank Frasier, on the other hand, was dedicating himself to gaining strength as an over-the-board tournament. player. As I remember, this was an era when the best computer chess program was still Greenblat's MacHack from MIT, and it ran on our PDP-10.

I'm not sure of the other of the rest of the activities, but another was juggling. I picked up a copy of Carlo's Juggling Book in a book store in Coos Bay, OR, where my mother lived. I taught myself a three ball cascade at home over the bed (Sara would get mad when I practiced with her in the bed). Soon I showed off my minimal talent to Crowther, Eric Roberts, etc., at BBN. Eric already knew how to do basic three ball juggling. Soon lots of BBN people were buying three lacrosse balls and learning to juggle, do simple ball passing. As time went on, various of us began going to the Sunday afternoon sessions of the MIT Juggling Club where we learned to do club passing [see `http://walden-family.com/juggling/fortune.pdf`, from the December 17, 1979 issue of Fortune magazine, page 26; in the photo the left most person facing the camera and the person second from the right are BBNers]. Shortly, this BBN interest in juggling spread from BBN into the greater ARPANET community; I remember one visit to at meeting at Ft. Meade where Vint Cerf (probably at ARPA then) and I both had our juggling balls in our brief cases. Don and Lana Reed were local street performer jugglers who we all knew and admired from their performances in Harvard Square. They were the current editors of the International Jugglers Association (IJA) Newsletter. Seeing their hand written address labels on the Newsletter, I put the IJA address list on line on a BBN computer and provided Don and Lana with adhesive address labels for the rest of their tenure as Newsletter editors. At my first IJA annual convention in Los Angeles, I got elected IJA Newsletter editor (I think I was the only volunteer to take over from Don and Lana), and for the next two years the Newsletter was composed on BBN computers and printed by the BBN print shop which was allowed to take outside paid work. For two exciting weeks, Lana happened to appear the temporary-agency supplied replacement for my secretary who was on vacation. A couple of times

we managed to get her to join us for lunch hour juggling in the multi-purpose room on the sixth floor of 10 Moulton Street. At the IJA convention in Eugene, OR, Eric Roberts suggested the next convention be held in Massachusettes, but somewhere else was chosen. However, the following year, Eric along with John Robinson (JR to everyone who knows him) became convention chairmen for the IJA convention held at Hampshire College in Amherst, MA. For quite a few years after this convention, JR maintained the IJA address, which he had converted into a more sophisticated form for easier use, on BBN computers. For five years or more, the IJA was sort of a BBN sponsored, given how much extra curricular (and perhaps some work) time of BBNers went into it.

The Cave Research Foundation was another activity that had this sort of BBN "sponsorship." Will and Pat Crowther were active in exploring and mapping the extent of Mamouth Cave in Tennessee. Will entered all the mapping data into one BBN's computers where he wrote a program to process it and plot a 3D perspective image of it. One or two other BBNers helped Will with this project — one of whom was JR, I think.

I don't know which came first to BBN, car rallies or map rallies. In any case, Bernie and Lynn Cosell (and perhaps other BBNers) got involved in car rallies, where they tried to follow complex directions and pass by checkpoints at precise times. Within the corridors of BBN, a desktop version of car rallies was played annually for a number of years. Some group provide a complex set of puzzle-like directions and a specific road atlas of the U.S., and participants had several weeks to try to solve the directions and find the correct course in the atlas. A number of BBNers participated in this annual competition, and some years it seemed like it was the main business of the division for the weeks before its ending deadline. One of the most fun rally-like events was the car rally to the division annual picnic. We all met at the fast food stop on Rt. 128 near the Rt. 2A overpass, got our directions, and then tried to follow them past the various required checkpoints at the required times until we found our way to Bob Brooks' house and the picnic. Of course, almost all of us went by car, but two or three people (e.g., Joel Levin) did at least some of the rally on horseback.

Another activity consuming many people in the division for a period of time was learning to fly air planes. Some of the people involved in this included Bernie Cosell, Tony Michel, and Dave Katsuki, I think. There was a lot of talk about buying airplanes, and I think at least one jointly purchased or leased plane. I remember Bernie getting enough licenses to fly most of the way across the country.

I also remember the fencing phase, when several people took fencing lessons (Dave Katsuki was one, as I remember) and there was a lot of talk in the halls of fencing and there was a tumbling phase, when Steve Butterfield led Will Crowther and others to gymnastics class and then they practiced at lunch hour on the grass outside our office windows, trying to to front flips and the like.

Then there was the Rubik's Cube fad, which consumed BBN just like it consumed the rest of the world. For months there was near constant work solving Rubik's Cube. As with so many things, Bernie Cosell was in the center of this extra curricular activity (or not so extra curricular) and probably did the most group theory work relating to Rubik's Cube.

Speaking of Bernie, one of my favorite BBN hacks was his billiards program, which showed the balls bouncing around a billiards table in what I believe were the correct paths based on the physics of the game. As I remember, he spent some time studying a book on the game by some famous 1800s French mathematician.

It was a bit later, when the first bitmap display had been built at BBN, that PacMan occupied a lot of people's time up and down the halls of the company.

Of course, not everything happened within BBN. Some of what I think of as BBN activities happened at home. For instance, for a period, several couples got together periodically at the home of one of the couples to cook Chinese dinner, with each couple cooking a different dish. In addition to us, I remember the Katsukis, Kraleys, Rettbergs, and Bresslers participating in this events.

I am sure there were many other "home events" involving BBNers. However, the enthusiasm about these activities never seemed to just stay at home. News of what was going on was broadcast up and down the halls of BBN. At one point Lynn Cosell got involved in weaving. A while later, we

began to hear of the involvement of Bernie and Lynn and a couple of other people in competitive weaving, where a four person team apparently designs a weaving piece, prepares the wool, and weaves the piece. It was never clear to me whether the competitive event involved actually shearing a sheep. I'm sure that this is partly what led to Bernie and Lynn leaving BBN and buying a sheep farm in Virgina here they are today.

Another home event which consumed a bunch of us was Dungeons and Dragons. I was visiting Eric Roberts at his Harvard dorm on th Ratcliff campus one night and participated with him a some women friends of his in a D&D game. This was the first I have ever heard of the game. The next morning, I went into BBN raving to Crowther, Cosell, and others about what a wonderful game that was. Shortly we decided we needed out own D&D game, with Eric as dungeon master. That game went on for a year or two, held in my living room in Arlington for much of the time. Other BBNers involved were Bernie and Lynn Cosell, Mike Kraley, Steve Butterfield, Will Crowther, Bob Bressler, Martin Haeberli, Bill Mann, and John Robinson, and Dave Lebling of MIT. This game was pretty much original from Eric — no store bought stuff. At the end of the game Eric composed (in MRUNOFF on BBN's computer) a comprehensive description of "The Mirkwood Tales." I always thought this was quintessential BBN extra curricular activity: not only did it consume untold hours of time of lots of BBN people, it also included a nearly 100 page "final report." However, that was not the end of this D&D game. Crowther, with his experience with caving and with this D&D game, programmed up a version of D&D in Fortran to entertain his two kids and called it Adventure. Because it was in Fortran, this could spread around the Internet and be improved by others. In any case it was the first computer adventure game. In time Lebling and others at MIT took the idea and created (the at first freely distributed and eventually best selling) Zork, which itself consumed vast amounts of time of BBN people, including the time of several participants in our D&D game that inspired Adventure and Zork.

Of course, I mostly saw the extra curricular activities in my own division. I was less in touch with these sorts of activities in the other computer division or in the acoustics divisions. A lot of the musical happenings of BBN appeared to come out of the other division, e.g., I vaguely remember a BBN Chorus and the BBN piano is well known (see www.walden-family.com/dave/archive/net-history/TM1296.pdf). The most well known (to me) "hacks" in the acoustics division were Ed Kerwin's annual Sturdleigh memos (parody reports of BBN's annual meeting) and Ed's Mr. Small (who for years had a completely outfitted miniature desk in one of the halls of BBN's 70 Fawcett Street building).

What's truly amazing to me is how much real work we got done and technical progress we made given how much of our time was spent on other interests. Of course, just like lots of play was done at work, lots of work was done at home (this was one of the benefits of having remote access early on to time-shared interactive computers. I've always said when people asked me about work and non-work activities, "I could never tell the difference."

Relating to chess playing in our division, Frank Frazier recalled the following (emails of October 3–5, 2012) while reading *A Culture of Innovation.*

> During lunch Bernie [Cosell], Willie [Crowther] and I played chess. At some point we switched to solving chess problems published in a book such as *1234 Modern Endgame Studies*. I remember the three of us to working on these even though the problems were real mind-benders. Solving the problems was hopeless unless we discovered the author's obscure "theme." This understanding would usually lead us to the correct first move and ultimately to the solution.
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> After several weeks of lunchtime problem solving, Bernie spent a few days writing a program to solve the puzzles we found intractable. The solver was written in assembler for one of the first [ARPANET] IMPs to be delivered (Number 1 thru 5?). Since the solver often ran for a long time, used much of the [Honeywell 516] instruction set and

almost all of memory, it was useful in the short term as a way to "burn in" IMP hardware before the machine was shipped to a remote site.

The solver had a very simple design. It searched for a solution by examining every possible move using no chess knowledge other than finding legal moves. Typically chess problems require finding a checkmate within a fixed maximum number of moves which range from 2 to 5 moves although some puzzles are longer. If the solver reached the maximum move count without finding a win, it would back up and start over. If it happened to bump into a checkmate, it would stop and leave the solution in memory. Since the solver ran on an IMP that was on a palette sitting on the loading dock, without a user interface and no printer, Bernie had to examine stack variables and follow pointers to find the solution, and do it in reverse order back to the starting position. Not user friendly, but no problem.

After feeding it several problems we began to understand that some search trees are significantly larger than others. Initially and by chance, we gave the solver chess positions that were very crowded — lots of pieces and pawns were scattered on the board. Consequently the search tree was relatively small and solutions were found within minutes or hours. As a tournament chess player, I was astounded that the solver could find any solution in a relatively short time even though we humans couldn't.

One day before Christmas (1969?) we gave the solver a position requiring mate in 8 moves. The position had only 3 pieces, 4 pawns and the two kings. The solver didn't find a solution within the first couple of days and after a few more days of no result, we forgot about it.

After Christmas holidays, Bernie checked the IMP and saw that the solver was executing and still searching for a solution! Looking at memory locations, Bernie discovered the solver was examining possibilities stemming from the very first and incorrect move! Both kings had been wandering all over the board in random patterns until eight moves were reached. The solver then backtracked and started to search forward again. We tried to estimate how many pointless moves were made during the 2 weeks of execution time and guessed it was in the millions!

Frank (above mentioned emails) and Bernie (email of October 4, 2012) also recalled some thinking (never implemented) about a problem solver distributed among the ARPANET IMPs. Bernie said (in my merging of two quotes from him):

> I have a very vague memory that Will Crowther talking about using spare IMP cycles out on the net as a distributed problem solver to solve "something." I don't remember if it was chess or go. He figured — mostly correctly, I'd guess — that theIMPs had tons of spare cycles, and he figured he could put a "solver" in the background/wait loop, and the IMPs could cooperate to do a solution [passing control info between them, for example, along with the routing packets or some such].