My Path Through the FSM and Beyond

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This essay is a response to several requests for information on my particular political/technical trajectory from the FSM to the personal computer. "How did your involvement in the FSM affect your thinking on technology?" is one question from a PhD researcher, others ask about the overlap between the counterculture and the personal computer movement. This is a part of a future, more comprehensive memoir.

The Environment

In 1963, when I entered the College of Engineering at Berkeley as a freshman, the world was a much different place from today, especially for an 18-year-old acolyte entering the priesthood of technology. Engineers and other technologists were almost universally participants in large commercial or military institutions (or both – the "military industrial complex" described by Eisenhower in his farewell address). You worked as a small cog within a massive structure, with paper, pencil and slide rule as your principal tools. Numerous file clerks, documentation clerks, secretaries and technicians provided supporting services. If you needed computer time you had to write a justification and then write your program on coding sheets, one letter or number to a square. Someone else keypunched the code and had the resulting deck of cards delivered to a remote computer. You got back a batch of printout over which you pored until you decided whether the results were correct or whether another cycle would necessary. The upshot was that in your vocation you disappeared into a vast technological machine which was visible to the general public through its products – the space program, pharmaceuticals, automobiles and aircraft. The public relations machine of the institutions for which you worked extolled the products as the inevitable triumphs of administrative vision. Whatever resulted was described as the inevitable result of "progress", against which resistance was understood to be futile. No alternate outcomes could be posited.

The few published critics of technology, such as Lewis Mumford, C. P. Snow and Norbert Wiener, spoke mostly to academic audiences in their writings. They provided the only conduits through which any of the reality experienced by engineers was made known to intellectual opinion leaders. These works all seem to be written from the outside looking in – attempts to interpret something called "science" and people called "scientists" to a literate, intellectual populace who for all their presumed erudition could not distinguish between scientists and technological workers like engineers. I recall some conversations with an aunt of mine, a medical practitioner who religiously read the Saturday Review, which made it clear to me that she understood "engineer" to mean a maintenance worker like those at her hospital who held that title.

It is my contention that American culture has long held technology to be its secular religion – thus the reference to "acolytes" and "priesthood" above. Often in conversation with people in Berkeley I experienced them recoiling when the conversation turned to "what I do". "Oh, I could never understand things like that", they would say while

closing down utterly to my attempts to explain. I eventually came to understand that they perceived that I was flaunting my presumed intellectual achievements, when in fact I had done no such thing and was trying to connect with them on an accessible level. Priests and parishioners are supposed to maintain a distance in order to validate the relationship.

On a Different Plane

As part of the relationship priests are not held accountable for the consequences of their actions. When I participated in the planning of Stop the Draft Week in October of 1967, I was explicit in not participating in the political discussion within the small Steering Committee (the totality of the organization, counting among its members several names recognizable to people who followed radical activity in Berkeley and San Francisco at the time). "I'm a technician" I would say, "you can discuss politics; I'll work on implementing the decisions you make".

The actions organized by this group yielded the first antiwar demonstrations that could seriously be called a riot; with the streets around the Oakland Army Induction Center occupied by hundreds of protestors who re-painted traffic signs with antiwar slogans and baited the police (providing boxes of spray cans was a brilliant idea for which others bear credit). The result was a conspiracy trial of seven of the steering committee's members, including Frank Bardacke, a highly visible campus radical who joined at the last minute and who, like me, refused to engage in any decision making. The case was named after him and I was not one of the indictees.

During the course of the trial much of the testimony referred to things I had done, or so I was told. The trial resulted in an acquittal, obviating the necessity of transcribing the stenographer's notes, so I do not have a written record of the testimony. During summation, one of the defense attorneys argued that "they shouldn't have indicted these young men – they should have indicted Lee Felsenstein!" (The acquittal was based upon a strong antiwar defense and cannot be credited to this alibi).

I had been very visible to the authorities during the planning process, taunting police photographers as they attempted surreptitiously to photograph us scouting locations and dealing directly with undercover infiltrators of our radio squads. But when it came time for the political authorities to name those against whom their wrath would be directed I was invisible, as if my dimensions were smaller than their sensory organs could detect. Others with higher visibility were brought to trial, but not me.

I realized from this experience that as a technologist I was not seen as a political actor in any sense, at least by the empowered political actors of the society. They inhabited a domain that was separated from my domain by a third domain – that of business. Political actors made decisions regarding "policy" that resulted in money being directed to different sectors of the business structure. Those who acted in the business sphere would direct technical actors as to what results they were willing to fund, and the work would commence.

The idea that technologists could function as citizens in directing their own efforts, individually or collectively, toward desired ends other than enrichment of business owners was totally foreign to political thinkers, both within and in opposition to the established power structure.

Computer Power to the People

This was a direct outcome of the capital-intensive nature of technology. In the wake of the ‘60’s a few efforts started to at least provide access to computer technology directly to people without the intermediation of commercial or academic institutions. In 1971 I joined a group of former computer science students who were working to acquire and run a time-sharing computer system as a kind of coordinating service for a wide range of grassroots and non-profit activities in the San Francisco area. Led by a driven young woman named Pam Hardt, the group actually succeeded in securing control over a state-of-the-art timesharing mainframe computer, setting it up and bringing it to functionality (I was involved in the hardware maintenance).

The technical demands of this computer were so great that heroic efforts were required. Large-scale electrical wiring had to be installed to provide three-phase industrial power. A large air conditioning system had to be set up to exhaust the heat generated by so much power. A room had to be constructed (with windows as an attempt at accessibility, or at least demystification) in which the computer could run without being disturbed. Many technical obstacles were overcome with much help from computer hardware and software experts at Stanford, UC Berkeley, and Xerox Palo Alto Research Center.

The computer, run by a nonprofit organization called Resource One, Inc., served as a development and test bed for a public-access community information network, but otherwise was little used, partly due to the expense of renting terminals so others could use the system. In retrospect, I came to understand that the lesson of this effort was that attempting to take control of older computers for use by broader userships was a *bad idea*. In fact, the expense of obtaining and maintaining terminals and modems drove me to design versions of them that were more amenable to use by ordinary people.

As the Twig is Bent

I remember saying to myself, as I first walked through the crush of humanity that was class change at Sproul Plaza, “Now I can disappear”. This was my state of mind at age 18, having grown up rather thoroughly intimidated by my parents, an older brother, and an adoptive sister who, as I saw it, displaced me at age two. My major piece of guidance from my mother was to emulate her father, William T. Price, who in 1915 patented an important improvement to diesel engines that made him wealthy, and in 1920 died from medical malpractice, a god in his 5-year-old daughter’s eyes. I was to become an inventor, and have patents.

My brother was three years older and was charged with making sure I stayed out of trouble. He has since become a famous professor. Knowledge and science were the

totems of the household, modernism being the household philosophy. That which was new and based upon science was good, except when its implementation was “phony” – commercialized, cheapened, for effect rather than function. The Bauhaus motto: “form follows function” was my father’s favorite saying.

All families have tensions, and ours had somewhat more than its share. My brother and I sought refuge in different venues, he in watching for birds in the nearby park, I by retreating to a basement electronics workshop. I was tolerated in this, though not particularly supported. My father did locate a pile of used radio and television chassis and drove me over to the pile several times to replenish my stock of junk. He had been a machinist during World War II, and his toolbox rusted away in the basement. For a birthday he built me a small wooden workbench, but never gave me more than cursory instruction in mechanics or shop practice.

My father’s connections did help, in the form of a correspondence course in radio and television repair, fully paid for and bestowed upon me by someone I never met, a friend of a friend of my father. At age 12 I would flaunt the instructional booklets at school, desperate for approval as a “genius” and clueless as to what to do with such status.

A Nerd is Made

Such was the making of a tech-nerd – pursuing an ancestral ghost in a quest not just for for maternal affection, but in the logic of a two-year-old, survival itself. A life permanently in the shadow of others, with only minimal support and recognition, and driven by my brother’s injunction, “don’t make mistakes”. At age 13, with my friend Murray Kaplan, I built a model satellite that broadcast beeps (their rate controlled by light falling on a photocell) to a nearby radio. Murray actually made the electronic breakthrough, but he agreed I should be the nominal entrant in the Delaware Valley Science Fair, where it won a third division award, the lowest possible (this was 1958, and satellites were the big news with the upset triumph of Sputnik).

I sat back and awaited my fame. Nothing happened. Indeed, I was feted at school, where I didn’t know how to accept acclaim, but the press never came near. I opened my copy of “Junior Scholastic” – a weekly news magazine for middle-school students and found an article about a model satellite which had been constructed by a boy in – Ohio. It didn’t work, but it contained “real electronic components”. I was outraged. “You’re only as good as your press agent!” was my cynical distillation of the situation. The whole point, in my view, was to gain acclaim which would raise my status in the eyes of my parents so that I would not be rejected and abandoned. I entered the science fair every year thorough high school, but never won anything.

I had chosen electronics because the family had a high-school chemistry book which attracted my interest. In it I read that chemists had to know a lot of mathematics, so I put it down in disappointment – I was having trouble with percentages in elementary school at the time. My brother had been given a kit for making a crystal radio, but was not interested (as he much later told me) so I picked it up and managed to get it to work.

The technology of electronics promised something I apparently wanted greatly – communication outside the hierarchical structure of the family. I dreamed of having a radio amateur's license – but never managed to team up with anyone to learn the Morse code. I wanted communication at a distance, not close up where people were frightening. To this day I wonder how I might have developed had I a mentor and teacher. I'll never know, but gradually, over the decades, I became more and more that very mentor, both to myself and to others.

Physiological Aspects

At this point it is necessary to bring up the aspect of autism, or more specifically, that "high functioning" sort of autism named Asperger's Syndrome. I knew nothing of it until a few years ago, when a national article on it was published. At almost the same time a cousin of mine visited and explained that he had recently been diagnosed with that condition. He was always an odd one, we all knew, and this started me to thinking about other relatives who might have displayed symptoms. My aunt Carolyn on my mother's side, the mother of this cousin, was a brilliant woman who rose to be the preeminent book restorer in New York City and the savior of many of the books of Florence from the 1966 flood there (she had the idea of freeze-drying the wet and moldering books). However, she was always somewhat withdrawn and related to us through a clearly artificial façade of voice and intonation. Her father – my grandfather the inventor – was likewise odd and a biographical sketch of him commented on his "lecturing in short pants" – not out of line with a condition which has been nicknamed "little professor syndrome".

The current thinking on Asperger's is that it exists on one end of a continuum having classical autism on the other end. If it is a continuum, how far does it extend toward "normal" behavior? No one claims to know, but I suspect that I inhabit a position close to, but not exactly at, the "normal" point. I am a visual thinker, a condition which gives the title to one of the few books on autism written by an autistic person, one Temple Grandin, PhD ("Thinking in Pictures"). I have definite obsessive/compulsive tendencies, considering repetitive behavior to be a form of entertainment. It was always difficult for me to understand human behavioral conventions - until being set straight at age 21 I felt intruded upon when someone asked "how are you?" – I thought it was an actual question demanding a rather personal answer. In kindergarten, during recess I would take a ball and walk to the farthest removed corner of the yard, stand a few feet from the wall and throw the ball, let it bounce one and catch it, then repeat, for the whole period. People were threatening, I had concluded, though I was still able to function among them.

Asperger's is not an illness, and can be managed by training. My cousin could never keep a job because he would tell his supervisors exactly what he thought, and this often got him fired. I now think that I am lucky to be affected as much as I am with this condition, as it provides me with a basis for a kind of concentration and visualization that has served me well. I am a good extemporaneous speaker to crowds, though I am more awkward and reserved in face-to-face discussion.

New at Berkeley

This is now, and that was then. At age eighteen I boarded the train for Berkeley with a $1600 cashier's check in my suit pocket (it was 1963 and respectable men wore suits then), $600 of which was my own savings from a job after high school and the balance from my father. I was met in San Francisco by my uncle, and next day under my aunt's supervision had bought a bicycle and was installed in a rented room rather far and uphill from the Berkeley campus. That's when I told myself that my opportunity was to disappear into the horde of humanity that populated the campus.

At Berkeley, just because of the quantity of students, the fraction who were attracted to radical political activity was a fair number. There was a history, also, enumerated in some books ("Student" by David Horowitz – who later recanted everything he had done – was one I read while waiting in the registration lines) and I had become particularly interested in Berkeley by reading "The True Bohemia" about the San Francisco Beat scene. I was of radical lineage - my parents were active members of the Communist Party until they were ejected (one charge was "humanitarianism") around 1955. At that point the clandestine copy of the Daily Worker at home was replaced by the National Guardian, a radical independent paper. Many of my brother's friends' parents knew our parents, and as a tag-along their crowd was the only one I had to run with. There was an organization of this group, "Teens Ahead" with which I participated in a national march on Washington for civil rights – in 1957 (it was blacked out in the press), where we heard the young Dr. Martin Luther King speak at the Washington Monument. I began to participate in pickets of Woolworth stores in support of the southern lunch-counter sit-ins which began in Greensboro NC in 1960. In high school I joined a chapter of the Student Peace Union (started not by the Communists as one might imagine, but by their bitter rivals the Socialist Party), and picketed at both City Hall and at the White House in 1962 during the Cuban Missile Crisis.

I therefore sought out the analogous crowd at Berkeley and found myself walking a picket line in San Francisco protesting a visit by Madame Nhu, the "dragon lady" of South Vietnam. With me on the line was Allen Ginsburg, gentle, hugely bearded and the new winner of a substantial prize for poetry. I took a cab back to Berkeley because I was unwilling to ask how to find the busses. I dressed like a janitor, often with a grey sweat shirt (a kind of uniform for the bohemians) and cut my own hair very short with an electric clipper.

Disappear. Be swallowed up in the human throng – this was a kind of death wish. Not for my body but for my personhood. My credo was, in effect – be useful or be invisible, but above all don't depend on anyone.

The expectations I felt at the time were to become a sufficiently skilled engineer and to participate as a functionary in the grand process of automation of labor. This attitude is the basis for Kurt Vonnegut's first book – "Player Piano", written in 1952. If I were good at my work I could ascend to engineering management. Information about what people wanted and needed would be provided to me by a large apparatus consisting of social

science specialists – people who worked in market research and other incomprehensible departments of whatever mega-corporation I settled in. The outcome of my life's work was to be the increasing obsolescence of manual labor. This, I felt, without much enthusiasm, was foreordained.

Exile on Main Street – Edwards

The $1600 I had come with would not last. I took a full-time job as an electronic technician in the physiological Optics Lab and found that I could not support the effort needed to both do this and carry a student load. My grades were .07 grade point below the B average needed to qualify for scholarship assistance. I was loath to ask my father for more money – usually he would call when my bank balance had fallen below $5.00 and I would reluctantly accept some money. I considered giving money to someone as one of the worst things that one could do to them.

I found out about the Co-operative Work-Study Program in Engineering through word of mouth. Extend the time to get a degree to five years from four and one could spend three alternating work-study cycles of six months each, with the jobs tailored specifically for the population and listed with the Co-op office at the College of Engineering offices. I signed up in a flash and secured a civil service job as an "engineering aide" at the NASA Flight Research Center at Edwards Air Force base.

Oh, I was delighted to walk those halls in a short-sleeved white shirt and tie! The work was as difficult as I wanted it to be, and I plunged into it, pleasing my supervisors. I ran vibration tests on components and designed some simple circuitry to assist in the testing. The desert heat was hellish and I was going through most of the mistakes and ineptness that accompanies a first attempt to live independently, but I really felt part of the machine.

Return to Berkeley

Until the machine developed indigestion. The position required the lowest possible level of security clearance – "confidential". I had dutifully filled out the necessary six-page form 398 and passed it in – this gave the FBI information on where I had lived and with whom I had associated in the past. I checked the box that had be swear that I knew no Communists.

Seven years later, when facing the draft, I read the legal regulations, and found that for being conscripted into the Army someone "maintaining a sympathetic relationship with" such malefactors as "spies, saboteurs, traitors, anarchists or revolutionists" (note the spelling direct from 1919) would require approval by a specific bureaucrat. That made avoiding the draft much easier for me (I as eventually told to go home and wait, and am waiting still).

In this case I wanted to stay, but was gently told to resign "to return to school". The reason given was the fear that I might picket Edwards Air Force Base as I had picketed

Edward Teller and Admiral Rayborn with the Quakers in Philadelphia. I was told “keep your nose clean for a couple of years and you’ll have no problem getting back in.” My boss, Don Veatch, argued in my favor, and told me not to lose heart, “you’ll make a hell of a good engineer”. I am grateful to him still. A personnel specialist finally told me in a particularly offhand way (I suspect he was drunk for the occasion) that my parents had indeed been Communists.

Stunned, I sought out a pay phone and called my father, putting the question to him. He replied “I don’t want to talk about it on the phone”. I hung up and, stunned, gazed out he window to the lunar landscape outside. I felt the most alone I have ever felt.

Professor Westheimer, my employer in the optics lab and a 1938 refugee from Nazi Germany, immediately offered me my job back, even discharging the student who had stepped in. I got a ride to the train station from a worker who, when hearing my story, roundly cursed the administrators. Little things helped a lot.

The Existential Decision

Upon returning to Berkeley October 16th, receiving a kiss from my former roommate’s girlfriend (the daughter of a well-known Communist herself), and walking all over town to find a shared rental situation, I discovered that there was a full-blown student revolt going on. I had read some confused newspaper articles about a “riot” on campus in October, but had conflated it with tales of “panty raid” rioting from 1952. It was anything but.

I refer the reader to the website www.fsm-a.org for the whole historical story. In sum, the University administration, led by a premature neoconservative dean who claimed to have the support of the President, clamped down on student activity on campus in support of the civil rights movement. In the fall after Freedom Summer, the explosion was inevitable.

On Sept. 30 students defied the ban and set up a recruiting table for civil rights groups in the main plaza. One person, an alumnus and thus a non-student, was arrested and placed in a police car which was brought up right in front of the administration building. Immediately students sat down around the car, immobilizing it for 32 hours and some, permitted by the outnumbered police, climbed atop the car to address the group. An unprecedented open forum was thus created, wherein the history of the administration’s previous clampdowns and mendacity was recounted. This was the beginnings of a community in the midst of a crowd.

The sit-in was relieved through tense negotiations with the President of the University as hundreds of bully-boy Oakland police assembled to commit mayhem and the parents of students were to show up the next day, possibly to confront the scene of bloodshed and mass arrests. There ensued a period of continued negotiations, false starts, and political ferment among students. I walked into the middle of this.

I read the literature and listened to discussions. I knew the sorts of students who were activists – I would have been among them had I been there. But I had just been admonished to "keep my nose clean" by the representative of the security apparatus. While growing up I had read much about "destroyed careers", especially in the professions, as an outcome of red baiting.

Was my career in jeopardy? That was the question – and what career? I had seen that not everyone was about to shun me in the off-campus world. I remembered well the face and southern accent of the security director at NASA, and the drunken personnel specialist. It came down to whom I was willing to throw in with, especially at a time when my career direction was still ahead of me – plastic, moldable.

Recalling Huckleberry Finn's existential decision to help his fiend Jim, an escaped slave, I said "all right, I'll go to hell!" and made up my mind to help in the struggle. It was my own existential decision – one that cut to the heart of "who am I, and what is my place in the world?" I took it somewhat reluctantly, as it meant that the easy path was closed to me.

At the wrap-up of the Free Speech Movement I recall hearing Mario Savio, a philosophy major, comment that "Kierkegaard was right – the only free acts are those you can't help taking", when referring to the moment when hundreds sat down around the police car. I had my own such moment. I cannot imagine what might have become of me had I decided to play it safe.

Immersion

Once I had decided to commit to the FSM, my course was clear – I would attempt to find some way to turn my technical skills to serve its ends. Electronically, I considered myself to be an audio person – certainly not an expert, but capable of setting up, running and, if necessary, repairing audio equipment. I owned a large, good-quality tape recorder (7 inch reels of ¼ inch tape – this was before cassettes) and decided to see if I could use it in the service of the FSM. This brought me to Press Central – a dramatic name for a basement in a house, wherein resided a mimeograph machine and a plank table at which Richard Schmorelitz and Thom Irwin labored to relate to the press.

I volunteered to make audio press releases. The fact that I didn't just show up and ask what I could do is telling – it shows that I was more willing to take initiative and try to implement a new idea than my self-image allowed. Something was clearly coming forth. After some futile attempts to make these unheard-of audio press releases I gave up on that idea (the responses from the electronic press were incredulousness), and stayed around to help with the mimeo work. I owned a tiny mo-ped type scooter – one with auxiliary pedals – and could help by running supplies and stencils around among the other "centrals".

In this capacity I was introduced to the idea of distributed production. There were many organizations around town that also had mimeograph machines, and in one case they

were all pressed into service to turn out a thick document overnight. Berkeley being quite focused on social science, sociology, etc., there were many studies launched as soon as the Free Speech Movement broke out. One was turned out by graduate students in the History department, and was to be presented to an official committee looking into the situation. The FSM got permission to print and distribute it widely on campus – the only problem was how to produce the report of almost a hundred pages.

The volunteer lists were called and people asked if they could type a stencil (mimeos used an oil-impregnated paper stencil which was placed in a typewriter - where the pressure of the type squeezed the oil out was where ink could flow through and become an impression on the paper). Groups with a mimeo were contacted and asked to turn out one page each. I found myself as one of many couriers shuttling paper to and from these individual mimeos. The assembly of all the pages was done at the dining tables of a student co-op, Oxford Hall, where I later lived. The effort was a success, and the report was widely disseminated by volunteers on campus.

This was an impressive accomplishment, in my view. We could assemble a large printing plant when necessary out of resources already in place, just by coordination. It was an information problem, not a physical problem to do this. This experience planted a seed in my mind about how resources could be used more efficiently through information networking.

I began hanging around the main office, FSM Central, to see if I could apply my technical skills (such as they were – more a matter of approaching a problem than of having particular skills) to the information management problem. I discovered a table (made of a door laid across two sawhorses) with two telephones and lots of notices posted on the wall behind it. These notices listed offers of resources or labor as well as needs. Connecting the two was the necessary art.

I tried a few card-filing techniques but was foiled by my inexperience and lack of money (hint – you can't create clean, aligned holes through a stack of index cards using a power drill – it simply creates fuzz). Nevertheless, I understood that this vernacular filing system, which was really acting inside the minds of the people who maintained it, would need some technical assist in order to be more broadly usable. It was later that I concluded that computers in networks could do this.

Turning Point

Then came a most important occurrence, which I refer to as the "police radio incident". One night someone ran into the office (which was a rented house some students had been sharing) and announced excitedly that "the campus was surrounded by police". Consternation ensued, and one person there who knew my inclination asked me, in a loud voice "quick – make us a police radio". To my perception the entire house full of people had made this demand with one voice and were hanging on my reply.

It was not a totally fantastic request. In 1939 I could have opened a broadcast band radio and, with a screwdriver, changed the local oscillator frequency so as to bring in the frequencies just above the high end of the band. This was where police calls were then transmitted. But as of the 1950's this service had moved far up the spectrum and used narrow-band FM, which is difficult to detect. "You don't understand," I stammered, "it takes time."

The response seemed to come from all mouths at once: "Never mind about that – make us a police radio!" The stupidity of this demand took my breath away. Here were people I considered my intellectual superiors, people who were studying the intricacies of human behavior, who were easy and confident in the incredible arcane of human interactions, and they come up with this? The words betrayed a massive misunderstanding of how technological projects were carried out.

I had assumed that my destiny was to labor at technological tasks under the direction of exactly this sort of person. But I knew better than them! It became crystal clear to me that I could not pass off the responsibility of fundamental technological decisions to these folks or really anybody else. I had to organize my activities so that my response to the demand "make a police radio" would be "well, you can't have that, but here's what I've got available". In effect, the news was that I was in charge of my own actions and would always be if I wanted to be useful to people who needed my help. I would have to figure out my long range directions on my own. At that moment I stopped waiting for orders.

Revoloution

The history of the Free Speech Movement has been told elsewhere. Much can be learned by going to the website www.fsm-a.org, operated by the Free Speech Movement Archives. The struggle lasted from Sept. 30th to Dec. 8, 1964, when the Academic Senate at Berkeley voted by a large margin to adopt the position of the FSM that University administration may not regulate content of speech on campus – merely time, place and manner. This seems like a moderately legalistic and arcane point when presented this simply – but it was the opening of the counterculture. Mere students – raw material in the world view of the administrators who held the metaphor of university as factory – had managed to fight the administration of a vast state university to a standstill and drive them back to a position never previously accepted.

In a very real sense it was a revolution. My reference here is a book entitled "The Conquest of Bread" by Peter Kropotkin, the Russian "anarchist prince" and theorist of anarchism. Examining the Mexican Revolution of 1910, Kropotkin evokes the change in consciousness that comes over the peons when the revolution occurs. To paraphrase; everything becomes possible when the hand of oppressive authority disappears. I say that we experienced a revolution because that is what I experienced in the winter of 1964 – 65. A large fraction of students at Berkeley made major changes in their life paths. Many dropped out and moved to a neighborhood in San Francisco where they felt they could live more the way they wanted – the Haight-Ashbury. Study curriculums changed, essays written and self-published, magazines begun. "'Bliss it was to be alive", as Wordsworth

said of the French Revolution, and I knew what it meant. I wrote an essay on how a "free university" might be organized and helped a woman named Laura X to mimeo it into a little booklet. Her attempt to draw the cover on a mimeo stencil failed utterly, leaving an outside of blank paper, and my essay was in the center, so it was mentioned as the title of a pamphlet by Calvin Trillin in his "Letter from Berkeley" in early 1965. It still turns up when my name is searched on line. What was an engineering sophomore doing publishing an essay on how to organize a free university? This is what happens in the midst of a revolution, it appears. I wanted life to be like that all the time, and I still do.

One of our leading intellectuals in the FSM, Marvin Garson, gave an analysis of what happened in a little seminar, which I attended. He said that barriers to communication had been dropped in the midst of the crisis – it became acceptable to talk to strangers about the situation, and then other things, and that this had precipitated a sense of community. I am indebted to him for this analysis – it has been borne out in my observations since then.

Now What?

As "The Sixties" got under way for real, I tried to discover my role as autonomous and self-directed engineer assisting what we still called "the movement" (the term was a holdover from the civil rights movement, but now encompassed a number of additional salients – antiwar, feminist, gay freedom, etc.). I joined the underground press, having discovered a previously dormant talent for writing, and saw it change from small, clandestinely distributed eight-sheet weeklies filled with subversive text to 50 and 60 pages of display advertisements. I saw how the act of distributing leaflets on campus – a highly risky activity during the FSM when it was nominally forbidden – disappear and leaflets show up posted in geometric patterns on walls to attract attention.

I began to analyze the structure of media from this standpoint. Most media were centralized, emitting identical information from one point, and created a relationship in which the recipients were passive spectators. But we had won the FSM without such media in our hands. We produced leaflets – millions of pages in all – but they were carried on to campus and handed out by individuals who put themselves at risk in doing so and were available for conversation. Information came back from them, from networks of relationships – the man who ran the game room at the student union was one of ours, for instance, and fed back how students reacted to the situation of the moment. We had a network of representatives from various living arrangements – dorms, fraternities, independents, and they served as two-way information conduits and aggregators. The information structure that had worked in creating a revolution was not hierarchical, one-way, broadcast in nature, but non-broadcast. Its best analogue was the telephone network, but this was still not a complete equivalent.

I disengaged from the underground press around 1970, as I decided that the broadcast model was not what I wanted to foster. The function of the telephone table in the FSM Central had become a series of "switchboards" by then – special purpose information referral points, dealing with one issue or area each, and always in a state of

reorganization as the people who held the structure of information in their heads got overloaded and left. I looked into them and, while there was certainly a need for some technological assistance, the motivations were always something else from the operation of an efficient information process.

Thinking that the counterculture was best represented by networks of "intentional communities" – houses where many like-minded people settled, almost always temporarily, I tried to create the "Berkeley Network Bulletin" – a mimeographed collection of announcements solicited from each house and delivered to all houses by courier. Unfortunately, I was in the grip of clinical depression at that point and could not focus enough energy to make it work.

The Unseen World

I had dropped out of college when my depression came on in late 1967, and went to work in Silicon Valley as a junior engineer (no degree required) at a large corporation. In 1970 I was sent to learn the Basic computer language at what was then called a "service bureau". This was company that had set up a computer network (a very expensive undertaking at the time) and sold access to it through offices, to which work would be sent. They also sold training services. The instructors were quite full of themselves, and would make comments like "You see the terminal sort of hiccup and start working more slowly? That's because they switched off the computer in Los Angeles and we're now working on the computer in Kansas City."

Very interesting, indeed. On a network there was no center, or the center moved around. Place – geography – was of little importance. Everywhere on the network was the same place!

The instructors also pointed out a trick – you could give a file different levels of accessibility by prepending different numbers of asterisks to the file name. Thus, one asterisk made it available to the group you belonged to, two made it accessible to the group to which that group belonged, and three made it accessible to all users. This meant that a kind of multi-level publication scheme was possible. Information could be kept within communities of interest, and these communities need not have a geographical basis. It seemed to me that I had found my sought-for non-broadcast communication medium.

"Fine," I remember thinking, "all you need is a computer. Where are you going to get a computer?" Of course, the answer was beginning to assemble itself at that very time. The reason I had been sent to learn Basic was that I had been assigned to the development of a large-scale audio-visual information system that was controlled by a minicomputer – one that would sit comfortably on a desktop and cost about $10,000 in the money of the day – about $30,000 in today's dollars.

Lest the reader draw too close a comparison, the minicomputer still needed a terminal – usually a mechanical teleprinter built for Western Union or an IBM Selectric typewriter

running under remote control. This could set you back a couple of thousand dollars. And networking – well, we did have a modem as part of our system. It was about two and a half feet long, one foot high and one and a half deep, and it ran at the thrilling speed of 1200 Baud, or 120 characters per second (these days 33,600 Baud is considered slow). It was rented out by the phone company, as nothing but their equipment could contact their lines. I never learned the cost, but it must have been hundreds of dollars per month. And yes, there was no hard disc – no storage medium other than punched paper tape rattling through at ten bytes per second.

Early Efforts with Primitive Technology

This was the period of the big "mobilization" marches to protest the Vietnam War. Tens or hundreds of thousands of people would gather to walk from point A to point B and listen to speeches before dispersing. A San Francisco radio talk show host named Chan Lockman whose air name was Travis T. Hipp jogged me by asking "if we're going to get all those people to have a march, why not actually do something? Who has ideas about what such a thing would be?" I sat at the Teletype at work for the better part of a day looking busy and typing up my reply.

We could march out to some large building where we could gather indoors and be entertained while we filled out cards indicating our interests, what resources we had available, what we wanted to do, and whatever gratuitous comments we wished to make. Then, a crew of people would sort the cards, probably by geography, copy the contents to stencils and mimeograph pages of the card images so that there was one copy of every sheet for each person submitting. Then, on the way out, each person there would pick up one sheet. Presto – instant directory! When everybody went away they would have with them the names of everybody else, how to contact them, and what they need, have, or were interested in. The barriers to interpersonal communication would be seriously lowered, though probably not completely down.

It's still a good thing to do for any one-of-a-kind gathering, and a lot easier with photocopiers. I've done it a few times, and the people who attend go away happy. It's a paper non-broadcast communication network in a snapshot.

The Revolution Continues

In 1969 came the People's Park conflict in Berkeley, and I saw the same signs of revolution – the feeling that anything was possible, the creativity of the construction period, the euphoria (though tempered by the fact of nominal military occupation and the death of one demonstrator and blinding of another by roving sheriff's deputies armed with shotguns).

In the aftermath a group of architects briefly formed as "People's Architects" and produced a visionary plan for Berkeley. One aspect that caught my attention was the concept of "Life Houses" – neighborhood open houses where people could gather in small community centers. To this I added the idea of having tools for information

reproduction – copiers, etc., available for use by anyone with something to print up. The centers would maintain local bulletin boards out on the street (some people were doing this already) and could set up routes whereby notices could be posted and passed along to other life houses.

Down the Rabbit Hole

Later I added the idea of a computer terminal to a central system serving a city. This came after my experience with Resource One. To return to 1971, I was wondering how a computer network could be put together when one of those synchronistic events happened. Obviously I had been talking about the idea, because one Arnold Egel, a wild-eyed sort of guy who might have displayed a more advanced level of Asperger's, came running up to me on Telegraph Avenue, excitedly announcing to me that there was a group in San Francisco who actually had gotten a computer to do what I had been hoping to do. I checked it out and began attending meetings of this group. They were a nucleus of four computer science students who had abandoned UC Berkeley during the Cambodia invasion crisis, which shut the universities down for about a week and (in this case) impelled some students to go and do what they were talking about. They migrated to San Francisco and set up an organization called Computer Group One as part of a "warehouse community" that had formed at the same time – a number of counterculturists who piled into an empty building (rented, not squatted) and under the guidance of some architects attempted to set up their own community within four walls, known as Project One.

They started by securing some service-bureau on-line time and trying to make it available to other counterculture groups. They gained membership in a "youth meets the Establishment" weekly meeting which came about because the business establishment was caught off guard by the development of the counterculture and wanted to know more about who these people were and what their interests were. Through that network Pam Hardt, one of the founders and the clear leader of the group, had managed to secure the "long term loan" of a mainframe computer capable of timesharing – that is, running many jobs at once and keeping the whole mess straight with one job per terminal.

I arrived in September 1971 when the donation had just been secured and volunteered to help on understanding and maintaining the hardware. In the first six months of 1972, with my depression relieved by several years of therapy, I re-entered Berkeley and finished my degree work in June of that year. I then moved directly in to Project One and threw myself into setting up the computer. The day it was installed the man who was to teach me maintenance of the computer disappeared, not to be seen for several months, in effect leaving me to tend the baby.

I brought Efrem Lipkin in from Berkeley to work on the operating system software. I had in effect attached myself to his household, which I had come across when I met Jude Milhon in 1968. I looked up to Efrem and placed him in the niche which had been created in my psyche by my older brother.

To be brief, we got the computer up and running, with the help of many people at Stanford and Xerox Palo Alto Research Center. The complex and crucial operating system software was salvaged from the corporate wreckage of Berkeley Computer Corporation, and installed by L. Peter Deutsch, a legendary fellow who played the computer like an organ.

The Commons of Information Discovered

When we were ready to offer computer services, mostly in the form of an information-retrieval program to the counterculture, they weren't ready for us. We had let our connections atrophy, and the prospect of paying $150 per month to rent a computer terminal was far too daunting for any rag-tag group with a switchboard to contemplate. We were left with a computer and no users. We tried to interest the Bay Area Reference Council – a sort of library among libraries – in using it and were presented with an interesting metaphor – you seem to have shelves, the librarians said, with no books on them. Come back when you have some books.

Efrem took this comment and concluded that we could put terminals out in public places and collect the "books". It was a radical idea, one that I'm sure I wouldn't have had. We did it. In August 1973 we opened the first of four terminals available for walk-up use in Berkeley and San Francisco. We called it "Community Memory" and it was a shared bulletin board which placed no limitation on the users' ability to categorize items posted.

It was a success in terms of attracting use. The first terminal, a teletype, was set up next to a musician's bulletin board and attracted the music trade, in addition to more. In effect, we had created the computer-enabled life house in many ways. There were almost no examples of people shying away from this alien technology – as soon as we told someone who approached it that they could use it themselves, without intermediation, the users brightened up and asked if they really could use it.

In seeing this dynamic in operation and in considering the necessity to make the terminals less expensive and more reliable, I set off on what was to become the pursuit of the personal computer. Two events affected my course seriously. First, the publication in 1973 of a do-it-yourself article in an electronics hobbyist magazine purporting to show how to build a "TV Typewriter" whereby letters and numbers typed on a keyboard would appear on a TV screen whose antenna was connected to the device. There was an outpouring a response – 10,000 people sent in two dollars each for the plans. This indicated that something big was happening, there was a resonance at a certain point in the public for something which appeared to give real control over what the TV showed, and which did so by using digital "computer" technology.

The second event was communication from my father, who had become quite a "new ager", pointing me to the writings of Ivan Illich, a former Jesuit and a wide-ranging intellectual who had previously proposed abolishing the compulsory education system in favor of direct instruction. He had just issued a small book entitled "Tools for Conviviality" discussing peoples' relationship with technology. In it Illich posited a

distinction labeled “conviviality”, in which the technology was more or less capable of being understood, manipulated and modified to individual ends.

Illich told the story of how, when radio technology was introduced to the Central American Jungle (he did his research from Cuernivaca in Mexico), within two years there were people in these remote outposts who could repair the radios. These people had always been there, and had never taken formal instruction, but the technology was open and forgiving enough to allow them to learn by trial and error, along with oral instruction from others with a little more skill. Vacuum-tube radios would not burn out at the slightest outrage, unlike transistor radios. I knew this because I had basically learned about radio the same way, albeit with a home-study course, but still setting up my own workshop and trying to build things.

Revolution in the Digital Domain

I began to consider how computer terminals and computers themselves could be designed to be “convivial”. I made contact with a tiny underground culture of computer-skilled people who met weekly for potluck dinners to discuss that very question. We taught each other and formed a small community, centered around a kind of underground newspaper for those sharing the vision of computers for everybody, children included.

By 1974 I had turned out a specification for what I called “The Tom Swift Terminal, or, A Convivial Cybernetic Device”. For readers not familiar with the name, Tom Swift was a central character of a series of boys’ books who was in effect a young Edison – inventing his way through various adventures. I named the design after him “…in honor of the character most likely to be found tampering with the equipment”.

The principle of conviviality which I introduced into the specification was summed up in an aphorism: “in order to survive in a public environment, a computer must grow a computer club about itself”. The problem, therefore, was to design something that could grow from a terminal into a computer and further into a network of computers, all the time attracting the technologically curious to attempt to reconfigure it to their needs.

In this spec I worked out the details of implementing video display in a computer. I did the basic design work which allowed me to understand how such a video signal would be put together and how it would map directly from random-access memory. In effect, it collapsed the computer and the video display terminal into one device. I can lay claim to the invention of the personal computer if that is how “personal computer” is defined. I mimeographed (of course) the spec and sold it to other enthusiasts for 25 cents.

Shortly thereafter the lid blew off – the first personal computer was announced as a product (actually it was correctly titled a “minicomputer” as it lacked the terminal). The response was tremendous, long waits developed for the product, and this attracted others into a new market, including myself. I was into my next career, which lies beyond the purview of this essay.

Looking Back

To sum up, I found myself in a revolution and learned step by step that there is a need within each human being for the function of the agora – the public space of the Greek city-states in which political and commercial life was carried out. This space has been privatized into the mass media, but there are still times and places in which people come together and these are opportunities to recover this function, which I call the "commons of information". The Free Speech Movement created an agora out of what was available – destroyed the barriers to communication person-to-person, and won because of the creative energy thus liberated. This happened more or less without being calculated, but those who led the activity could at least sense it and respond, because they had set up a sensitive, bilateral information structure.

I continued to find ways to embody the function of the agora not in bricks and concrete, like a public plaza, but in electronic and digital technology. The vision of the revolutionary society, glimpsed first hand at least once, was powerful enough to impel me. I was fortunate to have been shown the foolishness of placing my own power into the hands of others, even though I knew I was not as facile as they were in human affairs.

Like everyone, I sometimes wonder "what if..?" The problem is that most of the answers are much worse than what actually happened. I benefited greatly from the actions, sensibilities, advice and skills of others, and managed to make my way relatively unscathed, not financially wealthy but wealthy in reputation, having accomplished a number of things but always with more envisioned than I could possibly fulfill. I hope to continue by delegating ideas and visions to others, but that part of my career lies mostly in the future. This essay has been one of my first attempts in that direction