

My Unplanned Career

Eric E. Ungar, Contributing Editor

With my 85th birthday creeping up on me and with the Acoustical Society of America recently honoring me with its Gold Medal, I have had the impetus to contemplate how I arrived at this juncture. As I look back, I find that my career has developed rather haphazardly along unforeseen lines. What events have shaped my career – and, indeed, my life?

I was born in Vienna, Austria, and attended public grade school there for the required four years. As a young child I always delighted in taking mechanical toys apart, occasionally also putting them back together in working order, and in building things with construction toys. This led my father to decide that I was destined to be an engineer and to enroll me after grade school in a *Real Gymnasium*, a school aimed at preparing students for higher education in science or engineering. I had been a top student in grade school, where my fellow students largely came from blue-collar families with no academic ambitions, but in *Gymnasium* I found myself to be on the lower edge of average, in competition with home-tutored sons of academicians and highly placed professionals. But I muddled through for about two years and probably would have continued to do so if my world had not changed.

In March 1938 Austria was annexed by Nazi Germany. Soon my family was faced with continuously increasing restrictions and our lives were made more and more difficult every day. I was forced to leave *Gymnasium*, briefly attended a public non-academic high school, and then did not attend school at all until we were able to emigrate in November 1939, shortly before we were to be deported to a concentration camp. We arrived in New York one week before my 13th birthday and stayed there for about a month until representatives of the immigrant aid society that supported us advised us to move to the Midwest, since they felt it would be better not to have all refugees remain in New York. We were to move to Cincinnati, but somehow got the wrong train tickets and wound up in St. Louis, MO, where another aid agency helped us to get settled.

In St. Louis I was placed into the eighth grade of a public school in one of the lower middle-class areas of the city, and after about a month there I graduated from that school. Students from my grade school had the choice of two high schools, but neither my parents nor I had any idea what the differences between these schools were. Thus, we followed my grade school principal's recommendation and I found myself at the high school that was attended by

the generally less academically oriented students. Also, I was the only refugee in my high school class, whereas a considerable number of refugees attended the other, more academically demanding, high school. My parents foresaw that I would need to go to work immediately after high school and encouraged me to take such courses as "Business Arithmetic," but by signing up for extra courses and by attending school every summer I was able to take all science and mathematics courses offered in the St. Louis school system.

As it turned out, this choice of high school was a fortunate one for me. I was able to excel and to graduate at the top of my class. Since Washington University (now known as Washington University in St. Louis) had the enlightened policy of giving scholarships to the top graduates of St. Louis high schools, I was able to begin attending Washington University – something that our economic circumstances would not have permitted otherwise. Also, since I was the only refugee in my class, I received some special attention and was given speech therapy to minimize my accent. Had I gone to the other high school, I probably would not have been at the top of the class, would not have received a scholarship, would not have been able to go to college – and also might still have a strong accent. And who knows where I might have wound up if we had gotten the right train tickets and moved to Cincinnati?

I enrolled in Chemical Engineering at Washington University in January 1944. Why chemical engineering? My father, who studied pharmacy in Vienna and who eventually found employment as a chemical technician in St. Louis, aimed me in this direction although neither he nor I knew what chemical engineers did. However, chemistry was the glamour science in his day, as nuclear physics was later and biological sciences are now. But I soon found that I did not like chemistry, particularly since the beginning classes were taught purely in terms of collections of apparently incoherent facts to be memorized.

I had completed about half of my third semester at WU on my 18th birthday. Since all of my fellow students had to report at age eighteen to be drafted, I also showed up at the draft board, not realizing that I would not be drafted since I was not a citizen. But I felt that I needed to do my part and was voluntarily inducted, with grandiose plans to learn to fly for the Navy. Notwithstanding my technical education, I was assigned to the infantry. After basic training I was appointed to officers candidate school (OCS) and emerged as a second lieutenant, trained

to be an infantry platoon leader. Since VE day, the day that Germany surrendered, occurred while I was in OCS, I was assigned to train troops for fighting in the Asian theater of operations. Then fate intervened again: the Army sought volunteers to serve in 'repatriation' in Europe, and I volunteered without knowing what I would be doing.

I soon found out that repatriation referred to bringing home the bodies of deceased U.S. military personnel. After relatively brief assignments in Belgium and France, I was stationed in Germany, first in Bremen, then in various small towns, and finally in Berlin. My unit's assignment was to locate the graves of our military personnel, to find out as much as possible about how they died, to dig up the remains, identify them, and prepare them for shipment back to the United States. During my longest assignment, in Berlin, I headed investigation and disinterment teams that worked in what was then the Russian zone of occupation (which later became East Germany), for which assignment my fluency in German was extremely useful. I had the opportunity not only to upgrade my German, but also to learn some Russian for interacting with our Russian liaison officers, and in my spare time to read German science and philosophy books and to take mathematics courses. I left Berlin on the last train before the Russians blockaded the city (before the historic "air lift"), changed from active to reserve status, and returned home.

The "G.I. Bill" (a government program that supported the education of veterans) now was available to pay for my further studies as I re-registered at Washington University, but in mechanical engineering. Since I was out of sync with the regular curriculum, I had a relatively open schedule and filled it with extra mathematics courses, so that I had nearly enough credits for a master's degree in mathematics by the time I completed my bachelor's degree in mechanical engineering.

I had several attractive job offers when I graduated in 1951. With no long-term goals in mind, I simply accepted the offer that appeared to be most interesting and that involved no mandatory hierarchical progression through work assignments. Although I had no clear idea what I would be doing when I accepted the job offer at Sandia Corporation (which eventually morphed into the Sandia National Laboratory) in Albuquerque, NM, this turned out to be another fortunate choice. Working on second-generation atomic weapons I was given considerable latitude and had the opportunity to interact with the aircraft industry and to carry out analytical and

experimental projects. I also was able to attend the University of New Mexico evenings and within two years received my master's degree from that institution.

After a couple of pleasant years in New Mexico my ambition drove me to pursue a doctorate. I applied to several institutions and received invitations from two applied mathematics power houses: Brown University and New York University. I chose NYU because it offered a slightly greater stipend, naively not realizing that the greater cost of living in New York City would more than offset the difference. I served as a full-time instructor, teaching core mechanical engineering courses, while working toward my doctorate. After receiving my Doctor of Engineering Science degree, but regretfully having had little opportunity to take mathematics courses at NYU's Courant Institute, I was promoted to the rank of assistant professor in mechanical engineering, continued teaching, and engaged in consulting and research.

I observed that some of the senior mechanical engineering faculty members at NYU were experienced old-school practitioners with relatively little theoretical grounding. The outdated books from which vibrations courses were taught with a minimum of mathematics prompted me to assemble a set of notes for an introductory graduate course, which notes eventually evolved into the "Mechanical Vibrations" chapter that has appeared in the *Mechanical Design and Systems Handbook* since its inception. (Edited by H. A. Rothbart; McGraw-Hill, New York. The third edition appeared in 1996, the first in 1964.) I also had in mind writing a mathematically rigorous book on mechanical vibrations, but I came across the beautiful – and, in my opinion, insufficiently recognized – book by Kin N. Tong (*Theory of Mechanical Vibration*, John Wiley & Sons, Inc., 1960) and convinced myself that I could not possibly come close to its quality, so that I abandoned this project.

In part because I felt that I was under-appreciated and underpaid by NYU, I agitated for some prerequisites. I eventually was able

to persuade my department head to send me to some summer courses, including one on "Random Vibration" at the Massachusetts Institute of Technology. This course turned out to be a pivotal point in my career, not because of its technical content, but because of what happened after it. Shortly after I returned home from the aforementioned course I received a long letter from Leo Beranek, then president of Bolt Beranek and Newman, Inc. (BBN), inviting me to come to Cambridge for an interview, and extolling the working conditions at BBN and the cultural environment of the Boston area. I was inclined to ignore that invitation, thinking that no president of a significant company would write such an extensive and personable letter. However, my wife convinced me otherwise, and I accepted the invitation. As it turned out, I received an offer I could not refuse, resigned from the NYU faculty, moved to the Boston area, and went to work at BBN.


My joining BBN in its golden years, when research support was relatively easy to come by and when the company was expanding rapidly, was another highly fortunate step. I was mentored by extremely talented and dedicated people and learned a great deal, not only about acoustics, but also about how to obtain continuing contract support and how to run projects and manage personnel. It became clear to me early on that BBN's technical staff included many experts in underwater acoustics and related Navy problems, which would make it difficult for me to make my mark in 'wet' acoustics. Therefore, I chose to concentrate on 'dry' acoustics and structural vibrations, and for nearly four decades participated in many projects that involved vibration damping and isolation, dynamic stresses, and structure-borne sound.

I also enjoyed taking on such 'strange' projects as dimensioning the flagstones for the doubly curved plaza of President Kennedy's grave site, participating in designing the slide wire system that would permit astronauts to escape from the top of a launch tower in case of a fire below, and consulting on the design of the presidential

helicopter hangar within which helicopters could become airborne.

For most of my thirty-seven years at BBN the major portion of my contract support came from the Air Force and NASA, but I also participated in numerous consulting projects related to facilities and components that needed to withstand extremely severe noise and to laboratories and buildings with stringent vibration requirements. During my last two years at BBN it became more and more difficult to obtain funding from my usual sources, with the result that I devoted increasing amounts of time to working on architectural and other building-related problems with Acentech, Inc., which firm had grown out of BBN's architectural consulting group. When I retired from BBN I joined Acentech, where I now continue to serve as Chief Engineering Scientist.

Looking back, I find that BBN's enlightened attitudes and working conditions, which have been carried over by Acentech, have permitted me to participate in numerous interesting projects, to publish extensively, to lecture widely, to participate in many activities of professional societies, and to receive recognition for my work. However, none of this would have been possible if it had not been for all of the unplanned fortuitous circumstances that shaped my life and my career. I might have had a vastly different career if I had been wise and insightful enough to plan it. It is clear, however, that hard work, perseverance, the willingness to take chances, and the support by family and colleagues are essential – and that luck plays an important role.

I owe thanks to a great many people – too many to mention – who have been my mentors and who have collaborated with me all these years. But I do want to express my gratitude to my wife, Goldie, who has been my adviser and helpmate for sixty years and who has given me four wonderful daughters and, through them, ten amazing grandchildren. 

The author can be reached at: eungar@acentech.com.