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Bruce F. Powers Interview (MORS)

Powers, Bruce F.

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INTRODUCTION

Oral Histories represent the recollections and opinions of the person interviewed, and not the official position of MORS. Omissions and errors in fact are corrected when possible, but every effort is made to present the interviewee's own words.

Mr. Bruce F. Powers worked in the Center for Naval Analyses (CNA) from 1961 to 1978 and was Head of the Navy Strategic, Affordability, and Readiness Assessment Branches (in series) in the Pentagon from 1994 to 2001. The interview was conducted May 13, 2015 on Bruce's pontoon boat on Lake Barcroft in Northern Virginia.

MORS ORAL HISTORY

Interview with Mr. Bruce F. Powers; Dr. Bob Sheldon, FS, and Mr. Mike Garrambone, Interviewers.

Bob Sheldon: This is May 13, 2015, and we're here for a MORS oral history interview with Bruce Powers, and we're on beautiful Lake Barcroft in Northern Virginia. Bruce, first of all, can you state your full name, birth date and location?

Bruce Powers: My full name is Bruce Frank Powers, and I was born 14 December 1938 in Chicago, Illinois.

Bob Sheldon: Please give us your parents' names?

Bruce Powers: My father was Frank Powers. My mother was Lucille Hankermeyer.

Bob Sheldon: Tell us a little bit about your parents and how they influenced you.

Bruce Powers: My parents had a crucial influence on me but, unfortunately, my father died when I was seven, so my mother became the more important parent then, although she remarried later. (I had a stepfather, who was a benevolent fellow. It wasn't like having a real father.) So my mother was the strongest influence on my young life.

Bob Sheldon: How did she influence you?

Bruce Powers: Basically, teaching me to be responsible, do what I said I would do, work hard, try to achieve, and "make something of yourself." I did that. I was, for example, the first in my family (stemming from immigrants from Europe) to finish college by going to live on a residential campus.

Bob Sheldon: Where did you grow up?

Bruce Powers: In Chicago. The West Side, but in the city.

Bob Sheldon: Where did you go to school for your elementary, junior high, and high school?

Bruce Powers: In the Chicago Public Schools, which were quite good at that time. The high school was Austin, which is also the neighborhood where I was raised.

Bob Sheldon: Did you have some favorite courses in high school?

Bruce Powers: Yes, chemistry, which led me to study chemistry in undergraduate school, and for a master's degree later on. That was largely because of the influence of a teacher, Mr. Wasserman, in high school chemistry.

Bob Sheldon: How did you pick your college?

Bruce Powers: Mainly because of low cost, I went to the branch of the University of Illinois in Chicago, which allowed me to be a commuting student. It was nominally a two-year institution leading to two subsequent years at the state university's main campus in Champaign, Illinois. In my case, I bent it a little and did five semesters in Chicago and three in Champaign. (By the way, the Chicago campus then was at Navy Pier, now a tourist site.)

Bob Sheldon: What was your major? Chemistry?

Bruce Powers: Yes. Physical chemistry, which led to the master's degree in physical chemistry from University of Chicago.

Bob Sheldon: So you finished your bachelor's degree in Champaign?

Bruce Powers: Yes.

Bob Sheldon: What year did you finish?

Bruce Powers: 1960.

Bob Sheldon: Did you go directly for your master's?

Bruce Powers: I did, finishing in 1961.

Bob Sheldon: Did you have to write a thesis, or was it mostly coursework?

Bruce Powers: It was mostly coursework, but I had an arrangement with Professor Ole Kleppa, and he and I published a couple of papers together. So that substituted for a thesis.

Bob Sheldon: What were those papers on?

Bruce Powers: They were on the volume change on mixing of liquefied halide salts.

Bob Sheldon: What kind of job did you look for after you finished your master's?

Bruce Powers: Well, mainly in chemistry. At the University of Chicago, there were

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arrangements where potential employers would come to campus and seek out students; I had no experience in this sort of thing. So I picked the first outfit coming to the campus for interviews simply to rehearse, to be better at this skill. It turned out to be the Operations Evaluation Group (OEG) at MIT, with a Navy connection, and that worked out to be my career choice. My interviewer was a fellow named Jim Hibarger, who was the recruiter for OEG at that time.

Bob Sheldon: Where was your office when you worked for OEG?

Bruce Powers: At first, in the Pentagon, starting in mid-1961. After a year, CNA was formed. When CNA was formed, we moved to offices in the Rosslyn section of Arlington, Virginia.

Bob Sheldon: What kind of projects did you work on initially?

Bruce Powers: At first, radar flooding in anti-submarine warfare (ASW). The notion was that diesel submarines in those days, in the hands of some potential enemies, had to come up for air to run their diesel engines, to charge their batteries. Snorkels that stuck up out of the water were vulnerable to detection by radar—but less so than if the sub surfaced. The idea was that aerial radars, which would propagate their radar signals to be detected by the submarines, and if we kept our airborne radars on continuously, the idea was that the submarines would be forced to wait for recharging of their batteries, and thus they'd get in a precarious position. Forced to stay near the surface, they'd be easier to detect with other sensors—and thus take out when the time came.

Bob Sheldon: Who did you work with there in OEG?

Bruce Powers: Many people, but my solid mentor in those days was Erv Kapos, FS. Erv later rose to become director of OEG, but he was a key mentor to me when I was very young.

Bob Sheldon: I know OEG sponsored some classes for their folks. Did you take any classes at OEG?

Bruce Powers: I took a few courses to brush up my skills in operations research (OR) in the early days, because I was a chemist and not really well trained in OR in those days. Back around 1960 there weren't degrees given in OR, so people were drafted to do it from other professions, and that was the case for me. So I

picked up courses in statistics and so forth from George Washington University (GWU) and other local universities.

Then, about 10 years later, I took advantage of a really good deal that CNA offered that they called academic leave, which is to take a sabbatical at full pay, go back to campus, and I picked up a master's degree in industrial engineering and operations research. I went back to Chicago and got it at the Illinois Institute of Technology.

Bob Sheldon: How was the transition from OEG to CNA for you?

Bruce Powers: It was okay, although a lot of the older analysts—I was still a very young guy then—were alarmed about the change from MIT to the Franklin Institute as sponsor, as it moved from OEG to CNA. And there was a hearing on the Hill in those days about the “unwisdom” of this move. I went as a young guy with some older guys who were greatly exercised about this change of sponsor. For the first five years, CNA, in its initiation, was sponsored by the Franklin Institute.

Bob Sheldon: When it transitioned to CNA, your offices were in Rosslyn. What part of Rosslyn?

Bruce Powers: CNA moved into what had been Capital Airlines offices in the Arlington Towers complex. That complex is still there, now known as River Place.

Bob Sheldon: Did you change the kinds of issues you worked on when it transitioned to CNA?

Bruce Powers: A little bit. By then, 1962, I was preparing for my first field assignment, a really important feature of OEG life. I was designated to go off to Norfolk to work with the Navy there. OEG's culture has older analysts looking after the younger.

Bob Sheldon: So you felt well-prepared when you went to Norfolk?

Bruce Powers: Yes, I did.

Bob Sheldon: Transition to Norfolk. Did you move there physically and set up a household?

Bruce Powers: I did. I was a bachelor at that point, although I married while in Norfolk on that first field assignment. My bride, Phyllis, coming from Chicago, joined me there in 1963. I had met Phyllis when we were students at the University of Illinois in Chicago.

Bob Sheldon: What kind of work did you do there on your field assignment?

Bruce Powers: It was the Operational Test and Evaluation Force of the Navy. Their job was to test gear that had been designated for potential procurement by the Navy before it got into the hands of fleet sailors, and see whether in controlled tests the equipment performed up to snuff.

Bob Sheldon: Was that test out at sea?

Bruce Powers: Sometimes at sea. Sometimes in more controlled conditions ashore, on instrumented ranges, although instrumented ranges in those days were very primitive compared to now. Virtually no computers existed.

Bob Sheldon: What was your role in the test? Did you set up the test design matrix and collect data?

Bruce Powers: All of the above.

Bob Sheldon: Were there any findings from your tests that surprised you?

Bruce Powers: Evaluating tests with a focus on sample size changed the results and our confidence in them.

Bob Sheldon: What year did you move to Norfolk?

Bruce Powers: 1963. And I was there all that year.

Bob Sheldon: What projects did you work on? What specific systems did you test?

Bruce Powers: It was generally antisubmarine things, but also attacking surface and air targets. There were squadrons that were part of the Operational Test and Evaluation Force—for example, VX1, VX4, and VX5. The X designated test, and each of these had different missions. VX1 did ASW. VX4 did air-to-air warfare. VX5 did air-to-surface warfare. I worked on projects in all those designated areas.

Bob Sheldon: When you were doing the tests, did you go out to sea or up in the air with them while they were testing?

Bruce Powers: Sometimes.

Bob Sheldon: Did you get to know some of the Navy operators?

Bruce Powers: I did, some of whom I still knew later in my career, because they got promoted to admiral and so forth, and opened doors for me as the years went on.

Bob Sheldon: Was your field assignment a fixed one-year tour?

Bruce Powers: Generally, they were one year. There were some exceptions to that, but generally,

you went off expecting it to be one year, and knew that. That provided special energy to your activities, because you needed to ingratiate yourself socially with the headquarters command where you were and then get some work done in that short available time, and persuade people that they should listen to the results, all in the space of a year or so. So you had to keep working fast.

Bob Sheldon: Then from Norfolk, where did you go?

Bruce Powers: I headed to Quantico in 1964 to work with the Marines for two years. In those days, the Landing Force Development Center was in Quantico for the Marines, and it was much like the Navy's Test and Evaluation Force. It looked at new gear before it was put in the hands of the Fleet Marine Forces. It was headed by a famous Brigadier General, Lew Walt, who later became the Assistant Commandant.

Bob Sheldon: What kinds of systems were you testing for the Marines?

Bruce Powers: Principally for me, it was helicopters and ship-to-shore landings, and I participated in a collection of data in exercises that included the first multiship helicopter ship-to-shore landings. LPH (Landing Platform Helicopter) was a new class of ships at that time. Initially, LPHs were converted old aircraft carriers. But in the early 1960s, they were commissioned as ships of their own class, USS *Iwo Jima* class. They were smallish flat tops designed for helicopter ship-to-shore landings.

Bob Sheldon: Where were the tests done? At Quantico or at Lejeune?

Bruce Powers: They were typically done at Lejeune, and offshore. The helicopters were based at Marine Corps Air Station (MCAS) New River, North Carolina. MAG26 was the air group at that time that did the job. We also had a major exercise that went over to Spain to conduct landings, and this was the first division-sized landing since World War II. The commander of the operation was a three-star admiral, John McCain Jr., who was Senator John McCain's father.

Bob Sheldon: What part of Spain did they do the landing test in?

Bruce Powers: Near Rota. A division and wing were landed there, and this included the use of three LPHs. My job was to design experiments, collect data, and so forth, on the operations of

the helicopters and ship-to-shore work, and then pull together the results, and evaluate the performance of helicopters in these landings for Vice Admiral McCain and, of course, his subordinate Marine commanders.

Bob Sheldon: How long did you stay in Spain doing the test?

Bruce Powers: It was a seven-week exercise, including the transits both ways across the Atlantic. The operations, the landings, were about ten days.

Bob Sheldon: Did you work with any of the Spanish counterparts in their military forces?

Bruce Powers: There were a few Spaniards who came out as observers to see what we were doing, but the Spaniards didn't use helicopters for ship-to-shore landing in those days, so they were simply there to see what we were doing.

Bob Sheldon: How many years did you work with the Marines?

Bruce Powers: Two years. All of 1964 and all of 1965.

Bob Sheldon: Were there any other notable projects you worked on there?

Bruce Powers: Yes. We evaluated the Stoner rifle, which was a candidate that the Marines had at that time for incorporation into their forces. I took rifle training for that purpose, learned to lie in the dirt and steady my gaze and so forth. I actually earned a marksman's medal while doing such training and enjoyed that a great deal.

Bob Sheldon: So "Every Marine a rifleman" and even "Every analyst a rifleman."

Bruce Powers: Sometimes.

Bob Sheldon: Were there any interesting results from that rifle test?

Bruce Powers: There were. The Stoner was promoted by a lot of people inside and outside the Marine Corps, but didn't make the cut in this case. The Army ran a separate evaluation. The evaluations said that the alternative was better, so the Stoner was put aside.

Bob Sheldon: What was the alternative?

Bruce Powers: The M16.

Bob Sheldon: How was it as an analyst working with the Marine Corps, compared to working with the Navy in Norfolk?

Bruce Powers: There were some important differences. The Marines were a little less used to civilians being around. For example, in the social

directory, in the Marine Corps, the officers were clumped in one area, then the enlisted and the civilians last. In the Navy, it tended to be the officers first, civilians next, and enlisted last; which told you something about how the Marine Corps valued its uniformed people. It was great to be associated with people then in the Marine Corps who had such great esprit and regard for each other, and I shared it.

Bob Sheldon: Then from Quantico, where to next?

Bruce Powers: By now, the Vietnam War had heated up, and as was the case for CNA and OEG over the years before, it modified its distribution of analysts to be able to do combat analysis. So in 1966 I headed to Pacific Fleet headquarters at Pearl Harbor to help fill out a small team of analysts there that was going to work on Vietnam War combat operations. I ended up being a member of a team of four, led initially by George Haering, and later by Erv Kapos.

Bob Sheldon: What kind of projects or studies did you work on there?

Bruce Powers: In my case, two—rescue of downed aviators in combat and air-to-air combat.

Bob Sheldon: What aspects of air-to-air combat did you study?

Bruce Powers: The first attacks by MIGs from North Vietnam against Navy air forces came in early 1966, when I happened to be aboard a carrier, USS *Hancock*, that was flying F8s that mixed it up with those MIGs. I debriefed the participating pilots when they returned to the carrier. That grew like topsy and became a large project, to evaluate our performance in air-to-air combat—Navy and Marines and Air Force.

Bob Sheldon: What findings came out of that study?

Bruce Powers: What was new to air-to-air combat in that war were air-to-air missiles, Sidewinders and Sparrows. It was important to view this campaign appropriately, because you would think the first kinds of measures of effectiveness (MOEs) that made sense for air-to-air combat, such as exchange ratios, would be the appropriate way to view this conflict. But that wasn't actually right, and it took a while to understand this correctly. Analysts helped a lot to reveal what were the appropriate measures for combat

performance. Because in this case, the air-to-air campaign was supportive to the air-to-ground campaign.

The air-to-ground campaign was called Rolling Thunder in those days. And the problem was that the small North Vietnamese Air Force was coming up to hound and harass our bombing aircraft as they would approach their targets. Unfortunately from our side, the arrival times of our aircraft, both Navy and Air Force, over targets in Route Package Six, North Vietnam, were predictable. This was because there was a fight going on between the Navy and Air Force over sortie rates, because McNamara back in Washington wanted to emphasize all sorts of numericals. Sortie rates were one of the things that we measured extensively, because of the competition between the Services to do more of this. The way in which you operate bases to gain more sorties over the course of a month meant the arrival times over targets in North Vietnam were predictable to the North Vietnamese. So they could hold back with their small air force, wait for us to come, and challenge us when we did, which they knew well in advance. (Soviet "fishing boats" were near our aircraft carriers.)

With their small air force, they were achieving some effects and getting us sometimes to jettison our bomb loads. In those days F4s, F8s, and so forth, were capable of both air-to-air and air-to-surface combat. If they were carrying bombs, to jettison them made them better fighters should the aerial engagement turn into a shooting encounter, as it sometimes did, although I should add that air-to-air encounters were rare, because the North Vietnamese had a small air force and not much experience in using it, so it didn't initiate frequently or press when they did.

But the true MOE of a campaign, viewing air-to-air work as a supportive activity of the air-to-ground campaign, was to see how much the presence of the North Vietnamese Air Force airborne aircraft caused us to divert sorties from air-to-ground bombing to air-to-air patrol instead. Early in that campaign, at times, but not on average, the rate at which US aircraft leaving their bases were diverted to combat air patrol armed with air-to-air missiles reached 30 percent. But, more regularly, it was 10 or 15 percent.

So the true MOE, and it took a while to figure all this out, was the rate at which the North Vietnamese with their small air force caused us to divert our missions away from bombing, which was the principal reason for being there, to air-to-air patrol, which had no direct effect on the targets on the ground.

Bob Sheldon: When you were at CINCPACFLT (Commander in Chief, US Pacific Fleet) in Hawaii, did you spend much of your time in theater in Vietnam?

Bruce Powers: Yes. The routine was that there were four of us analysts from OEG working at CINCPACFLT headquarters in 1966. We'd spend six weeks each forward in the combat zone—generally on aircraft carriers. There were other OEG people working aboard ships in the combat theater all the time. But we were in effect a team of augmentees, providing one man continuously forward in the combat theater out of the four in Hawaii, so every six weeks we would change, and every six months, each one of the four of us would go forward. So out of the team of four in Hawaii, one was deployed forward continuously.

Bob Sheldon: How was the data capture from debriefing fighter pilots and finding things out?

Bruce Powers: When you could, you would speak personally with the air crews, sitting in the intelligence debrief that occurred routinely, and then collecting more data from the participating air crews. As the air-to-air campaign evolved, so did analysis of it. Analysis focused on the performance, for example, of the new air-to-air missiles, which had been developed in the fifties and now used in combat for the first time in the sixties.

Interviews with individual pilots were followed after a while by data collection forms developed to be sure the right kinds of questions were captured in each interview.

Bob Sheldon: How much time did you spend at CINCPACFLT?

Bruce Powers: About 20 months, including the work forward in the combat zone.

Bob Sheldon: So you'd go for six weeks to Vietnam, and then come back to Hawaii for —

Bruce Powers: For what turned out to be three times six weeks, and back to the combat theater.

Let me go on and mention a little, if I could, about the work on rescuing downed aviators,

because that was important also in 1966–1967. Most aerial bombing campaigns don't have explicit provision beforehand for rescuing downed aviators, so it's an ad hoc activity. There aren't squadrons designated to do it before the combat occurs. But flexible forces can put together the wherewithal to be able to do it, and that's what occurred in the Vietnam War.

It was quickly learned by combat commanders, and particularly the aviation squadrons that participated in the bombing, that if your aircraft was damaged over North Vietnamese targets, if you could get to the sea before you ejected from your aircraft, the chances of your being rescued went way up, from roughly 10 percent when downed on land to roughly 90 percent. So of course, the aviators tried hard to reach the sea in damaged aircraft, but for a handful, they weren't able to get out over the sea with their aircraft, and had to eject, and in some cases, such as Senator McCain, were captured and endured a long imprisonment as a result.

Procedures were developed and communications techniques refined to be able to be able to get to downed aviators quicker by the rescuing forces, generally helicopters based aboard ships operating in the Tonkin Gulf. A true analysis of the data that was generated by this found some difficulties with communications delays and thus delays in triggering aircraft that would go off and conduct the rescues. These delays were analyzed by me and other people in the theater at the time, to make rescue more effective. The reasons that rescues should be more effective were obvious. You of course want to keep people safely out of enemy hands, and the investment in skilled air crews to get them able to do this is quite a lot, and you want to rescue as many people as you can to get them back in operations rather than start from zero to train the people to replace them.

So for all these reasons, it was wise to rescue as many downed air crews as could be, and the rescue rate went up as these procedures were refined. Analysis helped a lot to make it happen.

Bob Sheldon: Can you point to a couple of factors that impacted the effectiveness of rescues?

Bruce Powers: The principal difficulty was communications delays, and getting rescue people aware that their help would be needed, because vulnerable helicopters that would affect

the rescues had to make approaches to pick-up sites involving risk, particularly exposure to enemy fire. So picking the appropriate path to the site of downed aviators was key. Signals would be needed from aviators who had been ejected from their aircraft by their choice, and now communicating by radio. They had to get word to the rescue crews about where they would be available for pickup. Measuring those times was critical to understanding what the actual sequence was in alerting rescue air crews to come in and do that job.

So the rate of pickups rose. Analysis of communication means and delays turned out to be quite effective in increasing the rescue rate.

Bob Sheldon: Were there any other highlights of your time in Vietnam and Hawaii?

Bruce Powers: After I left CINCPACFLT late in 1967, I returned to CNA headquarters, where Erv Kapos was the leader of a larger entity back there called the Southeast Asia Combat Analysis Division of OEG, which consisted of a few teams of people, all of whom were working on analyzing Vietnam data, which by now was pouring out of the theater in huge volumes. Going back to what you asked earlier about how data was collected on combat performance, there were lots of routine reports generated by operators in the Vietnam War. They were called op reps for operations reports. They were message reports of what people had been doing on their various missions, aviation and other, in the combat theater. And this was getting to be quite a voluminous collection of reports on combat. Analysis of it was the job of many people back in Washington, but among them was this arm of CNA, OEG, that Erv headed, and I became part of that. That went on for a couple of years before my next field assignment.

Even though we've been talking about my combat analyses, I'd like to put it in a larger context. Combat with smaller nations occurred during the Cold War, but combat with the USSR was averted. Managing competition with the USSR during the Cold War while averting superpower combat called for decades-long patience and skill. I like to think I was a participant in that, and even that usable combat analysis helped.

Bob Sheldon: What was your next field assignment?

Bruce Powers: The next one was in the Sixth Fleet in the Mediterranean. That started in the spring of 1969. The Mediterranean was not at war, so there were other things to do there. One of the principal details of life in the Mediterranean was the Soviet Navy. There were regular interactions between the Sixth Fleet and the Soviet Navy in the Mediterranean. The Sixth Fleet had about 50 ships, and the Soviet Navy had about 25 ships in the Mediterranean, and there were ongoing interactions, including with Soviet submarines. In the Cold War setting, the Sixth Fleet and its NATO partners tried to detect the Soviet subs. In the Cold War, the interactions went up through the level of detection, but of course, stopped there.

The Soviet fleet was showing increasing operational capabilities in its surface forces and its submarine forces. The Soviets kept in the Mediterranean 10 to 15 submarines in those days, and they gave us constant headaches about their whereabouts and potential activities.

So detecting Soviet submarines was one of the major operational activities in the Mediterranean at that time, and I turned analysis to that problem. Regular reports were generated about intelligence and operational detections of submarines. Analyzing that was an important part of what I did. I actually did more of it later, when I worked in a subsequent field assignment at CINCUSNAVEUR (Commander in Chief, US Naval Forces, Europe) Headquarters in London, in 1974–1975.

There also were in those 1969–1970 Sixth Fleet days regular Soviet overflights of the US naval forces, because the Soviets had Badgers based in Egypt in those days, and some longer range aircraft (Bears) that came out from the Soviet Union and flew down the Atlantic into the Mediterranean occasionally. These overflights of US Navy ships led the CNO (Chief of Naval Operations) of the time, Admiral Moorer, to say that he didn't want his aircraft carriers anywhere in the world to have a Soviet aircraft fly within 100 miles of the carrier without escort by an aircraft from the carrier.

It was clear pretty quickly that this stricture, this goal by the CNO, was not being achieved. All too often, somebody would look up from the flight deck and say, "What the heck is that?" and it was a Soviet aircraft flying over that nobody

had detected. So I took this on as an analysis project. My work yielded improvements in the Sixth Fleet's performance with its carrier-based fighter intercepts.

Bob Sheldon: Where were you based there?

Bruce Powers: I was living in Gaeta, Italy, working aboard the Sixth Fleet flagship, which was the USS *Little Rock*. (She's now a museum in Buffalo, New York.) The *Little Rock* was the flagship for the Sixth Fleet commander, and she would stay in port for about ten days in Gaeta, and go off, visit some other port or two, partly to show the American diplomatic flag during that time. She very occasionally would operate. But generally, being a flagship, it went where it was told and took the Sixth Fleet commander where he wanted to go.

Bob Sheldon: Did you like working aboard a ship as compared to being a landlubber?

Bruce Powers: I did. I enjoyed it a lot. It yielded very close-knit social interactions with the staff on board. My Sixth Fleet commander had a staff of about 35 officers and one civilian, me, and we got to know each other extremely well, because shipboard life, even in peacetime there in the Mediterranean, meant that you worked very hard together when at sea and played very hard when ashore. Friendships built this way led later to attending each other's children's weddings, etc.

Bob Sheldon: From the Med, you went back to CNA?

Bruce Powers: Yes. I did return to CNA, and was there for four years before heading off for a year in London at CINCUSNAVEUR. During the four years, I went back to school for a year on CNA's academic leave program in Chicago. So I picked up my degree in industrial engineering in 1971 just after Gaeta, and then returned to CNA headquarters.

At CNA headquarters there was a significant initiative to try to get people with field experience, of which I now had some under my belt, to work on the future planning problems of other parts of CNA that were concerned with cost effectiveness and other kinds of analyses that weren't so focused on operations. I did a lot of that before returning to OEG itself as a division director in 1973, because a new director of OEG, Dan Rathbun, was brought in. He had worked in OSD PA&E (Office of the Secretary

of Defense Program Analysis & Evaluation) and other places. Dan didn't have any experience with OEG, so he needed somebody who had some to help him out. That's why I was brought in as a division director.

Bob Sheldon: You now have your master's degree in industrial engineering. Did you take mostly OR courses?

Bruce Powers: Virtually all, outside of a couple of rudimentary engineering courses.

Bob Sheldon: What kind of projects did you work on?

Bruce Powers: It was running the field program in my case. OEG had digested something called the Tactical Analysis Groups shortly before I returned in 1973. Erv Kapos was director of OEG, and Rathbun replaced Erv. The Tactical Analysis Groups came into OEG without any additional supporting structure at OEG headquarters. It used to be in OEG that the rotation cycle for field assignments in the fleet had a period of three years: one out, two back. The ratio of people in Washington to people in the field was thus something like two to one. Now, with the digestion of the Tactical Analysis Groups, which were out in the fleet, in the field, it was one to one, and it was necessary to build up the number of people at CNA headquarters who would participate in the field program to make the ratio more like the old two to one, which was the classical way of doing this.

Because I had worked in other parts of CNA after my Sixth Fleet field assignment and my academic leave, I was instrumental in broadening the field program's appeal within CNA to other parts of CNA besides OEG, and that's largely what I did for Dan Rathbun.

Bob Sheldon: How did you make it more appealing?

Bruce Powers: Basically making people in CNA, but outside its OEG component, aware of the pleasures and effectiveness of working with the fleet on OEG field assignments. There were significant barriers within CNA in those days, with OEG and its field program being separate and apart from the rest of CNA. Communications across those barriers was imperfect and needed to be accomplished, and I was instrumental in that.

Bob Sheldon: Was that an easy sale? Did you have an easy time recruiting?

Bruce Powers: The low hanging fruit came easily, yes. About 15 people readily signed on to participate in the field program, but the next 15 or 20 were much harder. So the sale became much more difficult to achieve.

Bob Sheldon: What other kinds of projects did you work on at CNA at the time?

Bruce Powers: After a year or so of this, Dan Rathbun moved on, and Phil DePoy became the director of OEG. Phil didn't need my kind of help. He didn't need a guy who knew about OEG, because he knew all about it himself. He was even more experienced than I, including on field assignments. An opportunity opened up for the assignment in London, and I opted to go off to the field once again in 1974, to work for the four-star for the Navy in Europe. He was called CINCUSNAVEUR, with headquarters in London. The four-star CINC in those days was Hal Shear, who later became the Vice Chief of Naval Operations. So I had a chance to live in London for a year in 1974–1975.

Bob Sheldon: Did you take your family over to London?

Bruce Powers: I did. I lived outside London and commuted by train. I lived in a town called Denham Village, and it was about 20 miles from downtown London.

Bob Sheldon: What kind of projects did you work on there?

Bruce Powers: Almost entirely ASW. I mentioned earlier that I started working on that in the Mediterranean with the Sixth Fleet commander, but the conditions for deep analysis of antisubmarine data that was collected over the course of the Cold War on the Sixth Fleet staff weren't very good, because of day-to-day operational interruptions.

So I'm now working in the same chain of command in London, where there were fewer interruptions for operational considerations, and I had the time to study this anti-submarine data more carefully, and come to understand which platforms and sensors were most effective in achieving detection of Soviet subs operating in the Mediterranean. This analysis yielded some quite useful results in figuring out just which platform and sensors should be procured for the future or assigned operationally in the short term, if that should be required.

Bob Sheldon: Since OEG has a history going back to World War II on ASW, were you able to draw on some of the insights that they gathered during World War II with their analysis?

Bruce Powers: For sure. There is within OEG a very careful effort to train young folks to understand what's been accomplished in the past, and guide them in the direction of data sources that past antisubmarine work produced, including in this case back to World War II. So even in the Cold War, as it stretched decades after World War II, we took advantage of that knowledge and understanding, and this is achieved by the older analysts in OEG guiding the younger ones in the right direction.

Bob Sheldon: What kinds of new insights were different from the old insights?

Bruce Powers: Nuclear-powered submarines had come along for the Soviet forces, and detecting them is quite different, the kinds of sensors and training amongst our sonar and other sailors to be able to do so. So capitalizing on new technology was required to detect nuclear submarines. Roughly five of them operated in the Med in those days. It was quite different from classical radar and acoustic techniques that had been used for the snorkeling diesel submarines in World War II.

Bob Sheldon: Did you go out to sea on a submarine?

Bruce Powers: I didn't go out to sea, not when I was working in Sixth Fleet or later at CINCUSNAVEUR. When I was new in OEG, I spent a week on a sub. I got a feel for what operations on a submarine were like, and then it was a diesel submarine. I've never been at sea aboard a nuclear submarine even to this day.

Bob Sheldon: Did you get to travel around Europe, outside of London?

Bruce Powers: We did travel on vacation from work. I'd go to the Med for work and to CINCEUR (Commander in Chief, European Command) in Stuttgart.

Bob Sheldon: What year was that when you came back from London?

Bruce Powers: 1975, when US forces finally left Vietnam. Back at CNA, I was made Director of Planning. This entailed design of CNA's research program, and tailoring it to Navy and Marine Corps needs. Negotiating would be with the staffs of sponsors in the headquarters

of each of the Navy and Marine Corps staff. So I would work with the staffs of the Deputy CNOs for aircraft, submarines, surface forces, etc. This was from 1976 to 1978.

Bob Sheldon: Did you see their priorities changing as the Vietnam War wrapped up?

Bruce Powers: I certainly did. There was a need to refocus on procurement as combat operations had shifted attention. Money was spent replacing attrited aircraft, for example; this was a significant activity for the Navy and Marine Corps. And so was modernization of other kinds of forces. With the war having ended, there was both a drawdown in the size of the Services, and at least as much in personnel, as the shift to the all-volunteer force occurred with its costlier uniformed people. This was coupled with a need to look at procurement issues to be sure that the right kind of replacement gear was bought for the return of full focus to the Cold War.

Bob Sheldon: How high on the food chain were you in CNA?

Bruce Powers: I was in the management staff, comprised of the top ten people there. But, to be fair, I was about tenth in line.

Bob Sheldon: How long did you stay in that job?

Bruce Powers: I was in that job for about two and a half years, and then moved to RAND.

Bob Sheldon: What drove your move to RAND?

Bruce Powers: A second invitation by RAND to join their staff. I had turned the first one down, because I had this new job doing the planning for CNA, but I came to realize the invitation from CNA's President was hollow; he wasn't terribly interested in planning.

Bob Sheldon: Was it the RAND office in Santa Monica or in DC?

Bruce Powers: I signed on anticipating going to Santa Monica, but I started out in DC, and ended up working there for two and a half years.

Bob Sheldon: What kind of projects did RAND have you work on?

Bruce Powers: There were a couple. One was looking at the contribution of the land-based Army radars to helping the Air Force sense aerial targets that they might deal with in air combat, and to some extent sea-based as well. And

we also looked at large-scale floating air bases—much larger than aircraft carriers. These large platforms that might serve as floating air bases were ideas and technology bubbling up from the commercial world. They did not come to pass. It turned out to be uncertain in operational effectiveness, and very uncertain in military cost.

Bob Sheldon: So your background in the Navy helped you in your work for RAND for the Air Force?

Bruce Powers: It certainly did. RAND was doing some simulation of warfare on the joint level, and wanted to incorporate naval forces into it. So I was instrumental in standing up that capability.

Bob Sheldon: Where was your RAND office?

Bruce Powers: Actually, in 1980 it was 21st and M Streets Northwest, downtown Washington.

Bob Sheldon: After RAND, where to next?

Bruce Powers: I went to IDA in 1981. The reason I did that is a personal circumstance arose where my wife's mother took ill, and our plans to move to Santa Monica couldn't be achieved because her mother was here near DC. So instead of heading to Santa Monica, I headed to IDA.

Bob Sheldon: There on Seminary Road?

Bruce Powers: Actually, I started out with IDA in the Paper Clip Building near the Pentagon. Eads Street. But during the time I was at IDA, which ended up being a year and a half, we moved to Seminary Road.

Bob Sheldon: What projects did you work on for IDA?

Bruce Powers: Two things for them. One was electronic warfare, how to help OSD figure out which electronic warfare should be procured. The other was intratheater lift, again, working for OSD. For combat campaigns of the future that might arise, what sorts of lift within combat theaters would be appropriate, how to capitalize on available infrastructure based in Europe or places elsewhere, where it wasn't very good, where procured lift should be brought to the theater, and so forth.

Bob Sheldon: Was that looking at the types of lift?

Bruce Powers: It was; not only air but also surface capacities.

Bob Sheldon: You didn't have much of a logistics background. How did you pick up the logistics project?

Bruce Powers: I had learned to be flexible and inquisitive from many prior experiences.

Bob Sheldon: CNA would send you out to the fleet to learn stuff. Did IDA send you out someplace to learn about the tactical lift and intra-theater lift?

Bruce Powers: They did not. In the case of IDA, working for OSD headquarters staff in the Pentagon, although some of the people populating those staffs at the Pentagon were operationally astute or logistically astute, a detailed knowledge of operations prized with OEG wasn't as required of you at such an OSD setting in Washington. So you didn't have to be as deeply understanding, deeply capable, in operational details.

Bob Sheldon: Did you work with some of the subject matter experts, some of the guys who were the lifters?

Bruce Powers: I did. IDA took advantage of resident consultants who generally had military experience. I used them on my team, both in electronic warfare and in intratheater lift logistics.

Bob Sheldon: You spent a year and a half at IDA. Where to after that?

Bruce Powers: Next, in 1982, was a think tank that the Secretary of Defense, Cap Weinberger, kept at the National War College at Fort McNair. This was a new initiative by Weinberger to provide personal advice to him on matters where he could let down his hair. One of the problems for a Secretary of Defense is he seldom can say in public that he doesn't know much about that issue, so he needed a sounding board, a group which was knowledgeable about policy and operational issues, where he would let his hair down and talk with us, and gain understanding about topics where it was important that he come to understand.

We would do research between monthly meetings with Weinberger and the Chairman of the Joint Chiefs, and in those days it was General Vessey.

Bob Sheldon: So that was physically at Fort McNair?

Bruce Powers: It was. We were an arm housed in the National War College, but working for the Secretary of Defense and Chairman of the Joint Chiefs. The President of the National

Defense University, Lieutenant General Pustay in those days, knew what we were doing, but the connection was directly with the top guys in the Pentagon.

Bob Sheldon: How large of a staff?

Bruce Powers: There were 10 of us there, about half civilians, and an officer from each Service, and led by civilians who had been knowledgeable in analysis and strategy beforehand.

Bob Sheldon: What were the issues you tackled?

Bruce Powers: There were questions then about so-called horizontal escalation. Would it be wise if the Soviets caused trouble in one theater to cause them counter-trouble in another theater? If so, which theater should we select for initiating crises or even combat—should they cause trouble, say, on the Central Front in Europe? And what order of such campaigns would be appropriate to initiate?

There were also issues of relations between India and China, which were very frosty in those days, and whether it would be appropriate to take advantage of friends we had in Pakistan to bring pressure against the Indians and/or the Chinese to make them each behave.

It was political/military work, and quite interesting and enjoyable for me, and the chance to work directly with the Sec Def and Deputy Sec Def, and the Chairman of the Joint Chiefs, was great.

Bob Sheldon: How receptive was Weinberger to analytic advice?

Bruce Powers: He was. He was open-minded, listened carefully, took advantage of this group to not only serve as a sounding board for him, but listened to its ideas, and encouraged us to think of fresh alternatives which he then could capitalize on in his discussions with other people. So it clicked.

Let me add an insight. Any Sec Def is very busy. Demands on his time are substantial. So, in Weinberger's case, his Dep Sec, Frank Carlucci, made it click by insuring we got on Weinberger's calendar monthly. Weinberger's two-star military assistant then, Colin Powell, also was key.

Bob Sheldon: How long were you there at NDU?

Bruce Powers: I worked there from 1983 to 1985, but during that time, as happens often,

the bureaucracy wore down the easy, open access we had to Sec Def and the Chairman. As time went on, the people in their staffs persuaded them that these outsiders weren't needed, and the staff could take care of the issues. So the frequency with which we met them, which was initially monthly, became quarterly, and ultimately, turned off entirely.

Bob Sheldon: You were there from 1983 to 1985, during the Reagan administration. Did you see any changes in emphasis over the course of those three years?

Bruce Powers: The most important thing that was happening was the Reagan administration was successful in getting Congress to increase the Defense budget. Our joke then was that Weinberger spent his days moving wheelbarrows of money from Capitol Hill to the Pentagon. After quite a lot of this, things began settling down, and there were reports then of excesses in procurement—\$500 hammers and expensive toilet seats and things like that. So the Congress's enthusiasm for up-ramped funding for defense had dropped quite a lot by the mid-1980s, and the ambitious plans set by all the Services and OSD and so forth in the early eighties were not being fostered any more by Congress. So adjusting to sharply altered fiscal constraints was the major issue in the mid-eighties. It tied the hands of all the people in DoD (Department of Defense), including in the military Services.

Bob Sheldon: After your three years there, where to next?

Bruce Powers: I moved to the Pentagon in 1986 and joined the Naval Aviation part of the CNO's staff as the senior civilian working for the three-stars who were running Navy and Marine Corps aviation. That was comprehensive—procurement of aircraft, their carriers, and weapons training, maintenance, and all this was done from Op-05, which is what the shop was called that did this, and the code they assigned me to was Op-05W, which had a long title. (You'll remember that in the DoD, the longer your title, the less important you are.) Mine was Special Assistant for Technology, Analysis, and Planning. Long enough.

Bob Sheldon: Was that in the Pentagon or in the Navy Annex?

Bruce Powers: It was in the Pentagon.

Bob Sheldon: What were the big issues of importance?

Bruce Powers: The things that took up lots of my time, particularly in the early days, were the development of new aircraft. I came there in 1986, and the initiatives that had been cooked off in the early Reagan time were now coming to fruition, and new types of aircraft were being procured or planned for procurement for the Navy, and this included the A12, the stealth carrier-based bombing aircraft that was to replace the A6, and advanced variants of the F14, and the V22 for the Marine Corps. And there was a plan then for replacement for E2 aircraft on carriers, which was to be a sophisticated command and control aircraft.

All these were percolating at the same time, and my job was to facilitate the new aircraft types and fit them into the Navy.

Bob Sheldon: How large was the staff you worked with?

Bruce Powers: I had about 12 people working for me, virtually all Naval officers—one or two Marines included.

Bob Sheldon: Did you use any simulation models or anything else to study the issues?

Bruce Powers: We did. We took advantage of all kinds of analytical tools and techniques to try to understand these issues of planning and technology better, and that included simulation, and work by CNA and other think tanks, anything we could get our hands on that would help us do a better job of planning and monitoring the development of the aircraft types, and seeing to their appropriate use once in the fleet and Marine forces.

Bob Sheldon: Did you use some of your old contacts at CNA?

Bruce Powers: I certainly did. I tapped that all the time to help me understand issues better. My old friends at CNA were anxious to make inroads among Naval Aviation and have their work exposed, so it was a mutually beneficial arrangement. Similarly, I would invite in analysts from industry, think tanks, universities, and government to flesh out and illuminate issues.

Bob Sheldon: You had some previous expertise in studying air-to-air combat in Vietnam and in the rescue of downed aviators in combat. Was that outdated by then, or was it still relevant?

Bruce Powers: Some of it was relevant. In fact, later on in my time at Op-05, I took on some teaching at GWU, and some of the lessons from that early combat analysis, quite early in my career, turned out to be valuable as instruction on doing analysis for operating forces.

Bob Sheldon: How was it working futuristic programs as compared to working with real data?

Bruce Powers: It was possible to link some. Aircraft that existed only on paper required guesswork about performance. Because I had come to understand aircraft in either operational test circumstances or combat, whatever was available from that that could potentially be used. And now it was estimating performance in the future. Where I could, I would extrapolate from performance as actually measured. But dealing with guesswork isn't as confidence-inducing as measuring current operational performance. Still, it had to be done.

Bob Sheldon: How long did you spend at OpNav (Office of the Chief of Naval Operations)?

Bruce Powers: I spent 16 years, but the first nine of those were in Op-05. Then I moved to the Assessment Division, the successor to the old Op-96. Over the course of seven years there, I ran three branches successively.

Bob Sheldon: So you evolved from one job to another?

Bruce Powers: Yes, always bouncing. But my longest—nine years at one place—was at Naval Aviation (Op-05) in OpNav.

Bob Sheldon: How many analysts were in the Assessment Division?

Bruce Powers: It started out as about 75 people, both uniformed and civilian. It was basically the analytical arm of OpNav. It evolved from its earlier days when it did cost effectiveness and other kinds of analyses. It didn't do very well during the Lehman era as Sec Nav, and he cut it back and reduced its size, and reduced its mission.

But after Lehman left the Sec Nav job, it was restored to some of its earlier health. And I moved to N81 because of the CNO at the time. Boorda was his name. He said he wanted to revitalize N81 and turn it back into what Op 96 had been earlier. So to me, that was the ticket—a chance to work for the CNO directly.

Bob Sheldon: How were analytic issues approached there as compared to at CNA and OEG?

Bruce Powers: The issues for OpNav were much more focused on planning future forces than at particularly the OEG portion of CNA, which is focused on the performance of current forces. So issues in OpNav were pointed at which mix of forces were most appropriate for procurement.

In N81, we were focused on the first "P" in PPBS (Planning, Programming, and Budgeting System). That was like the "architect" phase of building a home. The perspective was often that of the whole Navy, and it was always cost-constrained. So proposals for inclusion of additional ships or aircraft types had to be accompanied by trade-offs, or off-sets, of equal cost. Skilled teams of analysts, military and civilian, worked on these trade-off issues. Most of the officers had a master's degree in OR from the Naval Postgraduate School (NPS) in Monterey (where I later taught OR).

When I joined N81 in 1994, I was very fortunate to have as my deputy Captain Trip Barber. Trip was and is a standout analyst also skilled at getting the best analysis from subordinate officers on tough issues of Navy design. N81 was also lucky to have a full-time CNA analyst assigned. That billet was filled by a string of topnotch CNA veterans then. When I started in 1994, the CNA analyst assigned was George Akst, and his office was in my branch, N812.

Bob Sheldon: So you were in N81, OpNav, with the aftereffects of Desert Storm. How did you see that?

Bruce Powers: We capitalized a lot on combat performance and behavior as revealed in Desert Storm. Though the campaign was brief, only seven weeks for the aviation part of it, we learned a great deal about performance from Naval and other forces, and drew on that in our planning for future forces, not only against surface targets, but some air-to-air combat in the Desert Storm war, and of course, a significant logistics effort to get forces over there and keep them sustained. The Navy assigned six aircraft carrier battle groups and other forces to that campaign. By the time the five-month build-up period had ended, a big chunk of DoD was there.

Bob Sheldon: This was also the post-Cold War era. How did that change your analytic emphasis?

Bruce Powers: When Les Aspin became the Secretary of Defense in 1993, he had a notion that planning for a big worldwide war with the Soviets should be replaced for planning purposes with medium-sized conflicts in theaters—what were called major regional conflicts. This scaled down some the nature of the planning—from, if you will, dealing with one big dragon to now a bunch of snakes in individual theaters. Our plan for the future adapted to that in DoD in response to what Aspin called for in a "Bottom-Up Review." Aspin's Bottom-Up Review was mimicked in later Quadrennial Defense Reviews (QDRs) for future defense planning.

Bob Sheldon: The 1990s also brought a lot more computers into the Pentagon, or at least desktop computers and the Internet. How did you see the changes in the analytic approaches with the proliferation of desktop computers and Internet?

Bruce Powers: This permitted decentralized analytical work. No longer did people go to the machines, but the machines were in the hands of people. So it was possible to develop and assign to individuals smaller, more bite-sized analytical work, which they could pursue on their own with the machines available to them. I think that worked out pretty well. People became individually more capable, and therefore able to pursue, if you will, a larger net analytical product with smaller pieces of work being done by individuals. But the pieces needed integration by managers such as Trip, myself, and others.

It also enabled new analytical initiatives. In my OpNav N812 branch, we stood up the first joint campaign analysis capability in a Service headquarters.

Bob Sheldon: Did you bring stuff into N81 from what you learned 20, 30 years earlier in OEG?

Bruce Powers: I retained my reverence for data and measuring operational performance, and would use results of such measurements whenever I could when planning future forces. In fact, going back to the experience I described when at CNA about the bridge between work

that OEG had done within CNA to measure current fleet performance and link it to future-force work that the rest of CNA did, the key notion there was to apply measurement of current operational performance to future planning problems. CNA was substantially able to bridge that gap by using people experienced with field assignments in the fleet and sending such people to work on future forces analysis.

Bob Sheldon: What did you do after your 16 years in OpNav?

Bruce Powers: I retired from full-time work in 2001, and shifted to part-time work that was almost all teaching, but some consulting. I retired a month after 9/11, and was in the Pentagon when the airplane hit the building.

Bob Sheldon: Which side of the Pentagon were you on when the airplane hit?

Bruce Powers: I was 100 yards from where the airplane hit the building, but fortunately, not on the path that the airliner was on. It sliced into the Pentagon from its outside edge, but I was not on the path, so therefore not hurt, although my office was beat up pretty badly in the two days of firefighting that followed.

Bob Sheldon: What kind of courses did you teach?

Bruce Powers: Analysis. Basically, I passed on what I had learned over the years to younger folks—graduate students. I did and do this in two principal places. Over six winters, I went to NPS to teach a course in campaign analysis there. And, since 1993, I've taught analysis at GWU. Once I retired from OpNav, I increased my course load, and I continue teaching there to this day.

Bob Sheldon: Let me back up to your involvement in professional societies. Were you also involved in the Operations Research Society of America (ORSA)?

Bruce Powers: Much less in ORSA, although I attended a couple of their meetings. Most of my professional society activity was with MORS, where I attended about one-third of the meetings over the decades, and led working groups (naval warfare and other kinds of analysis, aviation) on maybe five to seven occasions.

Bob Sheldon: When did you first go to a MORS Symposium (MORSS)?

Bruce Powers: My first meetings were in the 1960s, when I was a quite young analyst, and

was guided to MORS by people like Erv Kapos, my boss then.

Bob Sheldon: The working groups that you led, were those at the annual symposium or at the workshops?

Bruce Powers: Typically at annual symposia, and they were, as I say, either on naval warfare or aviation, and once even in command and control.

Bob Sheldon: What kind of work did you present at MORSS?

Bruce Powers: Work that I had done on, for example, rescue of downed aviators, including significant focus on communications. In that case, it was very operationally focused, not technologically focused. So helping people understand operational issues as revealed in combat analysis in the case of downed aviators was helpful to them, because they wanted to turn technological tools to these problems of operational performance.

Bob Sheldon: What was your personal value added for going to MORS?

Bruce Powers: Getting to know colleagues and seeing how other people approached problems helped me over my career. I don't bring preconceived notions about the right tool to use on an analytical problem, and this was inculcated in me as a youngster in OEG. Fitting a tool to the problem is far better than finding problems that fit your tools. I was on a constant quest always to understand different ways to analyze and solve problems. So developing my range of tools was a personal quest of mine. MORS helped a lot with that. And MORS's classified setting increased the aperture for that.

Bob Sheldon: A wrap-up question: what advice would you give to a young analyst on how to become a better analyst?

Bruce Powers: It would be to come to understand operations and do all you can to get out where operating forces actually do their thing, and measure performance. Examine operations and especially combat carefully because the data can be ambiguous. The rewards are lasting from getting this right.

In the first 15 years of my career, I was very fortunate to spend a total of two years working aboard warships as a civilian analyst. There is no substitute for such experience in the messy

world of real operations and doing analysis in it. Invaluable.

Mike Garrambone: How did your academic background in chemistry help you as an analyst?

Bruce Powers: Chemistry taught me the scientific approach, and that is to be open-minded and even-handed about the competing alternative solutions to your problem. It's OK to develop hypotheses, but data must bear them out. Measuring performance and understanding it will help you see what the right answer is to selecting amongst competing alternatives, and applying a reverence for data that comes from chemistry experiments helps in figuring out what military operational performance is.

Mike Garrambone: You worked at various levels—the tactical level, the operational level, and you worked at the strategic level of analysis. And you were able to transition and bring insights from one level to the other. Can you talk about that?

Bruce Powers: Starting out doing work at the tactical level was crucial to my development as an analyst, because I gained reverence for the importance of data and measuring performance before I did anything on a more speculative level, so that as I moved later on to designing research programs for analysis, and ultimately advising the Secretary of Defense on the issues that you might call strategic, I had this grounding in the importance of actual measurement of performance, and realized that when I was speculating about the future, how uncertain that was, and therefore transmitted my views

about that uncertainty to the consumers of my work.

Mike Garrambone: Any parting shots or any questions we should have asked?

Bruce Powers: I probably should elaborate that in my time working in N81, the Navy's analysis shop, I also developed a capability for joint campaign analysis by the forces of all of DoD to illuminate issues for Navy planning. Joint campaign analysis, which tapped the understanding available from all the Services and all the analytical arms of the Services on performance, so that we could stitch together ways in which campaigns would evolve, and examine the performance of naval systems in that context. And the broader context brought much better understanding of what the appropriate procurement choices would be for the Navy in the development of forces it would use in such campaigns. That capability exists to this day, the joint campaign analysis. And it's why I ended up teaching it later in Monterey at NPS.

As I matured as an analyst, I took more of a mentoring role. Bringing along younger analysts—both uniformed and civilian—grew increasingly rewarding and, I hope, productive. For civilians I mentored, this was important. Civilians working in military-dominated staffs don't have the career development support that uniformed members do.

One last tip for analysts starting out: get to be known early for a particular analysis or two that you have done.

I loved my career, and would do it all over again—for half the pay.