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Andrew G. Loerch Interview (MORS)

Loerch, Andrew G.

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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.

Dr. Andrew G. Loerch was President of MORS from 2004 to 2005 and was elected a MORS Fellow of the Society (FS) in 2008. Dr. Loerch received the MORS Wanner Award in 2011. He is currently associate professor of military operations research at George Mason University (GMU). This interview was conducted on two separate occasions: May 23, 2006 at LMI, McLean, Virginia; and June 21, 2011 at the Naval Postgraduate School, Monterey, California.

MORS ORAL HISTORY

Interview with Dr. Andrew G. Loerch
May 23, 2006 and June 21, 2011
Mr. Bill Dunn, FS, and Dr. Bob Sheldon, FS,
Interviewers

Bob Sheldon: We're here at LMI to interview Andy Loerch. First of all, give us your parents' names.

Andy Loerch: My parents were George Loerch—my middle name is George—and Claire Loerch, formerly Bultmann.

Bob Sheldon: Where were you born and raised?

Andy Loerch: I was born and raised in Williston Park, New York. Nobody's ever heard of it. I always tell people I'm from Mineola, which everybody has heard of because it's a stop on the Long Island Railroad. I lived there all the way through college.

Bob Sheldon: What did your parents do and how might they have influenced your career choice and academic choice?

Andy Loerch: My father was a steelworker; my mother was a secretary. Nobody in my family had ever gone to college before. I think my father really wished he was an engineer so he influenced me to do that and, in fact, that's what I did. I was a mechanical engineer as an undergrad, although I would have been a lousy one because I really didn't have a real intuition for it.

I ended up doing mostly thermodynamics, heat transfer, combustion, all that stuff. And it was telling me something; that

I'd rather do something a little more abstract and mathematical than mechanical design.

Bob Sheldon: Let's back up. Where did you go to grade school and high school?

Andy Loerch: I went to grade school at Cross Street School, which is right across the street from my house. That was really convenient. The bell would ring and I would walk out the door. Then I went to high school at Mineola High School. I don't know if anybody famous went there. Carl (Rollie) Stichweh was the quarterback for Army in the early 1960s; he went there. Then I went to the Polytechnic Institute of Brooklyn, now known as the Polytechnic University of New York, as a mechanical engineer undergrad and Reserve Officers Training Corps (ROTC).

Bob Sheldon: Where did you first pick up your interest in mathematics or engineering?

Andy Loerch: In high school. They didn't have the number of advanced placement (AP) courses that they have now. I took AP calculus in high school and did okay. I thought about being an optometrist. I thought that would be cool because when you go to an optometrist, they don't hurt you and you walk out instantly cured. It seemed like they make pretty good bucks. But I decided just to become an engineer.

Bob Sheldon: Did you live on campus or did you commute?

Andy Loerch: I commuted from Long Island right outside of Queens' border into Brooklyn and back. I think I took the train once in four years. So it was a lot of driving.

When my brother was deciding where to go to college, he was accepted at Hofstra, which was a local university. He was also accepted at the University of Dayton. He asked me where I thought he ought to go. I said, "Go away, man. This commuting stuff stinks." But I stayed home for 22 years and when I left, I left—went right into the Army and that was it.

Bob Sheldon: Were you on an ROTC scholarship?

Andy Loerch: No, I joined ROTC as a walk-on. A friend of mine from high school was going to Georgia Tech on an ROTC scholarship and we had talked about it. Of course, this was in 1970 when I was a freshman. They sent you all of this recruiting literature, because it was the fall after

Military Operations Research Society (MORS) Oral History Project Interview of Dr. Andrew G. Loerch, FS

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Kent State and ROTC was not a real popular thing to do at the time. But this buddy of mine was doing it and I said, "Well, what the heck. As a goof, I'll join ROTC."

My grades were pretty good, better than practically everyone else in my ROTC class. Every year they'd offer me a scholarship and every year I'd say "no" because, hey, I didn't want to be in the Army for four years. I never took it. My father rolls over in his grave every time I mention that, but still I had no intention of having a military career.

Bob Sheldon: You liked thermodynamics. Were there any other mechanical engineering subjects that excited you?

Andy Loerch: No, there were a few that didn't, like mechanical design. That was certainly not my cup of tea so I did all my electives in thermo.

Bob Sheldon: How did you decide to go active duty in the Army after you turned down those scholarships?

Andy Loerch: I had stayed home all through college, and I had originally thought about going in the Reserves. Vietnam had just ended in 1973 so that really wasn't an issue at that point. But I said, "Gee, I've been home all this time. A couple of years away would probably be a good thing."

I figured I would serve for two years, but then I got offered a Regular Army commission; two years, three years, what's the difference? So I took it, with the idea that I'd go in and do three years and then I'd come back to New York. That would be it.

Bill Dunn: What branch did they sign you up for?

Andy Loerch: My first choice was Field Artillery because when I went to ROTC summer camp, I thought the coolest thing in the universe was to be a forward observer. I just thought that was really great. I also applied for Corps of Engineers because Brooklyn Poly was an engineer-specific school and I figured I'd get that for sure.

Air Defense and Ordnance were my third and fourth choices because there were four lines on the form. They gave me Ordnance and I would like to think it was because I was a mechanical engineer, but I know that that's not really true.

It was really luck that I was given Ordnance. But back then, if you were in a Combat Service Support branch, you did a two-year detail in a Combat Arms Branch, and my detail was in Field Artillery. So I did get to go to Artillery School and I did learn to be a forward observer. But then I got assigned to a basic training unit and did my entire detail in that unit and never fired a round. That's the way that goes.

So then I was a mechanical engineer and never did that and an artillery officer and never did that. I was on a roll.

Bob Sheldon: What was your first duty assignment?

Andy Loerch: Fort Ord, California. It was right in Monterey. They assigned me to B-5-3, Bravo Company, Fifth Battalion, Third Basic Combat Training Brigade to be a training officer in a Basic Training Company. And boy, the hours for that were unbelievable. I would show up really early, about 0415. There were three people in the company that could open the arms racks; the First Sergeant, the Company Commander, and me. So who do you suppose is going to do it and issue the weapons? I would have to show up to open all the weapons racks for 250 weapons, issue the weapons, and then take them back at the end of the day. Typically I'd work from 0415 until 1900, 2000, 2100 at night.

The training cycles were seven weeks long, and the first three weeks the trainees were not given a day off. I had to work seven days a week. The rest of the time we didn't train on Sundays. So it was a nasty job is what it all boiled down to.

Bill Dunn: So you went to Ordnance Basic at Aberdeen?

Andy Loerch: No. I went to Artillery Basic because I was detailed to Artillery. Around that time the 7th Infantry Division had moved into Fort Ord. The training base was closed. They moved me to the 707th Maintenance Battalion and then I talked them into sending me to the military occupational specialty (MOS)-producing part of the basic course for Ordnance.

I ultimately ended up in Aberdeen but it wasn't until I had just turned first lieutenant. There were two parts of Ordnance Basic course. There was the general part that everybody did

and then they broke you up into groups with particular specialties. I was an armament maintenance officer to start with.

They sent the missile guys to Huntsville and they had the tank and automotive guys at Aberdeen, the armament guys at Aberdeen, and I guess that was pretty much the breakup. So I stayed at Aberdeen only for that second part of the course. It was about three months long.

Bill Dunn: The Army Materiel Systems Analysis Activity (AMSAA) and Ballistics Research Laboratory (BRL) and other high-power analysis agencies were at Aberdeen, but did you even know about them while you were there?

Andy Loerch: I didn't even know they were there. But right before I left California to go to the course at Aberdeen, a friend of mine from college, Raul Torres, came to Monterey to study OR at the Naval Postgraduate School (NPS). He was a smart guy and he got a fellowship out of college to go to graduate school. He did one tour with the 82nd Airborne Division and then they sent him to NPS while I was at Fort Ord.

He called me up one day and said, "I'm coming out there. Do you want to share an apartment and split the rent?" Neither one of us was married at the time. I said, "Well, sure. What are you going to do?" He said, "I'm going to the NPS to study OR." I said, "What's that?" And it sounded cool.

He came out there and right before I went to Aberdeen, we moved into an apartment in Monterey. OR sounded really interesting when he described it, and then I went off to Aberdeen. While I was at Aberdeen, I went down to the Military Personnel Center (MILPERCEN)—it is called Human Resources Command now. It's had several names over the years.

I went down there and talked to the branch guy and I said, "I'd like to go to graduate school." He said, "Well, sonny," (I had just made first lieutenant and I hadn't commanded yet) "in order to do that, you have to go to advanced course. You've got to successfully command. You probably have to go overseas. We'll have to talk about this sometime in the future." Okay.

I went through the course and I went back to Fort Ord. There was a company coming open

and there were two captains in the battalion who hadn't commanded yet. The Battalion Commander brought the first one in and offered him the command. The guy didn't take it and, in fact, resigned rather than take it.

So he brought the second one in. Same thing; he resigned rather than take it. The only officer who outranked me left in the battalion who hadn't had a company was this humongous, fat, 300-pound lieutenant who had been fired from the job that I had at that point. So he wasn't an option.

I got back from Aberdeen and my boss at the time, MAJ Mike Krause, who was a materiel officer of the Maintenance Battalion, said, "If the Battalion Commander offered you A Company, would you take it?" Well gee, I was still on my first three-year obligation. I said, "Sure. I have to be here anyway." So here I was getting ready to take command.

I called the assignment officer back up at MILPERCEN and said, "I'm taking command. Let's talk about graduate school." And the guy said, "Well sonny, you've got to get some efficiency reports here and make sure you're doing a good job." At least I got command early as a first lieutenant and then ultimately, I did get to go to graduate school right after that.

I went to graduate school the first time very early in my career. I had just made captain. I'd just finished the Ordnance Officers advanced course at Aberdeen.

Bill Dunn: Sounds like A Company had a reputation of being a tough company to command.

Andy Loerch: Actually, it wasn't at all. The reason they needed a new Company Commander was they were moving the previous one from A Company, a Forward Support Company, which was a fairly small company, to a Heavy Equipment Maintenance Company—HEM Company—which was almost as big as a battalion. It had 400 people, and they just needed to backfill him in A Company. My company only had 120 people but it went to the field a lot. These captains that refused it; they just chickened out, I guess.

Bob Sheldon: This was before the All-Volunteer Force kicked in?

Andy Loerch: No. The All-Volunteer Force had kicked in and it was a bad time. It was

definitely a bad time. Lot of drugs, lot of other bad things going on. This was in the 1976–1977 timeframe.

Bob Sheldon: Did the problems you had to deal with affect the people in your company?

Andy Loerch: Oh, sure. I think that everybody had problems at that time. There was a lot of that, but I was pretty lucky. I had a good Battalion Commander so if I sent somebody down for a field grade Article 15, he hammered them. And I had good noncommissioned officers (NCOs) and a couple of really good warrant officers. That made life a lot easier.

The leadership in the company was good but it seemed like when I first got there, it was a pretty rough group of soldiers. Eventually they rotated out and were replaced by very good soldiers and good mechanics who could fix anything. They were the kind of kids who would work on their cars all day on Saturday. This is what they wanted to do.

It was always my management theory that people act the way you treat them, so I tried to treat them like adults and hoped that they would act like adults. Then if they didn't, I'd punish them severely. It worked out pretty well. It was a good company and we got really good at going to the field.

I think a lot of maintenance companies don't go to the field a lot and aren't good at it. But if you go, you practice and you get good at field duty. You train pretty hard though. It was the best job I ever had in my life. I cried when it was over. I think everybody does, because at the end of the year and a half or so, it's really your company. That was a great job.

Bob Sheldon: So at the four-year point, you went to the Naval Postgraduate School (NPS)?

Andy Loerch: I went to the advanced course first. I went back to Aberdeen for nine months and while I was at it, I got married and then we came back to NPS in March of 1979.

Bob Sheldon: You met your wife at Aberdeen?

Andy Loerch: Actually, she came to California on vacation and mutual friends introduced us. When I got sent back to Aberdeen, she was working for the United Way. They sent her to Reading, Pennsylvania, which is only about an hour and a half drive from Aberdeen—unless you get stuck behind an Amish individual in a buggy and then it's longer than an hour and

a half. It's one of those coincidence things. We got married at the end of the advanced course.

Bob Sheldon: What was your curriculum like?

Andy Loerch: It was the Army curriculum. We only had 18 months. The Navy guys got two years. We didn't have an experience tour, but we had pretty much everything else and we still had to write a thesis. So it was pretty intense.

Bob Sheldon: Who was your thesis advisor at NPS?

Andy Loerch: Jim Hartman. He was as good a teacher and as good an analyst as I've ever seen. I picked him as my advisor because I knew he would be available. I also knew he'd be hard, but I picked him because I knew he'd be helpful. That's the way I try to do it with my students now; to be available and responsive to them, but to insist that they do a good job.

There were other guys who were easier, but they were also harder to find. So ultimately, your thesis experience was worse. He was great. He unfortunately passed away from leukemia in 1986 right before I went to Cornell. So it was a little tough to get the recommendations I needed to apply.

Bob Sheldon: Any other professors from NPS that impressed you?

Andy Loerch: There were several. I've kept in touch with Jerry Brown over the years. In fact, for the book we're writing, Jerry Brown and a couple of the other professors there collaborated with me on the chapter on Capital Budgeting. He's a huge expert on the subject.

Sam Parry was my second reader for my thesis at NPS, and I've kept in touch with him over the years. In fact, when it came time to apply for the doctoral program and I needed recommendations, Sam and Jerry along with Don Barr, who's also active in MORS, and who later ended up as a professor at West Point, helped me out.

There was a great faculty there. It's a great program. I try to make the experience of Army students that come to our program at George Mason University (GMU) as much like NPS as I can.

Bob Sheldon: What was your thesis topic?

Andy Loerch: At the Ordnance Officers advanced course in 1978–1979, not long after a couple of the wars that Israel fought, the maintenance philosophy in Israel was to fix the tanks as far forward as possible, turn them around, and get them back on the battlefield.

So that's what they were teaching in the course, at the time. I had just commanded a Forward Support Maintenance Company, and my question was "How far forward is forward?" If you put mechanics on a two-way rifle range you're going to lose your maintenance capability if the conflict lasts too long.

You're going to attrite your maintenance unit plus the fact that there's only a certain amount you can do without the semifixed infrastructure that you need to do some of those repairs. So my question walking in the door was, "How far forward is forward?"

Basically what I did was simulated my own company. I had a lot of functional area knowledge of the subject and that facilitated data collection, and then I wrote the simulation in Simscript II.5. It turned out that probably as far forward as you'd want to get with third shop maintenance was about to the battalion trains. Otherwise, you start to get into artillery range. You start to get into other places where you attrite your maintenance forces.

I think it was unusual to have a student walk in with a thesis topic in mind because you had to know enough about OR and what it was used for. I learned that from rooming with my buddy who was going through the NPS OR program, and I had an idea what you could do with it. So that was my thesis topic.

Bob Sheldon: Did you sell it to anybody in the active force?

Andy Loerch: No. We briefed it often. There are always generals and high-level people that come through Monterey. They usually go there to play golf, but then they have to come listen to the students talk about their research. We had ample opportunity to brief it. But there really weren't a lot of takers and my next assignment was Concepts Analysis Agency (CAA), now called Center for Army Analysis. I did bring it there but they weren't operating at that level, so I never really got to sell it. But I thought it was a pretty decent piece of work.

Bill Dunn: I think that is somewhat unique because I know in the past, NPS and other schools were always out shopping for thesis topics and they'd come around and hit us up for potential topic candidates.

Andy Loerch: Yes, absolutely. At that point, Sam Parry and Ed Kelleher and a few other folks out there had a very active research program going on using a model also written in Simscript called Star. It was a research model and they had a lot of very interesting innovative parts of it. They used to grab the Army students and they'd carve a thesis out of enhancing it. Many of the Army students at that time did their theses working on pieces of Star.

But I doggedly hung to my problem that I showed up with. I remember one time General Starry, who was the commander of Training and Doctrine Command (TRADOC), brought with him the Quartermaster General of the British Army to listen to our presentations. He was particularly interested in logistics topics. I was really the only one that had a logistics topic at that point so I'm sure they were glad that I did it.

Some of the faculty would have preferred that I take a piece of the Star research, but I guess I was just a difficult student.

Bob Sheldon: Did working on the combat simulation help you get a job at CAA or was that a default assignment?

Andy Loerch: It's a funny thing because my wife wanted to go to school at Gallaudet College (now University) in Washington and I was a fairly junior captain. I hadn't been overseas yet so I wanted to manipulate the system to get to Washington. I filled out a dream sheet that said, "I volunteer for Europe as my first choice. My second choice is Washington." I knew at that point, there were only two 49 slots in Europe. One of them had just been filled because my buddy was assigned to Heidelberg.

So I knew that there was a slim chance of actually going to Europe, and indeed the assignment officer called me up at home and said, "Sorry. I tried but I couldn't find you a job in Europe, but I have three opportunities in your second choice in Washington."

One of them was the Program Analysis and Evaluation Directorate, Army PA&E. I had no idea what they did there, but it sounded cool.

It was in the Office of the Chief of Staff of the Army. One of the others was CAA, Concepts Analysis Agency at the time. The idea of working in the office of the Chief of Staff sounded good so I called them and they said, "Well sonny, when did you finish Leavenworth?" I said, "I just finished the advanced course." "Call us in a few years after you get to Leavenworth because that's all we take here." He meant that you had to be a graduate of Command and General Staff College (CGSC) to get an assignment there.

I called up CAA and found out that they did all kinds of technical things and I said, "That sounds even better." I accepted the job with CAA.

When I got to CAA, they were working on the Combat Sample Generator (COSAGE), which they still use. Basically it was a feeder model to the theater campaign model. Of course the model has been modified and enhanced continuously over the years. It was written in Simscript. So here I was; I had done my simulation, my thesis, in Simscript and I walked in there and they said, "You're going to work on this." So that's what I did for the first three years I was in CAA, working on COSAGE, both in development and using it for studies for the first time.

Bob Sheldon: Did you go to the Staff College as a resident?

Andy Loerch: I went to the Armed Forces Staff College (AFSC) as a resident after I finished my doctoral program. My follow-on assignment from AFSC was an Army Educational Review Board (AERB) slot at CAA for three years.

Bill Dunn: That was pretty late in your career.

Andy Loerch: Right. I was early in my career to go to the advanced course and late to go to Staff College. I got deferred because I got picked up for CGSC at the same time that I got picked up for graduate school the second time.

Bob Sheldon: Who were the notable people you worked with at CAA your first time around?

Andy Loerch: There were some interesting people at CAA, some of whom are still there. My boss was Colonel Richard Fickett. He ran Requirements Directorate; there isn't a Requirements Directorate anymore. He was a very hard guy, but he got the studies done. When first I

got there, a two-star general by the name of Atkinson was in charge of CAA and he was actually an intelligence guy. He didn't really influence things a great deal.

There was a civilian technical advisor who did a lot of the interface with the Pentagon. I worked with Jim Kramer. I think he still works for Unisys; great programmer. The two of us, two captains, owned the COSAGE model.

There was no configuration control. If we had an improvement to make, we would make it. Jim ran the direct fire side; I ran the indirect fire side. We had that model running and knew it, every line of code in it.

Bob Sheldon: You documented all this, too?

Andy Loerch: Actually, we did. If you look back at the first study that I participated in at CAA, a lot of documentation was done. I was the editor of it. It was the last developmental effort for the new methodology for determining wartime requirements. It was called WARRAMP Phase 5. They were very big on documentation of studies back then, of all kinds of studies.

Typically, unlike today, the studies were long term. There were a lot of people involved and they would be documented in great detail. So indeed, we did document it. As far as documenting the model, there was actually pretty decent documentation and, although we didn't document it line by line, we did document it at least routine by routine and described the inputs and all this other stuff. It was pretty well documented and I think it really goes to the change in the whole way that we do business as a community. Back then we spent a lot of time on documentation, both models and of studies but we don't do that anymore.

Bill Dunn: At that time, CAA was in Bethesda on Woodmont Avenue. I always thought that was an interesting building, with an entrance level on the seventh floor.

Andy Loerch: Seventh floor, right. You came in and you parked in a parking garage next to CAA. It was like lemmings—at 9:00, they started to enforce the meters in the parking garage. At 9:00 everybody at CAA went out to feed the meter unless you had a carpool pass. Everybody would go down there and do that and come back up. It was a cultural thing. Later I found a place about half a mile away where you could park on the street because I always

got to work really early. Then you would save the 80 cents to park there. If you add it up over a whole year you saved some money.

They had these extraordinarily slow elevators that would take you to the seventh floor where the guard's desk was, and that's where you would sign in. CAA expanded during the time I was there and there were actually two buildings hooked together. One of those went all the way down to the third floor, but you couldn't get to the third floor except through the seventh floor of the other building. It went all the way up to the ninth floor where the headquarters was.

I was there when Dave Hardison came. They had a two-star general commanding the place. Then Hardison came so they had a Senior Executive Service (SES) in charge of the place with a one-star deputy, Brigadier General Hugh J. Quinn and he was a great guy. He was a runner and I was a runner. All the runners would congregate in the one bathroom that had two showers in it. Everybody got to be real close friends.

That's how Quinn would find out what was going on. He'd talk to the runners in the bathroom. CAA was definitely a different kind of place. It was half civilian and half military. When I got there, they had about 150 military and 150 civilians; the whole agency was about 300 people.

They had flextime and compressed time, so you could work 10 hours a day for nine days and you got the tenth day off. The way it really turned out was you worked 10 hours a day every day, except for the people that weren't doing anything. They were the ones who were getting the days off, but that's the way that always works. After Hardison got there, he looked around and he called enough people and was told, "This is their compressed day," that he got aggravated about it and got rid of all that and made everybody come to work every day.

I don't think I got more than two compressed days off ever in the whole time I was there the first three years. But it was really different from being in a troop assignment.

Bill Dunn: When you had to go down to the Pentagon, how would you go?

Andy Loerch: I would drive because at that time—this was from 1980 to 1983—there was

no Metro that went up to Bethesda. The real pros at CAA knew the super secret back way through Georgetown rather than take the Beltway all the way around and George Washington Parkway. You would cut through the neighborhoods but you really had to know the way. Somebody had to show you how to get to the Pentagon the first time.

We had to go to the Pentagon fairly often. In briefings you had to wear the Class A uniform at that time. That's where I met E. B. Vandiver for the first time. He was the Technical Advisor to the Deputy Chief of Staff for Operations and Plans (DCSOPS), and he used to sit in on a lot of the briefouts of studies. He would ask a lot of questions and he was a notable individual.

Another guy that always used to come to the briefings of the studies and used to represent TRADOC was Seymour Goldberg; he's very well known in the Army analytic community. He was the guy that TRADOC Analysis Center (TRAC) would send all over the place to any study that affected anything that they did and he would also ask hard questions. We ultimately sold him on the idea of COSAGE and he really liked it. So he became an ally ultimately, but the first few times we briefed him were pretty rough.

Bob Sheldon: Toward the end of your CAA tour, did you actively apply for graduate school?

Andy Loerch: No. In fact I had seriously considered getting out. My wife was finishing up graduate school and she wanted to stay. I had a four-year obligation and a three-year tour and she wanted to stay at least long enough to be able to work once she was finished.

So I put in a request for an extension, which for just about everybody at CAA was a rubber stamp. The Chief of Staff of CAA, COL Chuck Curry, came down a little while later and he said, "I don't know how this happened but here it is." The response was rather terse. "Paragraph 1. Disapproved. Paragraph 2. You'll be in Germany in September."

They had me. I was still obligated so I couldn't get out, and as soon as I set foot in Germany I owed 5/6 of another three-year tour. So that's where I ended up. During that time—this was about nine months from the

day I was to accomplish permanent change of station (PCS)—I gave this four-hour briefing on data needs in preparation for a big requirement study. People used to come from all over the place, from all the TRADOC Branch Schools, because they're all interested in how much ammunition and other equipment their units would get.

We had a representative from United States Army Europe (USAREUR), a colonel who came from USAREUR headquarters, from Deputy Chief of Staff for Logistics (DCSLOG). Somebody said, "You ought to go talk to that guy and see if you can get a job." I did and he said, "Can you program a computer?" I said, "Yes. That's what I do all day."

They had this special project going on in USAREUR at the time. They were redoing the logistics management system and he said, "I'll get you a job doing that." In fact, they went as far as to change the Table of Distribution and Allowances (TDA) from a quartermaster slot (Specialty Code [SC] 92), to an ordnance slot (SC 91), so that I could be in it. I said, "Okay." Periodically I'd call USAREUR DCSLOG and say, "How's it going?" "Oh, fine."

Finally I called and it was only a couple months from when I was due to arrive there, and they said, "It fell through." I said, "Where am I going?" He said, "I don't know. You're going to have to call 1st Personnel Support Command (PERSCOM) and ask them." I called PERSCOM and he said, "You're going to 21st Support Command, and ultimately to the 60th Ordnance Group," which was an ammunition unit. I said, "What? I'm a card-carrying maintenance officer." I was getting to be further along as a captain now. I would have liked to be a materiel officer at a maintenance battalion or something like that.

And I had every intention of doing the dual track, alternating between SCs 49 and 91; and here they send me to this awful job to be the maintenance officer of the 60th Ordnance Group. Most of their equipment was commercial and I was thinking, "This is awful. This is the worst thing that could possibly happen." But it turns out it was in the exact same place—it's in Zweibrücken—exactly where 200th Theatre Army Maintenance Management Command (TAMMC) is, where USAREUR DCSLOG is doing this logistics software project.

And I'm saying, "Right church, wrong pew. I'll get there and they will just send me to the place I wanted to go." No. I was in the 60th Ordnance Group and the first seven or eight months I was there, I was a maintenance officer. This was a weak job and I was thinking, "My career is over." But then my boss, who was the S4 (Logistics), rotated out and they said, "You're going to be the S4." This wasn't so bad.

It was a brigade-level principal staff job, plus the fact that it wasn't a terribly stressful job. The ammunition business was kind of boring. We had \$4 billion worth of ammunition in the ground, and sometimes we put in a little new ammunition, and sometimes we took some of the old ammunition out. Sometimes we moved it from one place to another, and sometimes we counted it. That's pretty much it.

But I didn't have anything to do with that. I was S4 and was in charge of maintenance, supply, and food service for the group. I never went to the field—our General Defense Plan (GDP) was a cave in Pirmasens and it wasn't like being in a division in Europe back in the 1980s. Those guys were in the field all the time. I never experienced that, but I did get to travel a lot and had a really good time.

A couple of interesting things happened there. Arguably one of the best pieces of analysis I ever did had to do with containerization of ammunition. LTG Bruin was the commander of 21st Support Command and he had just come from Military Traffic Management Command (MTMC) where they'd built this huge container facility. As a result, he was pushing containerization of ammunition. He wanted to make use of this facility.

The Army's machinery to move containers around was the 50 thousand pound Rough Terrain Container Handler (RTCH). It looked like a giant forklift. The Germans wouldn't let us use it at the railway stations because it tore up the ground, it was so huge. After all, it was picking up a 20-foot container full of ammunition. So you are talking about a lot of weight there.

We had to buy—and it was part of my responsibility to do this—these commercial pieces of equipment called side loaders that would pull up alongside a rail car, pick the container up, either carry it some place, put it onto another

conveyance, or put it on the ground. We had to buy a bunch of these loaders.

And the question was asked, "How many containers can we move if we buy this many of these loaders?" My boss, the S4, was a helicopter pilot. He could barely add a column of numbers, and he came up the stairs and said, "You've got to help me." I said, "It's an OR problem." NPS let us keep our TI-59 programmable calculators. There were no computers. This was in 1983-1984—the Cold War era.

It turned out that my boss had done his CGSC nonresident project on containerization. He had all the data. He had the whole description of the system. It was easy and it all boiled down to a few equations and a few unknowns. So I built this model on my calculator, and I looked at it parametrically because I had more unknowns than equations.

I built this matrix and said under these circumstances, this is how many we could move. Ultimately, if everything went perfectly we could move a thousand containers a day or so, which was the goal. I showed it to my boss and he said, "Wow, that's great." I put together a briefing and he left and went on leave to Spain. He wanted to get away. I briefed the Group Commander after I put together an analytical type briefing like the ones I had done for three years at CAA.

I knew what an analytic briefing was supposed to look like so that's what I built. It had the purpose and problem statement, assumptions and limitations, methodology, results, and then some kind of conclusion. That's what I did and I wrote it on butcher paper because that's the way the Commanding General liked to see it. We didn't do PowerPoint back then.

I'll never forget this. I was standing there with the Group Commander, Colonel Brailsford, who was later the three-star deputy at Army Materiel Command (AMC), briefing him on this. He got to assumptions and limitations. Obviously in order to do this, you had to make a whole bunch of assumptions—things like the Bundesbahn (German railroad) could not be interdicted. It was assumed that they would find some way around whatever problem they encountered, a huge assumption in that day and age.

There was a whole page of assumptions. He looked at that and said "We're not going to show this." I was shocked because it's unethical to not show that page. "Oh, no." He briefed it. The briefing went great, and I wish I had it now because I would use that as a case study in my class. It was a very nice military OR problem. Of course what happened then was that I got calls from the USAREUR Operations Research Systems Analysis (ORSA) Cell. "You've got to come here." I didn't want that because I wanted to go back to a 49 assignment when I got back to the States and I wanted to stay on the operational side while I was in Europe. So I warded them off my entire three years and I never worked with them.

Bill Dunn: I was in the USAREUR ORSA Cell about that same time working for LTC Jim Malley in 1983-1984. Also at that time, General Otis was Commander-in-Chief (CINC) USAREUR. He's a good analyst as well. Did you ever get a chance to interface with him?

Andy Loerch: I met him but never got to talk about analysis, and of course I wasn't doing any, except for that one occasion. I guess you always are doing analysis, once you're an analyst. But that was the only explicit piece of analysis that I did in the whole three years.

Bob Sheldon: Living in Germany, did you study some military history?

Andy Loerch: No. I was never hugely interested in that. E. B. Vandiver at CAA used to have this huge military history program and still does. We used to go on trips and look at Civil War battlefields, do terrain walks. The guy that they had running the military history program at CAA was Mike Krause. He was a retired Army colonel by that time, and he was my boss that I spoke of earlier at Fort Ord. It's a small world.

I did learn to speak German pretty well. My wife and I both worked pretty hard at that. And we did travel around a lot. But I was never much into military history.

Bob Sheldon: Coming to the end of your tour there, were you looking for a 49 job?

Andy Loerch: Yes. I was hoping. I figured I'd either end up back at CAA or at TRAC and that was on my dream sheet. There was always the possibility of getting out again. But the month before the end of my obligation from the PCS,

I got a letter in the mail. It said, "Congratulations. You've been selected for fully funded graduate school."

I said, "Isn't that weird? How did they fail to notice that (a) I've already been to fully funded graduate school and (b) I didn't ask for this?" The letter came from ordnance branch. Then I read on and said, "Oh, it's for a PhD. That's hard. I don't know if I really want to do that." I was concerned about it because I had seen some pretty ugly things that went on with PhD students at NPS.

Also, it wasn't considered career enhancing at that time. You're going to be out of the net for three years. I talked to my wife about it. Attempting to get a PhD was always something I really wanted to do, but I thought I'd end up doing it after I retired. So I called up branch and said, "What's this?" And he said, "Yes, we've got a slot and you were coming out at the right time and you were qualified so it's yours if you want it."

I said, "Okay." He said, "Then apply to three schools. We'll pick the one you will go to. Take the Graduate Record Examination (GRE)." I rushed off and did that. My wife was working at the education center on Zweibrücken Air Base across town. She made a list of about a dozen places that had PhD programs in OR, Cornell not being one of them at that point.

I had this big office full of people with a couple of secretaries, and we mailed off a dozen letters to all these schools and requested catalogs. When they came back, I looked to see where their faculty had gone to school, and there was always somebody from Cornell on every faculty in OR. So I said, "Wow, that'd be great because my mother still lived in New York. My in-laws lived in Pittsburgh. The Yankees were on television in Ithaca. That's the perfect place."

So I applied to Cornell. I also applied to Case Western and NPS—at least I thought I did. I sent a letter to Jim Hartman saying, "This is going on. I need some recommendations, etc." I never heard back. It turned out he had leukemia. Finally I heard from Sam Parry and he and Jerry Brown ran the process for me and did all that administrative work to get me approved by the department to come back and get a PhD.

They called the administration at NPS and said, "He's okay." And the NPS administration said, "Who?" It turned out the Army has to apply to NPS. You can't do it yourself, and they failed to do it even though I told them that was what I wanted to do. So somebody from the administration at NPS called up PERSCOM and said, "What's the deal? Are you going to apply this guy or not?" Apparently he was very abrasive about it and they said, "No."

So that took care of NPS. I had applied to Case Western. I knew how long it took for a letter to get from Germany back to the States and I figured it must have been 30 seconds after they got that letter that they accepted me. You worry about that—it was too easy.

At Cornell, they didn't accept me right away, and they made me wait. Finally I called and they said, "You're accepted." So the Army said, "Yes, you're going to Cornell," after they got that call from NPS. That's how I ended up at Cornell. And that was a shock because I showed up there and I was the stupidest guy in the place. There were nine people in my class and, man, they were smart. It turned out 180 people had applied and nine were accepted. I never asked the question, "If Uncle wasn't paying my freight here, would I have been accepted?" You don't ask questions you don't want to hear the answer to. And I found Cornell very difficult.

Bill Dunn: Were you the only military?

Andy Loerch: At that time I was. But there had been one right before me. In fact, at the end of my first year, I met this guy at the pool at the YMCA and we swam in adjacent lanes. Then I went to see my advisor and the pool guy turned out to be Bob Sheldon. He was back to participate in the graduation ceremony because he had finished the year before I got there.

I spent the day with Bob Sheldon and we walked around campus. He told me who was good to have on your committee and totally squared away my act. So a week later I had my committee all set up, pretty much based on the recommendations he made.

Of course, we had the same advisor. It was Jack Muckstadt. Jack was a retired Air Force colonel although he did most of his time in the Reserves. Narahari Prabhu, the famous

queueing theorist, was on my committee. After that things got better.

I still had some difficulties. The second year in the OR PhD program, you take the qualifying exam in January, and then they have four options based on your performance on the exam. These options were “You pass,” “We’d like you to come back and do an oral qualifying exam,” “We’d like you to write a master’s thesis,” or “We’d like you to go away.” I got the second option.

So I had to go back three months later and do an oral qualifying exam. Then I had to do the admission to candidacy exam, also known as the A exam, by August because I only had a year left. You had to have a year in residence after passing this exam. I did the qualifying exam, oral qualifying exam, and an A exam in rapid succession. That was a very difficult year, but once I got to the dissertation part, it was okay. But to do a PhD at Cornell in three years is a significant emotional event.

Bob Sheldon: What was your thesis topic and how did you pick it?

Andy Loerch: I talked to Muckstadt and he said, “Let’s go talk to Robin Roundy.” Robin Roundy won the Lanchester prize the following year—very bright guy. I walked into his office and he said, “I’ve got this problem.” Basically, it was a factory scheduling problem—factory scheduling and due date prediction for a cyclically scheduled factory, meaning each of the machines in the factory had a sequence of operations that they did and they repeated that sequence over and over.

So between the sequence of operations on the machine and the bill of materials, you could build a network and do a network optimization on the schedule. If an order came in for a product, you could then go back through the network, and find the longest path through the network, to see if you could actually meet the due date that they asked for. The crux of the thesis was “How do you add resources to the system to shrink the time if you can’t meet the due date under normal circumstances? How can you shrink the time by adding additional resources such as overtime or subcontracting to meet the due date in an optimal way?”

It turned out to be a big optimization problem, and if you took the dual of it and then

decomposed it, you could actually solve it. Probably now you could solve it straight up without doing all those manipulations. But back then it was a big deal to do it that way.

So I got my thesis topic from Robin and I offered to put him on my committee but he said, “No, that’s okay. You don’t have to do that.” But he was the one I’d always go to for help. Interesting that following year, he won the Lanchester prize and I bumped into him in the hall and congratulated him. He wasn’t much older than I was. He’d just gotten out of Stanford.

I said, “Robin, do you know who Lanchester is?” And he said, “No.” I said, “Let me tell you since you’re winning the prize.” It shows you that they didn’t do much military OR at Cornell. I didn’t know that, and being in Europe when I applied made it harder to really check things out. There was no Internet at the time—none to speak of.

So I learned a heck of a lot about factories and manufacturing, inventory, and other industrial applications. But the beauty of it was when I came back from there, following a stop at Staff College; I ended up back at CAA. I had pretty good experience doing mathematical optimization at that point.

Bob Sheldon: Your Staff College experience, anything notable there?

Andy Loerch: I went as a geographic bachelor; my family stayed in Ithaca. I really do enjoy playing softball and I got to be a pretty decent volleyball player also at what sometimes is called the Armed Forces Sports College. It’s now called the Joint Forces Staff College.

Mine was the last class where you actually got credit for CGSC. After that it became a follow-on to Service Staff College. So that was the last Military Education Level 4 (MEL4) granting class. I got into it after a big manipulation by the folks at PERSCOM. I was coming up on the lieutenant colonel board and I hadn’t been to Staff College yet because I was deferred for three years to go to graduate school. You don’t get promoted to lieutenant colonel in the Army without going to Staff College.

They manipulated the system and got me down there and the course ran from January to June, not as long as CGSC, which was nine months. It was certainly a good introduction

to joint operations and joint planning. It was a great course and I met a lot of people. I didn't really know many people from other services before that.

It was funny; they did this survey in the beginning about your impressions of the other services, and the impressions were all over the place. Marines are this and Navy guys are this and back and forth on the survey. At the end of the program, they ask you the same questions, because everything goes to the middle at that point and you realize that everybody's pretty much the same. It was a great experience. I really enjoyed it.

Bob Sheldon: Did you have your follow-on assignment already lined up?

Andy Loerch: No. What was required at the time was that 51% of the people that went to Armed Forces Staff College had to go to a joint assignment. It was funny because they had a huge guest speaker program. All the Commanders-in-Chief (CINCs) at the time, now called Combatant Command (COCOM) commanders, every single one of them came and spoke. For example, General Schwarzkopf came, and this was right before Desert Storm.

Schwarzkopf gave this presentation. Of course, he's soliciting for people to come to work at United States Central Command (CENTCOM) and he shows a picture of the Pentagon parking lot at 1700 packed with cars. Then he shows a picture of another parking lot and says, "Here's CENTCOM at 1700." There was one car there. Several of my classmates ended up going to CENTCOM.

But the fact of the matter is, I had a requirement to go to an Army Education Requirements Board (AERB) slot, a payback tour for the PhD, and there were no joint PhD positions then. I ended up going back to CAA for a second tour. I never did get to the Joint Staff although later on I did a bunch of joint studies; I represented the Army in joint studies. So the course was useful in the long run.

Bill Dunn: The first time you were at CAA, you were a captain, which was probably pretty unusual as well.

Andy Loerch: But there were no captain slots at CAA, so I was in a major slot.

Bill Dunn: And the second time you came back, you were a major.

Andy Loerch: I was a major and I got promoted to lieutenant colonel and my second tour—I got two extensions on it—was five years long. I was a captain in my first tour, and I was a major and then a lieutenant colonel returning the second tour. In the second tour I did mostly optimization. I did the Value Added study there.

Bob Sheldon: What division did you work in your second time?

Andy Loerch: The Resources Division and we established the optimization capability that CAA still has. They didn't really have large-scale optimization software before that time.

Bob Sheldon: What kind of optimization problems were you working on?

Andy Loerch: We were working mostly on capital budgeting problems. The Value Added studies were huge. About a dozen analysts worked on them for about a year. It was the capital budgeting problem for the Army, meaning that there were decisions to be made regarding which candidate procurement programs would be funded, which would be terminated, and for the ones that were funded, what quantities should be procured in what years. We would look at the top 40 or 50 procurement programs and, given some assumptions about what amount of money would be available over the next 15 years, optimize the program given that you couldn't buy everything. The hard part—the interesting part of it from a technical standpoint—was that the variable costs for big procurement programs were nonlinear.

There was a learning curve associated with those costs. I got there just as they were finishing the pilot study, and the optimization that they wrote which was very simple didn't have any of the nonlinear costs in it. The pilot study was criticized significantly for not incorporating nonlinear costs very well. That was a difficult problem.

Bob Sheldon: So it was nonlinear in the constraints?

Andy Loerch: Yes, it was nonlinear in the budget constraints. We had a budget constraint for each of the 15 years in the planning horizon. So basically, we did a piecewise linear approximation of the curves, which made it a much bigger problem. It was a mixed integer

programming problem, and this approach added many more binary integer variables to it.

Bob Sheldon: About how many variables and constraints did you have?

Andy Loerch: I think it was about a thousand binary variables. There were other continuous variables. We formulated it and actually got it working, and we had a small test problem which we used to develop the model. This small problem took 45 minutes to solve on an IBM Unix box with IBM Optimization Software Library (OSL). It was quite state-of-the-art at that time. We were concerned that the full problem would either take days to solve or not solve at all. It was an order of magnitude larger in the number of integer variables.

Then we went to an OSL training course down at Georgia Tech and they talked about some things you could do with integer programming to make it go faster. In fact the software that we were using had a preprocessor that would find some of these things in your formulation, and I was sitting there thinking, "Whoa, we can do some of this."

So we went back and we tried the preprocessor and didn't find anything that would help. But we thought about it and wrote in a lot of explicit constraints directly. We basically implemented some of the suggestions that they made in the course. As I said, it was taking 45 minutes to solve the baby problem. We put the whole problem in there and solved in two minutes. All that they teach about clique constraints and lifted covers really works.

It all has to do with the relationships between the binary variables. For instance, if it is a case that when one binary variable is zero that several others have to be zero, you write constraints in directly and explicitly that reflect that requirement; it makes the branches in the branch and bound method much more powerful. Then you branch on those variables that control the others. It makes the algorithm a lot faster.

We got a couple of papers published describing this work, and having the optimization part working enabled research on the overall capital budgeting methodology, the Value Added methodology. It's always cool to get papers published given that I was thinking about trying to get an academic job after I retired. Having

articles published is a very important criterion in getting one of those jobs.

Fortunately, Mr. Vandiver was the director of CAA by the time I got back for my second tour and he was very supportive of that, and, of course, of going to the MORS Symposia and giving presentations. I did a lot of that as well.

Bill Dunn: What other folks did you work with at CAA your second time around?

Andy Loerch: I worked very closely with Bob Koury. There was a really great group of people that coincidentally all lived in the same neighborhood. We had a carpool together. One guy was Bob Clayton, who now works for Booz Allen Hamilton and still comes to MORS now and then. He did the decision analysis component of the study.

We had Captain Bill Mann, who had gone to the Air Force Institute of Technology (AFIT) and who was really good at response surface methodologies. They do a lot of that at AFIT and he built the models to extract the information from all the combat simulation runs in the design of experiments we did to measure the marginal force effectiveness difference that you get by including a new procurement program into the force. Bill got out of the Army and is now the vice president of a bank.

Linda Coblenz is still an analyst at CAA. She's been one quite a while and we worked very closely building the optimization model. She's actually as intuitive an optimizer as I've ever seen. She is an extraordinarily smart woman. We worked very closely together for a long time. She still does that sort of thing although I believe that she's temporarily working in the Pentagon right now. CAA rotates analysts through the supported staff sections in the Pentagon because it gives them a better appreciation of the problems and it more closely connects CAA to the decision-making process. CAA has been doing that for quite a while. And of course all the division chiefs, Frank Mackey and John Elliott, who is still there as a division chief.

Bob Sheldon: Who was your boss?

Andy Loerch: Steve Seigel was the Resource Division Chief at the time and Bob Koury was the Study Director. We all worked for Colonel John Harrington. He was a great boss. I did a lot of the technical work, particularly the optimization of that study. It was a big study and,

in fact, it is still being done. It's a repetitive study they did every couple of years to support the Army Program Objective Memorandum (POM) submission. Apparently they don't do it anymore.

The second iteration of the Value Added study was the first time that it was used to support decision making for procurement. It was a big deal. It was an interesting study to do since there were so many aspects to it. It was one of the big studies in the agency. We won the Wilbur Payne Award, which is given for the Army Study of the Year. I briefed it a hundred times if I briefed it once. I presented this work at the MORS Symposium (MORSS) as well.

It was one of those studies that got briefed so many times that I got really good at it. I could throw the slides on the ground and brief them in random order. I could brief it for 15 minutes or four hours with the same set of slides. In fact, I still cover it in one of my classes because it's a good example of capital budgeting in the military. We've incorporated it into the book we are writing on military analysis as well.

Bob Sheldon: So that got you past your three-year point at CAA?

Andy Loerch: Yes but I worked on some other things. We worked on a very interesting project for the Deputy Commander in Chief (DCINC) of USAREUR. In about 1994, they reduced the force in Europe from 225,000 soldiers to 65,000. So the question was, "Where shall we put them?" We worked the problem as a collaborative research project with Georgia Tech and funded them to help.

We formulated the problem as a mathematical optimization problem and came up with a solution. We were fortunate because the Artificial Intelligence (AI) Center at West Point had done a massive data collection on locations and what their capabilities and capacities were, and also on units and what their requirements were. All the data was available.

We built another huge optimization model, solved it and came up with a solution that would have saved \$50 million a year in operating funds. Our goal was to minimize operating expenses. They wanted the cheapest configuration of locations. Of course they didn't actually implement that solution because there were political issues. But I think that at least it showed

them that they weren't that bad off being within \$50 million per year with their hand-built solution. We went to Germany to brief it to the DCINC. He made them at least consider our solution and think about it.

It was fascinating to work with Georgia Tech. I worked with George Nemhauser, Ellis Johnson, and a couple of postdoctoral fellows that they had there.

I also did some work in support of Desert Shield. Two days after I got to CAA, the balloon went up in Kuwait. CAA had recently done a people-in-the-loop wargame on an almost identical scenario to what was going on in Kuwait. They were ready to go and do analysis right away, and they did.

I volunteered to participate in that effort, and we played the wargame with the real units that were there. At first, there were hardly any friendly units and it was looking pretty grim. Then over time, more units got there and it got better and better. But I have to admit that we were among the people that were predicting 10,000 casualties a month. I only worked on that effort in the very beginning. Later, as more units came into theatre, the estimates were revised downward a great deal.

Bill Dunn: CAA was still in Bethesda?

Andy Loerch: This was at Bethesda, right. We did that until they finally got the Concepts Evaluation Model (CEM) cranked up. That was a closed loop model that didn't need players. CAA continued to support the US Army Forces, Central Command (ARCENT) throughout the war and in all the preparations of different courses of action analysis.

It really changed the way CAA did business because they got CEM to run on a supercomputer at Aberdeen, and that speeded up the whole process. The process that they were using to do this, which might have taken months previously, was now being done overnight on the supercomputer.

Bob Sheldon: Can you point to any specific decisions that were made as a result of your analyses?

Andy Loerch: I read Mr. Vandiver's history and I'm sure he talked about this, but I know that they checked out all of the courses of action prior to execution. I can't say for sure that the left hook in Desert Storm was tested out in

CEM, but there is a good chance of it. They did all of that in real time and they were passing the information back and forth overnight.

When they got to that point though, I wasn't involved in it. I went back to work on the resource problem. But it was interesting and you felt like you were actually contributing to the war for those of us that never got to go. There was another thing that we did for Desert Storm. Bob Clemence, who's now an analyst at Evidence Based Research (EBR), was the other PhD at CAA at the time. We worked on this problem together. The problem was that we were shooting a lot of Patriot missiles to defeat incoming Scud missiles. The question was how long was the supply of missiles going to last and what firing doctrine should we employ? And there were several different options of how to fire them.

How do we best do that? We looked at it as an inventory problem. We have the stack of Patriots over here as our on hand inventory, and here come the customers, the Scuds flying in, and we have to service the customers. It turned out there were two kinds of Patriots. There were ones that could shoot down missiles and ones that couldn't. So the options were you could fire one Patriot at the Scud or you could fire two of the missile-defeating Patriots, or you could shoot one of each. The options had different probabilities of success.

The question was, how long will the supply last? To get the arrival distribution of the customers (the Scuds), we had to find data, and the *Washington Post* tracked all the Scud firings. So we went back through the issues of the *Washington Post* that had times and dates of Scud firings. We fit an exponential distribution to the data, and we built a spreadsheet model that calculated inventory levels over time and engagement results for the various options. That analysis got briefed all the way up to the Deputy Secretary of Defense.

We did this analysis over a weekend. It's a shame that we don't get to do more of that kind of analysis where it's largely back of the envelope. All we used was a spreadsheet to build a model right then. We collected data that was available, made some assumptions, and provided answers quickly. The answer that we provided said that if they keep firing the Scuds at

this level, they would run out by this particular date, which was too early. Our work resulted in a couple of outcomes.

One was the Air Force had to do attack operations, which meant that they would try to destroy Scud launchers before they fired. This operation was fairly unsuccessful but they tried it. The other was Raytheon was told to hurry up and make some more Patriots. So this analysis actually did have some ramifications. I like those kinds of studies where you have a couple of days and you do what you can and come up with something interesting. Those opportunities don't arise that often. I think that if you were to be in a situation to support a combatant commander on the battlefield like a lot of our analysts are now, that you would have more of those opportunities and that would be pretty cool.

Bob Sheldon: In the seven-year lapse between your first two tours at CAA, did you notice any difference in the character of CAA?

Andy Loerch: One is that CAA shrunk. It was down from 150 military and 150 civilians to 150 total, so it was a lot smaller. The other thing was that when I first got to CAA, they had only one computer, a Univac 1108 with cards. To run COSAGE once overnight, you had to have the signature of a colonel. If it died overnight, they'd call you at home—2:00 a.m.—and say, "The run died. Come and fix it." They upgraded to a UNIVAC 1100/32 shortly after I arrived for my first tour. It had a whole megabyte of random access memory (RAM), which made it like magic. We went from running COSAGE once overnight to being able to run a couple during the day and then a whole set of 10 overnight. That made the evolution of the model (COSAGE) a lot faster. It also made it possible to do studies with it. But all the computing was done behind vault doors in the terminal rooms. The security people used to take a room in the hotel across the street and try to read the emanations from the computers and the terminals. If they could, they came and repaired the vault doors.

When I got back six or seven years later, everybody had a personal computer (PC) on their desk. They still used the mainframes for some of the computing. The PCs represented such a significant improvement in computing capability

that it really changed the way analysis was done.

Another thing was that they still had to perform the big studies that would take a year or a year and a half and require a half dozen or a dozen people; the repetitive studies like Total Army Analysis (TAA), which they still do. But they were starting to do a lot more fast turn-around analyses by then, and that trend has continued at CAA and all the other analytical agencies.

To be relevant you have to turn around the analysis a lot faster now. You want to be inside the decision cycle for the particular question at hand. I think what I learned doing the Value Added studies though, is that we did a lot of those quick response analyses after doing all the background work of building and running the models, collecting information, and getting buy-in from the decision makers on all that preliminary work. This took a lot of preparation. We set it up so that we had everything we needed to answer specific questions as they arose. So to be responsive, it took a long time and a lot of background work. Then you were ready. We could run the optimization and change constraints to reflect different decisions very quickly and then answer the mail within 24 hours. We could produce answers even faster if they were willing to accept the results in something other than a color briefing. There were times that I sat in a meeting in the Pentagon, in Army PA&E, when they were looking for ways to reduce procurement expenditures. I would call back to CAA and they would run the optimization model and we would give results in about 10 minutes while the discussion was still going on. This was unusual though, because providing results directly to the customer without internal review was typically not done.

So the improvement in responsiveness was one of the big differences between my first tour at CAA and the second. The changes were amazing and I think it makes you more relevant when you can answer these questions sooner.

Bob Sheldon: What other kinds of studies did you work on?

Andy Loerch: Practically all the work I did in my second tour involved mathematical

optimization. Another study I worked on involved the efforts to improve Army strategic mobility. Many deficiencies were noted in the deployment of forces to Desert Shield/Desert Storm. As a result, a call went out to the field to identify projects that could be funded to improve the ability of units to deploy. They ranged from buying different kinds of ships that were easier to load and unload, to widening roads that units used to travel to their ports of debarkation (PODs), and many others in between. Naturally there were many more projects submitted than there was money to pay for them. This is another example of a capital budgeting problem. We were to formulate this as an optimization that maximized the improvement of force effectiveness through the implementation of some subset of the projects, constrained by available budget. We formulated the model, but to our surprise there was no requirement to identify what the expected result of the implementation of each project was. For example, we expected that the project proposal would say something like, "If we had more of a particular kind of material handling equipment, we could deploy such and such a division to its POD two days faster." Without this kind of information the model could not be run. So that study never went anywhere. I really didn't work on many other studies because Value Added went on and on. I spent most of my time on that with an occasional excursion into other problems. But they were largely optimization problems. So I got a facility for formulating optimizations, which is always useful.

Bob Sheldon: So you didn't do any joint analyses?

Andy Loerch: Not then.

Bob Sheldon: You left CAA in 1995?

Andy Loerch: Right, 1995. The assignment officer called me up and said, "You've got to leave. You've been there five years." I said, "I'm planning to retire in 1996. My six-year obligation from graduate school will be over. I'll be a lieutenant colonel with 22 years. So if you just leave me alone, I will go away and you'll never hear from me again." He said, "No, that won't work. You've been there for five years. You've got to go someplace." I said, "Okay, what have you got?" And he said, "Not much." And I said,

“That’s ridiculous. Why don’t you just leave me alone?” And he said, “I’ll call you back.”

He offered to send me to teach at West Point, but I didn’t really want to leave town for a year. I was planning to retire. A few days later he called back and told me that he was sending me to Army PA&E. I guess everything goes full circle and I finally ended up in Army PA&E. I showed up there and found that I was “reassignable excess” in the part of PA&E that we used to support with Value Added studies.

I knew my way around that place, and each action officer there had a lane, a set of programs they were responsible for. You had a guy who did helicopters. You had a guy who did artillery or indirect fire systems. You had a guy who did logistics. You had a guy who did tank and automotive. Everybody else had a lane, but I didn’t have a lane.

So I got all this other weird stuff like digitization and horizontal technology insertion. It was like nailing Jello to the wall and it wasn’t really analysis. Basically it was database queries and adding columns of numbers. PA&E is not a huge analytical place although it has the reputation of being that and they have a lot of Army OR officers, 49s, there. I had been there for several months when Van Cunningham came to brief MG Heebner, the Director, PA&E.

It turns out that there were several big joint studies going on at that time. The Heavy Bomber Study was just completed by the Institute for Defense Analyses (IDA), and Van Cunningham, who worked in the office of the DCSOPS Technical Advisor, was one of the folks who represented the Army during that study. About that time the Deep Attack Weapons Mix Study (DAWMS) was just starting up. So Van Cunningham briefed General Heebner about the Heavy Bomber Study and the follow-on which was DAWMS. The briefing was just for information and the general asked Van, “What can I do for you?” He said, “Well, you can let LTC Loerch come to the DAWMS meetings.”

I became one of the Army representatives to the DAWMS analytical meetings. I showed up there the first day and I met Jim Bexfield and several other people from IDA, as well as several analysts from all the different services. This was my first opportunity to do joint studies. The first words out of their mouths were, “We have

this big optimization model called the Weapon Optimization and Resource Requirements Model (WORRM).”

It was one of those from the class of models that matches weapon and platform combinations to a static target set over time. It had a lot of bells and whistles. They said the objective function was to minimize aircraft loss. An Army guy sitting there doesn’t particularly care about aircraft attrition so I said, “What has that got to do with anything?” They looked at me because that’s what they had used for the heavy bomber study, and I said, “What has that got to do with the success or failure of the campaign, which is what we want to measure.”

I raised all kinds of complaints about it, and ultimately they changed it and they did it a different way. That was my first DAWMS meeting. We worked on that study for about two years. A lot of people have a lot of bad things to say about DAWMS because it involved a big group of analysts, and every part of the analysis, every data element, every piece of methodology that included building all new scenarios for Korea and for Southwest Asia, and the way the optimization was set up was argued and argued. It was admittedly a very slow process.

Two very interesting guys—Colonel Dewey George, who was the Division Chief at J8 Warfighting Analysis Division, and now General Cartwright, who was a colonel at the time but is now the US Strategic Command (STRATCOM) Commander. General Cartwright has been the J8, but he was the representative from a different part of J8 at the time. Those two guys ran the study and IDA did the heavy lifting. IDA did a lot of the model running, and Jim Bexfield was the lead analyst there.

Jim would always run in with warm slides because they had just come from the printer. That’s how that went and we did that every day. It was a huge study and the question that needed an answer was “What mix of high performance smart munitions should be bought?”

The heavy bomber study said we don’t need any more B-2s; we need more smart munitions. So what smart munitions and how many was the question for DAWMS. We didn’t only consider Air Force weapons, but weapons from the other services were considered as well. For example, Tomahawks for the Navy, Army

Tactical Missile System (ATACMS) missiles, and Hellfire missiles for the Army were also in the trade space for the study.

It was truly a joint study and we worked on it for a long time. It was fascinating and it became my primary duty. Ultimately I was moved out of PA&E. They set up a temporary directed military over strength division in Army DCSOPS, and we represented the Army in that study and then eventually in other joint studies, and finally in the 1997 Quadrennial Defense Review (QDR). We were part of the Army contingent that represented the Army for the QDR in 1997.

It was an interesting tour but I never really enjoyed working in the Pentagon. But at least this was analytical and we had a big optimization. It had a lot of moving parts. It was a very interesting study and I think the hard part of it was that everybody in the services knew this was a resource drill. So everybody was fighting for their service and fighting for the resources and the question was, could you do that and then not have everybody else in the world hate you.

I always felt best about the fact that I walked out of there with my reputation intact. We all advocated for our services; we had to. But to be able to do that in an ethical way was a difficult task. A lot of people didn't like the way that DAWMS became so adversarial.

It did take a long time but I think that was a very interesting case study on how to do joint analysis. What resulted from it were the scenarios that we built from scratch, the Tactical Warfare (TACWAR) simulation scenarios that J8 ran, were then scenarios that were used for the QDR in 1997. They didn't have to build new ones because all the services participated in building the DAWMS scenarios, and had signed off on them.

That would have really slowed down the QDR if you had to start over again and build a set of joint scenarios. So there were a lot of good things that came out of DAWMS. I ultimately ended up as chief of that directed military over strength division in DCSOPS. That was possible because I had been unexpectedly promoted to colonel. A month before my obligation from graduate school was over, while I was still working in Army PA&E, I got called to MG

Heebner's office and he said, "Congratulations. You got selected for colonel." This was a huge shock. You'll see that the trend here is that I never made a conscious career decision. Every time I came up on a place where I could possibly get out of the Army, they gave me something else and I ended up staying around. I stayed for another five years due to being promoted.

Bob Sheldon: Who did you report to in DCSOPS?

Andy Loerch: We worked for Force Development (FD), so for a while, it was MG Anderson, who was the FD, and then he was replaced. But we actually did a lot of work directly for then LTG Shinseki who was the DCSOPS at the time. It was interesting because we really had an open door to his office. Part of the whole drill in DAWMS was that every three weeks they would hold a huge meeting where all the services would be represented by their operations officer, and then the week after that all the Vice Chiefs would get together and be briefed on DAWMS. So we spent a lot of time with the DCSOPS and the Vice to poop them up for these meetings. We got to know them pretty well. So we were operating at a pretty high level there.

Bill Dunn: Who was the Vice at that time?

Andy Loerch: General Griffin. He had been the Inspector General (IG) before. The process of getting these guys ready for these meetings was always funny because as a staff officer in the Pentagon, we used to make what were called facing pages. The read-ahead briefing would come in, we would put information on the backside of the previous slide that had the Army point of view and included what we wanted them to say. They would have a notebook with this augmented briefing in it.

The general would follow along with the briefing and then periodically, he'd bang his fist on the table and read what you told him to say. That's just the way it was. It's staff work.

That division had some pretty good analysts in it. It was originally led by Colonel John Floris. He was working for SYColeman the last I heard. When he retired I took over as Division Chief. Another of the action officers in FDX—that was the designation of that division—was John Gordon. He is a Rand analyst now and he got his PhD at GMU and I was on his doctoral committee.

Bob Larson also got his PhD at GMU, and he later served on the Joint Staff at J8 for a subsequent QDR. There were a lot of people in the division that were very good—all good writers, good briefers. Our goal in that division at DCSOPS was to leave at 5:30 in the afternoon.

We typically got there at 5:30 in the morning so that meant that you worked a half a day, 5:30 to 5:30. We usually were able to leave by 5:30 only two or three times a week because it was DCSOPS after all. People typically put in long hours there. But people would say, "It must be nice," when you were walking out at 5:30 and you'd say, "Yes, it is nice. If you anticipate requirements and do it right the first time, you get to leave." It was a great bunch of guys to work with and I think we represented the Army pretty well and pretty ethically.

Bill Dunn: What did the assignment folks want to do with you when you made colonel and had been in DCSOPS for a while? Did you have any choices?

Andy Loerch: It was a directed military over strength division. Everybody in there was over strength on the staff and to extend us again—because they had extended us a couple of times now—they would have had to go to Congress for permission and that wasn't happening.

So I was a free agent. Just at that time, Dick Pollen, who was a division chief at CAA, unexpectedly retired. He's now an analyst at IDA. So Vandiver called me up and said, "FS Division is opening up. Dick just retired." I was surprised about it. He said, "It wasn't what you've done before but if you're interested, you can have that job."

Bob Sheldon: What's FS?

Andy Loerch: It's Force Strategy Division. So I called up Branch and a much more cooperative assignment officer was there. I said, "Vandiver just offered me this Division Chief at the CAA." So she said, "Tell me that you have found yourself an assignment and I don't have to backfill you." I said, "Yes." She said, "That's what I'm talking about." So next thing I know, I was back at CAA for the third time. This was my third tour. Nobody else has ever had three tours at CAA. Now Joe Stilwell, who was General "Vinegar" Joe Stilwell's grandson, was an analyst at CAA when I was there as a captain. He was there for nine years straight, so he holds

the record for most continuous years at CAA. But I was there longer than any other military officer, and I'm the only one who's ever been there for three tours, as far as I know.

Bill Dunn: And you were at both CAA locations.

Andy Loerch: Right. We were still at Bethesda in 1997 when I got there and then we moved to Fort Belvoir shortly afterward. I was a Division Chief.

Bob Sheldon: What projects did Van throw at you?

Andy Loerch: We did a lot of very innovative work in FS and I had some really talented analysts that worked there. We had LTC Pat Dubois, who did the SADE [Stochastic Analysis for Deployments and Excursions] work, which was a prediction of the number of small-scale contingencies (SSCs) that the US Military would have to respond to. We also did the so-called Mission Task Organized Force (MTOF) work, which involved force structure requirements for SSCs.

This was a hot topic back at that point. It was the end of the 1990s and that's what the Army was doing. Nobody knew how to predict the number, type, and duration of SSCs at that time. To do it we modeled the system of prosecuting SSCs as a queue—I guess a G/G/infinity queue—because basically these SSCs would arrive and then the Army would service them by sending forces out. The question was "How often did these missions occur? What was the arrival rate? And then how long did they last?"

They had very hard data to collect. Nobody kept good records of deployments and missions that had occurred. The Armed Forces actually went to many of these things. But by the time I left there in 2000, they had around 400 named joint operations in the database they had tracked from the end of the Cold War to about 1997. Then they built the database and used it to fit distributions on the times between occurrences and durations, and then modeled the system as a queue.

They ran the simulation and developed a distribution on how often different missions were executed. The important part of the analysis was measuring the overlap between missions. The idea was to see what kind and how many missions were going on at the same time.

This had ramifications for force structure decisions. At the same time we were doing the MTOF work. As I said, that work estimated the types and number of Army units that would be used to respond to different kinds of SSC missions. The process was actually very simple. It was a workshop. It was originally done in response to the Dynamic Commitment wargames that J8 sponsored. All the services were given scenarios and were told to provide the forces that they would use to accomplish the given missions. There were around 60 or so scenarios. It was a lot of work to answer that question. So CAA developed the method to build the MTOFs before I returned, and then we made use of it to do force structure analysis.

We'd have these workshops and we'd get people from the various branch schools and from the COCOMs to participate. The participants would sit down and say, "For this scenario, what would we have to do?" And they'd go through the Universal Joint Task List (UJTL) and make a list of all the things that they'd have to do to accomplish the given mission associated with the scenario. Then they would ask "What units would we use to do this?" They would make a list of all the units that they needed to do all the tasks that were identified.

They would then have to reconcile the list by considering the relationships between the tasks. If a particular type unit could perform multiple tasks, it had to be determined if they could do them sequentially so we only needed one unit, or if we needed more than one because the tasks had to be done at the same time. That was the way they built the force structure for a particular scenario, and they repeated the process for a whole bunch of different scenarios.

Ultimately what happened was we put those two together, the prediction of the occurrence of SSCs and the MTOF work and were able to develop a probability distribution on the simultaneous use of each individual type unit over time. So it answered the question, "How many units of each type were needed at any particular time?" Then that could be used to influence the force for the TAA, which had heretofore only done major combat operations.

That SSC force structure and prediction was a big accomplishment. We also did a bunch of

work in preparation for General Shinseki's announcement at the Association of the United States Army (AUSA) annual meeting that the Army would transform. He was the Chief of Staff by then. For that whole summer before the AUSA convention in 1999, we did a lot of work on what has since become the Future Combat Systems (FCS), and the idea of a smaller vehicle that could be moved more quickly.

What we showed was that it wasn't really going to do exactly what they said. They wanted to be able to put a brigade anywhere in the world in 96 hours. It turned out that you really couldn't do that unless you pre-positioned equipment in several different places. It was another example of a very fast turnaround analysis that was very important. In fact, I still have the data that was collected, and I still use it for a case study in one of my classes now.

It was a very interesting problem and I think very cleverly addressed by some of the people at CAA. The analyst that worked on that was Lieutenant Colonel Keith Solveson. He was very good and ultimately ended up in the Pentagon working for Vern Bettencourt. Our idea in FS was we would do interesting things and when it became routine, we would pass it on to somebody else.

Bill Dunn: Were you reporting directly to Vandiver?

Andy Loerch: Pretty much, yes. I was a Division Chief and Dan Shedlowski was the Tech Director at that time. Colonel Mike Simmons was the Chief of Staff at CAA. He had been the Chief of Staff for a long time.

Bob Sheldon: Where was Forrest Crain?

Andy Loerch: Forrest Crain was in a different division. We had been analysts together as lieutenant colonels but he was a campaign analyst and he was a School of Advanced Military Studies (SAMS) graduate and tactically very proficient. He is the best campaign analyst I've ever met. As a matter of fact, that's why I got him to write the campaign analysis chapter in our book. He worked over there doing theatre campaign analysis and then ultimately, he became the Division Chief of that Division about the same time I became the Division Chief of FS. So we worked together but separately for a long time.

Bill Dunn: So you made colonel. You never had anything that was equivalent of battalion command and you never went to the War College.

Andy Loerch: No. The year before I was to go to the colonel promotion board, they promoted three guys that were single-track 49s to colonel. Before that they hadn't promoted any in a long time. But none of them had a PhD so I believe what happened was Mr. Hollis and General Stroup, who was the Deputy Chief of Staff for Personnel (DCSPER) at the time, influenced the instructions to the colonel board to say, "Yes, we have a floor of three and, by the way, take a close look at these guys with a PhD because we've got a lot invested in them."

That year they promoted three of us. They promoted me and Gary Swenson, who was also in PA&E at the same time and later became the Chief of Staff of CAA; and Bob Clemence, who was the guy I worked with on the Patriot project. After that they promoted one guy a year for many years so it was very difficult to get promoted. I had been picked up for War College by correspondence because 49s were not allowed to go to resident War College at the time. Go figure. They've changed that now. But I was looking at this and saying, "I'm not going to do War College."

I was teaching on the side because I was preparing myself for my next career at the time. I was teaching even when I was in the Pentagon. I was teaching operations management and decision support systems courses at Virginia Tech. I always felt like I had a finite capacity brain and I had gotten to the point where everything I learned, I would forget something else. So I had to be very judicious in what I learned because I was liable to forget something that I'd rather know; so twice I turned down War College by correspondence.

I think the more important thing was that you got picked up for War College, not that you actually went. Nevertheless there was no way. I considered it impossible to be promoted to colonel. I did not get a new picture taken. I did not look at my officer record brief (ORB). I did not do any preparation for the promotion board. The day that the colonel list came out, I was at a meeting with an analyst Army guy

from J8 named Dale Kem. He was a lieutenant colonel. He said, "The colonel list is coming out today." I said, "Oh, really?"

I didn't even know they were meeting so when I got a call from the executive officer (XO) at PA&E who said, "Come and see the general," I said, "Whoa." I went in there and I was shocked, to say the least, especially since I'd planned to retire in the summer. But I had held off putting in my paperwork for retirement because I really wanted to see what would happen with the board, and I guess it wasn't a zero Bayesian prior probability of making it, but I think it was very unusual.

I was happy to have made lieutenant colonel because I came out of Staff College right after graduate school. I had not had an efficiency report for four years going to the lieutenant colonel board. So I figured I was really lucky to make lieutenant colonel and I figured my career had culminated. So I tended to be outspoken in some of the things that I said, but I figured, "What are they going to do? I'm not going to be promoted anymore anyway." But then after I was promoted to colonel I was even more outspoken.

Bob Sheldon: Let's backtrack to when you first got involved with MORS. I assume that's one of the times you were working for Van?

Andy Loerch: Right. When I started working for Van in the early 1990s, I started to go to MORS all the time and I was largely a presenter.

Bob Sheldon: Which studies did you present?

Andy Loerch: I presented the Value Added studies; and I presented the nonlinear costs implementation as a separate presentation. I came close to winning the Barchi prize with that one. There was one MORSS at NPS where I gave six presentations of which four were different and two were given twice. I did a lot of that and I always enjoyed it.

Then I got involved in the resource analysis and costing working group and I was a co-chair for that for a while. Tom Frazier was the chair, but they evolved more into the costing side than the resource side and I was more into the resource side. So I got involved in other ways but that's primarily what I did. I went all the time and I gave a lot of presentations.

I kept doing that. Even when I was in the Pentagon, I was going and they were not as

supportive in the Pentagon of people going to MORSS as Van was at CAA.

Bob Sheldon: Did you serve as a working group chair?

Andy Loerch: I was never a working group chair at the annual symposia, but I was a co-chair for a couple of years. Also, I was a working group chair at some special meetings. My MORS background was less on the meeting planning side of the house and, let's face it, most of the leadership of MORS comes from the symposium committees and out of the working groups, and I was always more interested in professional affairs (PA) issues such as publications and education.

Bill Dunn: And you were nominated for the Barchi prize four times.

Andy Loerch: Yes.

Bill Dunn: You came close.

Andy Loerch: Yes. Maybe now as my time on the Board here is growing short, I look forward to going back and being a presenter again. Give it another shot, who knows?

Bob Sheldon: What year did you join the MORS Board of Directors?

Andy Loerch: It was 1999 at West Point. I had never really thought about it and Howard Whitley, who was on the Board and worked for Van, came to my office one day. Van likes to have people from CAA on the Board. So Howard Whitley said, "Van wants to know if you want to run for the MORS Board." I said, "Okay." The problem was that in the previous year, when the symposium was in Quantico, I had hernia surgery that week so I didn't go.

Whitley said, "Who do you want to nominate you?" I had Cy Staniec, who I knew and was in my class at Armed Forces Staff College, and Bob Sheldon. Howard said, "Well, Bob's going to be the President." I said, "That ought to work." I didn't even go to the symposium the year before, so I was thinking, "I've got a snowball's chance in hell of getting elected to the Board." I got off the bus at West Point and they said, "Congratulations. You got elected." So I was on the Board. I've been there ever since. It seems like a very long time.

Bob Sheldon: During your early years on the Board, do any activities stand out in your mind?

Andy Loerch: Very early on, I was education chair and I did an education colloquium

at CAA, and that worked out pretty well. That was important because it seemed that the education colloquium had sunk a little bit. I had a really good group of organizers. Jeff Appleget worked on that committee and his big accomplishment was to get the Coast Guard Academy there. We've had a real hard time getting the Coast Guard ever since.

We had all the academies. We had folks from GMU. It was real successful. Stuart Starr gave a tutorial on best practices in command and control (C2). I think that event was the genesis of Roy Rice's famous "What's the Problem?" tutorial that he did in the symposium the following year. He decided to put that tutorial together because the students would get up and give their presentations and they didn't give a really good problem definition. We all know that that's probably the hardest and most important part of any study. So that resulted in Roy's tutorial, which has really had legs.

I steal it and show it in my class. We've incorporated it into the book. So that was a big deal. I was education chair. I was publications chair. Bob Sheldon was also my MORS mentor and he always will be. One's MORS mentor is always one's MORS mentor. Bob said try to do things that lead you to one place or another. PA was my interest and I had the publications committee. That's when Larry Rainey from Aerospace Corporation approached MORS about writing a book on military OR, and particularly about analysis at the national and departmental levels. There's really nothing written about that level of analysis in any comprehensive way.

If you look at the military OR literature, you'll find a great deal written about things like detection and attrition. There's tons of stuff written about attrition. Most of it is at the very micro level. There really wasn't anything written about "This is how you do force structure analysis or this is how you do theatre campaign analysis or this is how you do capital budgeting or strategic mobility.

Willie McFadden was the Vice President for Professional Affairs (VPPA) at the time. In fact I ran for VPPA and Willie beat me. He called me up and said, "Would you talk to this guy because he's got an idea for a new MORS book and you're the publications chair." So I did.

When Larry explained his idea for the book, I said, "Gee, that's interesting. I have the outline for that book. It's the outline for my course and there is no book for that course. I'd be very interested in working on it with you." We've been working on it ever since and it's almost done. So that was a big deal.

I did audit committee and prize committee. I did a lot of different committee work, and then I ran for Vice President for Financial Management (VPFM) and won that. I think my year in VPFM was great preparation for being President, because it's not well known, even to the Board members, exactly how the finances of MORS work. Of course it's all changing now.

I had a fairly noncontroversial year as VPFM. We did the standard things, pay for the staff and bonuses and meeting fees and that's pretty much it; approve the budget. Then I ran for President and, surprisingly, won.

Tom Allen was the Immediate Past President that year. Around December, just like always, he started to put together the slate of candidates to run for the Executive Council (EC) for the next year. He asked me if I wanted to run for President. By this time, I had retired and I was at GMU. I had a three-year contract and it wasn't clear whether they were going to renew it or not. I didn't want to run the risk of running for President and then not being able to do it if something changed. Then I might not be able to participate in MORS. So I told Tom Allen, "No." Several months later, he called me back and said, "Right now the situation we're in is that Suzanne Beers is running for President and nobody else. So would you please reconsider?" By this time my contract was squared away and I said, "Sure." I didn't think I could beat Suzanne, to tell you the truth, but I did. So I think one of the qualifications to be President of MORS is that you don't expect or even necessarily want to be President.

Bob Sheldon: How was your year as President Elect?

Andy Loerch: First of all, Willie was really great as far as allowing me to participate in just about everything and the fact that I was here in town facilitated that. So I did everything that I could possibly do. I went to every meeting I could possibly go to. Then Willie got sick and

I got a call from the MORS office saying, "Willie's in the hospital." And I'm thinking, "Whoa."

So I got to do some things that he would have actually done. For instance, probably the most important thing that a MORS President does is run the Sponsors luncheon in the December/January timeframe, because that's where the special meetings topics for the next year are discussed and approved by the Sponsors.

That's very important because arguably one of the most important things MORS does is the special meetings and you've got to not mess that up. But Willie was not able to do that so I had the opportunity to do that, both his year and my year.

Bill Dunn: I was the special meetings chair then.

Andy Loerch: You were the one. The most important innovation was that was the first year we had concept papers on special meetings (I have since heard that in fact a concept paper was a requirement for special meetings, and had probably been ignored for some time). I had no idea what to expect. I'd never been to one of these Sponsors meetings before, but they all had the copies of the concept papers.

It focused the Sponsors. It made them understand better what we were thinking with respect to the potential special meetings, and the conversation was great. There were some instances where they took a couple of the meeting topics and combined them into one. They picked some others.

There was a lot of good discussion at that Sponsors lunch, and after it was over I asked Brian and Natalie, "Was that okay?" They said, "That was great because everybody was talking and contributing." But it was all facilitated by the concept papers. They have become an important component of managing and planning special meetings, and it's something that we've continued and in fact expanded. And that's a very important thing as long as we do business this way. In the past, all we gave the Sponsors were just meeting titles. They each interpreted them in different ways. A lot of the Sponsors lunch was taken up just getting everyone to understand what the meetings were supposed to be about and to get everyone on the same sheet of music.

Bob Sheldon: So this was the first use of concept papers for special meetings?

Andy Loerch: Yes. That was during Willie's year, and that was very important. I had as good a year as a President Elect as you could possibly have and it was largely because I was in town. I was able to do a lot of things and I appreciate Willie's allowing me to do them.

Bob Sheldon: Then you transition to President and the workload explodes?

Andy Loerch: Everybody says that. "Watch your emails double." And that's exactly true. You get emails from everybody. You'll get two guys down in the depths of a special meeting planning committee exchanging emails and copying the President. You get these emails and especially when you're a rookie at it and you're first starting out, you feel like you've got to come up on the net for each one of that type of message.

Later on you realize, no, you don't. Note it and then that's it. The other thing was as soon as I took over, I got a call from the Joint Staff saying, "Come and talk to Major General Hunseker, the Vice J-8." I knew him—he was the lieutenant colonel in the Joint Staff working on DAWMS.

They gave no indication what the topic was, plus Brian was on vacation so I'm on my own. I stopped at the MORS office and I grabbed a couple of briefings because I didn't know what he wanted to hear; coffee mugs and other paraphernalia, and I was off to the Joint Staff to meet with General Hunseker. As we were walking through the door to his office, he said, "The topic is money." That really set the tenor for my whole year because we messed around with Sponsors' contributions the entire time.

The crux of the matter was the smaller Sponsors—Joint Staff, Office of the Secretary of Defense (OSD), and the Marines—didn't want to pay so much. They were in a period where money was tight. It was a capital budgeting problem and they had other expenses.

It got a little bit scary because MORS depended on Sponsor funding. The advantage of having been VPFM was to be able to say, "Here's how MORS does business," and be able to explain the difference between societal money and contract money, how the symposium is run from a financial standpoint, how the special meetings were run, how the *Phalanx*

was paid for, and how the *MOR* journal is paid for.

I walked out of there and that set off a whole sequence of events that got us into a discussion of MORS funding issues. So that was probably the most noteworthy thing in my year. In fact, it generated yet another Sponsors lunch. I think I also hold the record for most Sponsors lunches. We had a special Sponsors lunch on funding and the result of that was to put together a committee from the Sponsors to examine this issue and to determine how they were going to finance MORS.

The chair of that was Roy Reiss. He volunteered to do that, and I tell you, we all know people in MORS that do a lot of work. Roy Reiss does a lot of different things and he's contributed to MORS in so many different ways. He's been the synthesis chair of several different special meetings, and he's a Sponsor's rep for the Air Force.

He chaired this very difficult committee on funding and there was a lot of back and forth on the whole thing for the whole year and, finally, at the symposium at the end of my year, he had what amounted to another Sponsors lunch and sat down and discussed it. The Sponsors all agreed on a new formula for how each organization was going to contribute to the MORS contract.

That took up a lot of energy. It started right away and it lasted the entire year. My goal was that at least Suzanne and whoever came behind would not have to worry about that. I was happy as a hog in mud. I said, "We've got this nailed and everybody's satisfied and everybody's signed up to do this." Of course that happiness was short lived given the changes that are taking place in MORS financing now.

Bob Sheldon: Talk about the annual symposium during your year as President. Any crises?

Andy Loerch: No. It was actually very smooth. It wasn't one of the bigger ones. I think we had about 900 people; I guess that's usual for MORSS at West Point. I got nominated at West Point for the Board and was President at West Point at the annual symposium, although I never went to West Point as a student. The symposium went pretty well. Another issue that took place during the year was a Training Transformation special meeting. The previous year,

Dr. Chu addressed a Sponsors Hot Topics special session at the symposium at Leavenworth. He said, "We're doing a training transformation, joint training, and we really don't know how to assess it. So we would like to gather a group of people for a special meeting on the subject of joint training assessment, and kick it around and see if we can work on that."

That was supposed to happen in the spring before I became President. It got delayed and we ended up holding that meeting in the fall. It was a very successful meeting and I think that was the kind of thing that MORS does very well. When somebody comes and says, "We just don't have a clue what to do analytically in a particular area, to actually get smart people together for a few days to think about the problem and to suggest some ways to deal with it." That was the case for the Training Transformation workshop.

We did the first Capabilities-Based Planning workshop. It was held at IDA and they didn't expect a huge crowd. We had room for 100 people and 200 showed up. It was very good and had great speakers. General Hunseker was one of the speakers. He was upset because there was a tongue-in-cheek *Phalanx* article several months before that made fun of the Capabilities-Based Planning System. Although the article didn't mention him by name, they did mention his position as gatekeeper and made fun of that.

So he addressed all that. All the sarcasm in the *Phalanx* article was said tongue-in-cheek, but it reflected the fact that many analysts were uncomfortable about the changes that were being made, and didn't really understand it all. A lot of information was provided and people were able to ask questions and I think it really did move that process forward as well. We had, I think, a really great set of meetings. We were originally supposed to have five but it was moved back to four.

I think that was the second year of the education colloquium student competition. The colloquium was held up at West Point. That forum has been very successful in introducing MORS and military OR to others besides just military people and people in the academies. So we're getting all kinds of civilian students to participate. I think that's a really worthwhile thing.

I look forward to being involved in that and continuing to participate in the education committee and colloquium in the future as I've done before. It was an eventful year and it went by very fast.

Bob Sheldon: Then you transitioned to being a Past President. What advice has Suzanne solicited from you?

Andy Loerch: Because I was Immediate Past President, I was still part of the EC, and the chair of the advisory committee. But she never formally asked for the advisory committee to do anything. I sat next to her at all the EC and Board meetings and we would discuss various things that came up.

Over time we've talked offline about different things, especially when the Government Accountability Office (GAO) ruling came with the changes in the way MORS is going to do business from now on. There's a lot of discussion there and we've interacted on that. I sent her an email and said, "It's a good time not to be President because this is a hard one. This financial change is a really big deal."

She's done a good job of that and it will be interesting to see how it goes. I think it's a great opportunity for MORS to be a little more independent. I think that would be good. I certainly think that we always have to be connected to the analytical infrastructure of the Defense Department through the MORS Sponsors. But I think that the opportunity to be a little more independent financially will allow us to be a little more independent—period. And I think it'll allow us to be a little more responsive to the membership than we might have been in the past.

I was co-chair of the Homeland Security-Homeland Defense workshop and I think that it took a long time for the Sponsors to come around to the idea that we really did want to engage in Homeland Security and the analysis that is associated with it. Our membership, especially on the contractor side, does work for Department of Homeland Security (DHS) as well as the Department of Defense (DoD).

We could argue that the defense of the country is the defense of the country whether it is being managed by DoD or by DHS. I think that it should be fair game for MORS to be involved in the business of homeland security and that we have a contribution to make. I think we've

come to a position now where we can actually be a little more responsive so that's a good thing.

That was a very difficult special meeting because it took place right around the time of Katrina, and the Federal Emergency Management Agency (FEMA) and the DHS took a lot of gas for what happened. They really circled the wagons and didn't want their people out talking in public. We lost our plenary speakers shortly before the meeting. It was my job as co-chair to find the plenary speakers. There aren't too many worse things that could happen for a special meeting than to lose them right before the meeting. We went into scramble mode at that point to put it back together. Fortunately, we found some very good speakers.

One was from FEMA, who had some very interesting things to say; some very constructive things to say for the audience who were largely from DoD and were participants in that meeting. That actually came out pretty well.

I did the same things as Tom Allen did as well as other Immediate Past Presidents, and that was to set up the slate of potential MORS officers for the next year. I think we've got a good slate this year. We also gather nominations for the big awards for the year, the Wanner Award and the Thomas Award. Steve Balut won the Thomas Award, which is interesting because we teach a class together at IDA in our GMU graduate program on cost analysis. I knew that he had been nominated by Jack Borsting, from NPS. Steve was the first PhD in OR from NPS ever, and he was retiring.

I went over to coordinate the class and Steve asked me, "What are you doing with MORS?" I really couldn't tell him because I knew he had already been nominated for the Thomas Award. Roy Rice won the Wanner Award. He was President of MORS my second year on the Board and I admire him a great deal. The change from being President to being Immediate Past President is significant, but there's still plenty to do. It's structured with respect to when you have to do things and when they're due. I guess my last official act here is to run the elections.

Bob Sheldon: Let's drop back. You retired from the Army at CAA and went to GMU.

Andy Loerch: I wasn't sure what I was going to do. I always wanted an academic job and I

expected to retire in 1996 as a lieutenant colonel. At that time I applied for 20 academic jobs all throughout the northeast. I got zero interviews, and I was thinking, "Why?" I had a PhD from Cornell, which is considered a good thing.

I had been teaching as an adjunct faculty at Virginia Tech and George Washington University for eight years. I had several publications. I was involved in several journals as associate editor. I felt like I had done almost a full-time faculty job in my spare time and I think I'd demonstrated that I could do it. But what I was told was largely that, "You're different. Most faculty members at most universities go from undergrad and right through graduate school and then they become faculty."

Just like a promotion board, hiring faculty is like a cloning exercise. People looked at it and said, "First of all, this guy's old. Second, he's military." So zero interest was generated in hiring me as a faculty member at a university. I wasn't sure what to do, and then making colonel delayed the decision for several years. But in 2000 I picked a retirement date one year in advance. I turned in my papers before they did something else good for me and kept me around even longer.

I started thinking about it and I got contacted by GMU. They said, "We're looking to put a track in military applications in our OR master's program. Are you interested in participating?" Yes, I was. Here I was after all of that lack of success a few years earlier to have this opportunity just show up, and I got hired at GMU. It's a great job. I really enjoy it. I get to teach what I did for a long time. I'm still able to participate in a lot of things.

I do consulting. I do MORS. So I'm still able to do the things I like. I maintain a security clearance, and then I get to teach and have the advantages of being a faculty member.

It's a big transition to go from a place where somebody knows where you are 24 hours a day, seven days a week, to a place where they really don't care where you are as long as you show up to class and your occasional committee meetings.

I really enjoy working with the students. Most of our students are part time. I interact mostly with graduate students.

Bob Sheldon: How many are active duty officers or military contractors?

Andy Loerch: Right now I have four Army PhD students. I have four Army master's students and then we've had a steady stream of Coast Guard people. We're going to get a Navy student this year. So we've got quite a few active duty military people. We also get part time active duty people that need their master's degree. In this field, you need a master's degree to be competitive on active duty or even if you work for a contractor.

I've had whole classes where everybody had a security clearance. We don't ever do classified work there but everybody in the class has a security clearance. Some are government employees. I had a very good student from the Simulation and Analysis Center in OSD PA&E this year. So we get government employees. We have active duty military and we have contractors, lots of contractors.

Probably 90% of our OR program is made up of folks that are doing defense-related work. So that's what made GMU want to do something with military applications in the OR program. We teach military OR—just like I described in the book—at the national and service departmental levels. Rob Alexander, who got a PhD from NPS, teaches combat simulation. So we do have the combat simulation class in the program. As I mentioned, we teach the cost analysis class out at IDA. They trot out the world's greatest experts on the various aspects of defense cost analysis to give the lectures.

Most of the lectures are given by folks from IDA who do research in the various areas. It is a very well-received class. I only teach two of the lectures myself. One is a statistics review, because you've got to do a lot of regression analysis in building cost estimating relationships. I teach the learning curve lecture because that's the basis of the nonlinear costs in the value-added study. I always talk about the optimization of nonlinear costs in the lecture as well. So that's been great. I've really enjoyed it and it's a great second career.

Bob Sheldon: Let's talk about your appointment here at LMI.

Andy Loerch: We had funding for the book to get a literary edit. After all, we had 35 engineers

writing this book. So Aerospace Corporation was going to fund it but my co-editor left Aerospace and went to AFIT for a while, and his boss left Aerospace as well. He was very supportive of the book project and had put a bunch of money in his budget for the edit. Then they both left and we lost the funding.

So I called Brian McEnany at Science Applications International Corporation (SAIC), Cy Staniec and Bill Lese at Northrop Grumman, and some other folks at Calibre and DFI International Government Services looking for corporate contributions to cover the cost of the edit. I would say, "Brian, this is the deal, you think you can help me out?" I think they gave us some money. I called Cy and Bill Lese in Northrop Grumman and they gave us some money and called Calibre—several places—DFI. They all contributed, but still I didn't even have a third of what I needed. I play in an orchestra and the conductor of the orchestra worked at LMI. He invited me to visit LMI and see a project he was working on. It was along the lines of things that I teach. So I came to LMI to see his project and to have lunch with him. That's where I found that Susan Marquis was the Vice President of LMI. I knew her from the Pentagon from my DAWMS days. So I added her to the list of who I was going to snivel money off of and, to make a long story short, through the LMI Research Institute, they picked up the whole tab. They gave us \$19,000 to fund the edit.

It turns out that the other money will not go to waste, that I got from the other places. It costs \$4,000 to have an index put in the book and then we're going to have the editor go through the book for a second look at it and it'll cost us some more. So I will spend all of the donations. But still LMI gave us an order of magnitude more than anyone else.

So I'm a pretty happy guy, right? A few weeks later I got a call from Susan Marquis' administrative assistant at LMI saying, "Could you meet Susan for lunch?" She explained about the LMI Research Institute and how they had just formed it. It was part of a branding initiative for the company, and they had put several company functions under the institute. They include a multi-million dollar research and development (R&D) program. At that time they were looking for an academic person to run

it for a year at a time. A lot of the academic people that had applied were really academics without any management experience. The leadership of LMI saw that there was a significant management function to set up the research institute in the first year. When I showed up, albeit to ask for a donation, they decided to ask me to do it.

I come here two days a week and LMI reimburses GMU so that I could reduce my course load. I have only taught the two military courses that I normally teach this year, one a semester.

Here we manage the internal R&D program. There's a couple of million dollars that LMI spends on internal R&D. They have this sequence of what they call the executive forum in which they pick leaders from all over the government to sit down over breakfast. We sit around and talk about important topics and then we write up the results in the LMI Research Institute journal called *The Public Manager*.

It's been very interesting and I've learned a lot about working in the corporate world, which I never had done before. This is the first place I've ever worked where they actually keep track of your hours. At 3:30 in the afternoon, up pops your time sheet on your computer. This is a big surprise for me. It's been fascinating and I'll do that until the end of this summer.

Then I'll go back and just be a regular faculty member at GMU. I asked to be an advisory director on the MORS Board, but it's not quite the same as being a voting director. So at least MORS activities will be different at that point and no more LMI, so I can go back to being a regular faculty member again and see if I can't get some research done. That's it.

Bill Dunn: You mentioned that you play in the orchestra. Can you tell us about your love for the bassoon?

Andy Loerch: I was a bassoon player in elementary school through high school and never had a private lesson. The guy said, "Here it is. Here's how you put it together. Here's a fingering chart. Knock yourself out." I played it all the way through high school. I got decent at it. Then when I got to college I joined the band. But music was not a big priority at Brooklyn Poly, and the band was awful. So I said, "Forget it. I'm out of here and call me if this ever gets good." They never did.

When my son started to take up music, I started playing the clarinet with him. I used to play the clarinet, too. Then I wondered how it would be to play the bassoon again. So I rented one and it was pretty tough and, ultimately, I found a teacher off the list at a middle school and she was gracious enough to work with an adult. She talked me into buying an instrument because when you rent bassoons they are often not very good.

I joined the orchestra in Manassas. They desperately needed a bassoonist right then because there aren't many bassoon players around. I became the principle bassoonist shortly after I joined, and I've been doing that ever since. I played in three orchestras this year and a quintet and a lot of other groups. I actually get paid to do some of the gigs. I also take lessons at GMU. I take one credit of bassoon lessons every semester. Because I am an employee, GMU pays the tuition but they still make me pay a fee. It's my hobby.

Bill Dunn: Last but certainly not least is your unabashed admiration for the Yankees.

Andy Loerch: I grew up in New York as I mentioned. When I was a kid my father was a Mets fan. Actually, he was originally a Dodgers fan and he was from Queens. But there was a time after the Dodgers and the Giants left town, when I was about six, the Yankees were the only thing going. Then the Mets started as an expansion team but they stunk.

So I'm about 10 or 11 when the Mets show up and I'm thinking, "Okay. I got the 1961–1962 Yankees here—among the greatest teams ever—and I got the Mets and they're lousy; the worst ever. So this is a no-brainer to me." Partly that and partly to be a pain in the neck, I started rooting for the Yankees. I got really serious about it in 1965 when I was 13—and I would watch every single game—and they always televised the games in New York.

Of course the Yankees went south and stayed south for a long time. In fact, they were a pretty bad team until I graduated from college and left. And they finally got good again for a while. The fact of the matter is, though, that when they were really bad in the late 1960s and early 1970s, I was in there hanging tough.

I know there are a lot of Yankee fans out there that jumped on the bandwagon since

they've been so good over the last ten years, but I was there when they were lousy, too. So I deserve to be there and I've been a Yankee fan all my life. I always include the fact that I am a Yankee fan whenever I write a bio. I always include that because that's an important thing to me.

A follow-up interview of Dr. Loerch was initiated at the 79th MORSS, June 21, 2011 at the Naval Postgraduate School, Monterey, CA.

Bob Sheldon: You were recently selected for the MORS Wanner Award. What are your thoughts on that?

Andy Loerch: I was very surprised to even be considered for that award. I looked at the list of previous recipients and was pretty overwhelmed to be considered among them. This is especially true since I have been out of the government for more than 10 years, and this award is largely given to government folks or leaders of analysis agencies or FFRDCs (Federally Funded Research and Development Centers), with a few exceptions. It was very gratifying. I have to say that being recognized right along with Bob Sheldon, fellow Cornellian and my MORS mentor made it even more special, along with having my family at the Plenary. I have to admit that I was concerned that the kids (ages 14, 12, and 9) would get bored and be a problem, but they really came through. Another thought that crossed my mind was in regard to getting what could be considered a lifetime achievement award. My hope is that my lifetime is long from over and that I can continue to contribute. It makes you feel a little old. But I am older than Roy Rice and he got the award several years ago.

Bob Sheldon: You were co-editor of the MORS book *Methods for Conducting Military Operational Analysis*. Talk briefly about the development of that book and its reception by the military OR community. Do you think it has made any impact?

Andy Loerch: I have been told by people in the MORS Office that the book continues to be a big seller, and that it has outsold all the other MORS books combined. The book has been adopted by ALU (Army Logistics University) in their ORSA MAC (Military Applications Course) program, and of course, I use it in my own class. I became involved in the project when Larry Rainey, my co-editor, approached

MORS about publishing a book of this nature. I had two reasons for getting involved. The first was the fact that I had no textbook for my class. I swore that I would never use my own book for a class that I taught since I had had bad experiences as a student when I had teachers that did that. But there really wasn't any other option out there. The second reason was that it has become harder and harder to do the research part of operations research. Back when I started in the OR business, a study always involved a detailed report that included a problem definition, literature review, methodology, data, results, and conclusions; and it was easy to find. You always did a DTIC (Defense Technical Information Center) search when you started on a new project to see what was out there and what others had done. No need to reinvent the wheel. Now, the output of many study efforts is a Power Point presentation, and if you found one with notes you were really lucky. So the purpose was to provide a reference with numerical examples of a set of important military OR problems at the service department and national levels. I believe it has served this purpose. Just the other day, someone told me that they referred to it often, and even carried it when they travel. That is significant given the size of it. I even had a student tell me that he got a used copy from Amazon for a lower price. I guess you have really made it when Amazon is selling used copies. As I might have said in the past, there were 47 contributors—all practicing analysts—that wrote the book. My favorite part is Chapter 19 on Value Focused Thinking, written by Greg Parnell. The book was done as a service project, and no one got paid a cent to do it. MORS pretty much sells it for cost. I'm very proud of that. It has been a few years now since the book was first sold. Clearly updates and changes are needed. We will do that eventually. I was very fortunate to receive a large grant from the LMI Research Institute, plus some smaller ones from other companies. This paid for a literary edit so that it reads like one author wrote it. I had enough so that I could provide a free copy of the book to each author as well. One of the impediments to doing a revision is that it may be difficult to obtain funding. That is something that would have to be worked out with the MORS leadership.

Bob Sheldon: How has the military OR curriculum at GMU progressed over the years?

Andy Loerch: The structure of the military OR courses that we offer is largely the same, but some of the content has changed over the years. The Effectiveness course (the one that uses the book described above as its text) has been updated several times. I now include a block on attacker-defender networks which is taught at the Naval Postgraduate School and is the result of their research. I also introduced some of the work we did in support of the Joint Improvised Explosive Device Defeat Organization (JIJEDDO) as the type of analysis that is done to support military decision making in operations like Iraq and Afghanistan. I have some new case studies that are assigned and I try to bring in new ones as I identify them. These tend to be very unstructured problems with dirty data and a very vague problem statement. Most of the students enjoy working on these, and my purpose is to give them experience in working more realistic problems, similar to the kind they might encounter when they are working analysts. The combat modeling class and the cost analysis class are pretty static with respect to content, but they are relevant and well received.

Bill Dunn: Do you think there is an adequate supply of young analysts in the pipeline??

Andy Loerch: When we first started offering this set of courses, my experience was that the students were more experienced in the field. So in some cases, the class was more like a seminar than pure instruction. Now, however, I am definitely getting younger and less experienced students. I believe that the number of people that were trained to be OR analysts while in the military has been greatly decreased, so contractors and government agencies are hiring

smart young folks with technical degrees and then sending them to school. The discussion in the class tends to be more basic in nature. So, in my experience, the flow of young people into the field is pretty robust. I have also had a pretty steady stream of officers in our program for both Masters and PhD. We have officers from the Army, Coast Guard, Navy, and every once in a while, someone from the Air Force. We currently have a Marine officer who is a graduate of the Naval Postgraduate School and who is working on his PhD part-time. We try to be accommodating with such students, and he was able to take his qualifying exams in theater. I find it particularly rewarding to work with the military students.

Bill Dunn: Do you think the downturn in the economy and reduced federal funding have impacted the OR profession?

Andy Loerch: I don't think that the downturn in the economy is as big an issue as the budget crisis in the federal government. The long period that the government functioned under a continuing resolution affected hiring of students, both in the Federal government itself, and in the contracting community. It also affected research funding. I have been at George Mason University since I retired in 2000, and this is the first time that I have seen students struggle to get jobs. It certainly helps if they have a security clearance when they apply for a job. There also seems to be a reduction in the availability of internship programs as well. None of this bodes well for the OR profession in the short term, but I believe that it is just a down part of the cycle, and it will recover eventually. I haven't seen any downturn in the need for analysis, and that bodes well for the future.