

## 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. Roy E. Rice was President of MORS from 2000 to 2001 and was elected a MORS Fellow in 2003. Dr. Rice was awarded the Barchi Prize twice (59<sup>th</sup> and 60<sup>th</sup> MORS Symposium [MORSS]), the Rist Prize (61<sup>st</sup> MORSS), the Walker Award (76<sup>th</sup> MORSS) and is a Wanner laureate from 2006. Dr. Rice was selected for the Air Force Analyst Lifetime Achievement Award in 2006. Currently, Roy is the Chief Technologist for Teledyne Brown Engineering.

## MORS ORAL HISTORY

INTERVIEW WITH Dr. Roy E. Rice  
June 13, 2007

US Naval Academy, Annapolis, MD  
DR. BOB SHELDON, FS  
MR. ROY REISS, FS

**BOB SHELDON:** We're here for a MORS oral history interview with Dr. Roy Rice. Give us your parents' names and tell us about them and their influence on you.

**ROY RICE:** My father is Charles J. Rice. My mother is Mary Lois Rice. My dad is 83 years old. My dad grew up in Arkansas just outside of Lonoke, Arkansas. In 1940 and 1941 he was the fastest man in the state of Arkansas in track. He was an honorable mention All-State in football – a little bitty guy who was fast as lightning.

He had just finished his first semester freshman year at the University of Arkansas when the Japanese bombed Pearl Harbor, so he joined the Navy and went to fight in World War II. He was in World War II on a patrol gunboat – PG59, the USS San Bernardino.

After the war, my dad came back to Lonoke and married my mom. They had known each other in high school. They dated for one month and then got married. And they've been married for 61 years now, so I guess that worked.

Early in my life, my dad ran a locker plant/slaughterhouse. When I was nine or ten years old, my dad (about age 40) became the Game Warden for the county. Eventu-

ally, in the early 1970s, he was elevated to the head Game Warden for the state of Arkansas. So we all grew up hunting and fishing and living a good country life. My dad stayed with the Army Reserves after the war and retired with 28+ years as a first sergeant in the Army.

**BOB SHELDON:** How did he transition from Navy to Army?

**ROY RICE:** He came back after the war. In about 1951, when my older brother was born, he decided to go back and join the Reserves. He was with an Army unit – the 389th Engineering Battalion in Little Rock. So I grew up in an Army first sergeant's house and he never quite forgave me for joining the Air Force. He says it wasn't bad for a paramilitary organization (*Laughter*).

**BOB SHELDON:** How about your mom?

**ROY RICE:** Her family had been there in the county for years. Her father, my grandfather, had been the County Sheriff back in the 1930s and the 1940s. My grandmother had run the high school lunchroom. It's funny that in our little town, my dad and my mother, my sister, my brother, and I – all five of us graduated from the very same building 30 years apart.

In the early years, my mom had been a telephone operator back when operators had to plug in – I think there were only 47 telephones in town. She had everybody's phone numbers memorized and still does to this day. Years later, she worked as a teacher in the school systems around the county. In 1976, she was elected county treasurer and spent the next eight years in that position. She's been an at-home mom and a working mom in various professions and she's always been very supportive. She's also very musically inclined – plays the piano, sings in the choir at church. She was more of the sedate side of the family. Dad was the outdoorsy, sportsy, kinda guy.

**BOB SHELDON:** Were you interested in math and science in high school?

**ROY RICE:** I was always interested in math and science. I was also interested in history. I was very fortunate to have some very good mentors as teachers. My algebra, trigonometry, and geometry teacher—Miss Ethelee Cheeney—got me very interested in math. To me, math was like a big puzzle – who can solve the puzzle first? It took me a few years to realize that it's its own language, and I kinda like that language.

# Military Operations Research Society (MORS) Oral History Project Interview of Dr. Roy E. Rice

**Bob Sheldon, FS**

*Group W, Inc  
bs@group-w-inc.com*

**Roy Reiss, FS**

*AF/A9I  
Royce.Reiss@comcast.net*

MILITARY OPS  
RESEARCH HERITAGE  
ARTICLE

**BOB SHELDON:** How did you choose your college?

**ROY RICE:** I had never heard that much about the Air Force Academy. But as I said, my mother had been a teacher. A very close friend of the family was the counselor for the school, Miss Carolyn Mann. Right after my sophomore year in high school, Miss Mann had been on a trip out west with some other counselors and had just happened to run through Colorado, and they had a 1½-day tour at the Air Force Academy.

My sister got married a couple of weeks after that, and Miss Mann had come to my sister's wedding. At the reception, she came up and grabbed me and took me over to my mom and dad there at the reception, and she said, "I found the school that you're going to attend." And I said, "What are you talking about?" And she said, "You're going to go to the Air Force Academy." And I said, "Great, where is that – what is it?" (*Laughter*)

So really, she came up with the idea and helped me do all the preparation, write the letters, do the applications. So I have to give credit to her, because she's the one who came up with the idea. Maybe she was just trying to get me out of town and get rid of me.

**BOB SHELDON:** Did you consider any other colleges, or was that your first choice?

**ROY RICE:** Yes, I had applied to Southern Methodist University (SMU) in Texas. I applied for both West Point and Annapolis too, so I had applications in for all three of the academies. I was notified my senior year that I had been accepted at the Air Force Academy. My sponsor was Senator J.W. Fulbright – at the time very controversial in the Vietnam War – but a brilliant man.

**BOB SHELDON:** Let's talk about your Academy experience. Did you go there with a major in mind?

**ROY RICE:** I thought I would major in math because I always loved math, and I picked it as a major right off the bat. Unlike most of the guys who went there at the time, I knew from the very beginning that I was totally colorblind, so I knew I couldn't fly. A lot of folks had flying on their mind and would never have gone there if they knew they couldn't fly. But I knew I couldn't fly, so I wanted to be some kind of engineer or scientist or mathematician.

I got there my freshman year, and I was a little cocky. I thought I knew everything there was to know about math. In the first refresher class, after the first week-and-a-half, they had covered everything I ever knew about math. Now all of a sudden, we're starting this new thing I had never heard about called "calculus". In high school, we had just gone through algebra, geometry, and trigonometry – that was it – I had never had calculus. So here I show up thinking I'm the next Einstein, and within the first week-and-a-half, I'm lost. I found myself having to study pretty hard just to keep up.

**BOB SHELDON:** Do you remember any of your math teachers?

**ROY RICE:** I was very fortunate to have some great math teachers. Jerry McKeuen was one of the first instructors I had there in the calculus class. One of my mentors – and I still maintain contact – in fact, I had dinner with him several months ago – is Dr. Warren Langley. Warren Langley had been a graduate of the Academy and had been an instructor there in the Math Department in statistics and Operations Research (OR) – he had received his OR degree from Georgia Tech – and quite bright. I always enjoyed his classes. I can't mention them all because they were just all so great – all the math professors. Joe Faix was another good one who taught statistics.

I had Captain Sutherland who taught statistics – he also had the Distinguished Flying Cross (DFC). Here's a captain standing up in front of us with the DFC for a mission he had flown through the Mugia Pass between Vietnam and Laos – the most heavily defended area in the history of the world with all the anti-aircraft artillery (AAA) that they had there. And you know good and well this humble guy has been to war and has won the DFC. It's quite motivating to have an instructor like that.

We had another instructor who I found to be one of the best instructors I ever had – Lieutenant Colonel Max Lund. Max taught differential equations. He was one of those professors who was very soft-spoken, easygoing – always walked in and would say, "Take seats, lads." Differential equations are not always intuitively obvious to a lot of people. But he could be instructing up at the board, and just by looking at you, he could tell whether or not you got it.

And if you had that look on your face, he would stop, and he would say, "Okay, Mr. Rice, exactly where did I lose you?" And you'd say, "Well, you lost me back up here." He had a very unique way – he would go back to the point where he lost you, and he would explain it again in a different way, just to give you another look at it. If you still didn't get it, he could tell who in the class did get it – he could look at them and he would say, "Cadet Schmidt, come up here. See if you can explain to Cadet Rice where I lost him." So now, he was not only giving you a third look at this topic, but he was reinforcing it in the other guy. And then if you still didn't get it, he would smile and say, "Why don't you come up to my office at your convenience, and let's have a little extra try at it." He was always there for the students. He was one of the most unique professors. He could just tell by looking at you that you had that "deer in the headlights" look. "Where did I lose you? Let me get you back on track." He was just a marvelous professor. He used to tell us that when he retired, he wanted to go back and teach 8<sup>th</sup> grade math. He said, "You let me grab some kids before they've been turned off to math, and I'll make mathematicians out of them." And I think he ended up doing that. He was a great instructor.

Of course, we had Colonel Lowry, who was the department head back then. There were a lot of wonderful professors in the Math Department – not only good professors, but they knew their stuff. And we were right there in the Vietnam War, and a lot of these guys had served over in the war. So it was motivating to have guys with operational background and a lot of real-world experience, besides all of them being real smart.

**BOB SHELDON:** What years were you at the Academy?

**ROY RICE:** I entered in July of 1971 and graduated in June 1975.

**BOB SHELDON:** What kinds of athletic activities were you involved in at the Academy?

**ROY RICE:** All the intramurals – rugby and football. I was also into boxing. My senior year, I was runner-up in the wing open boxing championship for my weight class – I won't say what weight class that was. That was a lot of pounds and a lot of time ago. But boxing was a lot of fun. I enjoyed the team sports, but I also enjoyed the

individual ones. Some people think I may have taken too many shots to the head.

**BOB SHELDON:** Did you have your nose broken?

**ROY RICE:** I had my nose broken, but not in boxing. I had it broken in another venue.

**BOB SHELDON:** Getting towards graduation, what kind of career did you have in mind?

**ROY RICE:** I had mentioned Captain Warren Langley who was one of my professors. Being totally colorblind, I couldn't fly. But the Academy and the medical clinic down there with the flight surgeon – they bent over backwards to give me all sorts of tests to get me just past the minimum standards on colorblindness so that I could at least be a navigator. I couldn't do that either – I just couldn't pass it. So all of a sudden one day, Captain Langley came up and said, "We've got it set for you. You're going to be a reliability engineer at Tinker Air Force Base (AFB)." I said, "Great. What the heck is a reliability engineer, and where the hell is Tinker?" *(Laughter)*

I guess it was the last semester of my senior year that I found out I was going to be a reliability engineer at Tinker AFB, Oklahoma. So here all the rest of my classmates were going off to Undergraduate Pilot Training (UPT) and I was the only one in the class of 1975 who was assigned at Tinker. Back then, our Air Force Specialty Code (AFSC) was 2891 Developmental Engineer for Reliability Engineering.

**BOB SHELDON:** Did you have a mentor there or someone who trained you how to be a reliability engineer?

**ROY RICE:** I actually did; I was very fortunate. When I showed up, my point of contact and my sponsor was Major John Hertz. He had been an old retread – he had been enlisted. This guy was one of the best reliability engineers I have ever worked with now in 30+ years. He had a ton of experience – a wonderful memory. He could remember lessons learned on programs he had worked before – things that worked right and things that didn't. He could remember Military Standards and he could quote them. He was also a great mentor who took me under his wing. He would take me to meetings and explain to me what I had just experienced. He would do things like, "Lieutenant, you just learned a valuable lesson." And I

would say, "Yes, sir, I sure did. What was it?" (*Laughter*). Major John Hertz was a wonderful mentor.

**BOB SHELDON:** What were your top reliability issues?

**ROY RICE:** We were working on a lot of avionics upgrades to a real old weapons system called a B-52. And here we are 30 years later and the B-52 is still flying. We were again trying to upgrade some of the reliability – some of the avionics on the B-52. I got to work on some of the early logistics requirements, definitions, and development for the B-1. I worked on the air launch cruise missile (ALCM) and the short-range attack missile (SRAM). I got to work on reliability of subsystems on the KC-135 and on the development of the KC-10. I got a lot of experience with air-to-air, air-to-ground, air frames – not many on fighters, but a lot on bombers and cargo. I got to do some of the first reliability work on the Airborne Warning and Control System (AWACS) – the E-3A – before it became operational. It became operational in the late 1970s there at Tinker with the 552<sup>nd</sup> AWACS Wing.

**BOB SHELDON:** Did you have some textbooks to study reliability theory from?

**ROY RICE:** Actually, the Air Force had a good program at the time – the Air Force Institute of Technology (AFIT) taught short courses – AFIT doesn't do much of that anymore. There was a three-week course in reliability theory – reliability and maintainability. I had reported for duty in August. About three weeks later, the first of September in 1975, my office sent me to AFIT for a three-week reliability course. This was eight or nine hours a day, and it was very good. There were about 20 folks in the class. I was the most junior, so I got to make all the coffee and take care of all the little menial details, but it was great.

I'd just come on active duty, and in three weeks, I'm going on my first temporary duty (TDY). I didn't know how to rent cars, hop on airplanes, and go – I had never done that. The Air Force made sure that I was trained in reliability. Now I could go back to my office and work with Major Hertz and understand some of the things that he was talking about. It wasn't like I was just thrown into the fight unarmed.

**BOB SHELDON:** Talk about the theory versus practice of reliability. How did you juxtapose the two?

**ROY RICE:** I didn't find it that difficult. I don't ever see it as an "either/or". A lot of people treat it that way whether it's reliability engineering or any other kind of engineering – I have never really seen it as either the theoretical side or the application side. I think it's both, and I never really had a problem on either side. I find it very frustrating when I work with people who claim to be reliability engineers, and they know a lot about maintenance, data collection systems, supply systems, and all that. But when a real no-joke theoretical issue comes up, they don't understand the math and theory that backs all of this stuff. That's very frustrating for me, because sometimes some decisions are not the best decisions if you don't understand the math that backs it up. I have found that on more than one occasion, people who are labeled as reliability engineers don't really understand the theory behind it, and I think that's not good.

**BOB SHELDON:** Did you get any hands-on data collection work looking at when these systems broke, where they broke, and how they broke?

**ROY RICE:** Yes. Back then, the Air Force had a system called the Air Force M66-1, which did all the data collection for the maintenance across all the systems. We had a group there at Tinker – the organization's office symbol was MMEAM. The MMEAM folks were in charge of collecting all of the maintenance and supply data, both at the retail and wholesale level, for all the major weapon systems. They were right next door to us – we were MMEAR (Reliability). So anytime I needed to do some reliability studies or investigations, they were always there, and I could always go talk to them, and they were just marvelous at that. They had the data. It was run by Mr. Jim Bias, who was a GS-13 at the time.

**BOB SHELDON:** So he produced biased answers (*Laughter*)?

**ROY RICE:** I wouldn't say that. But Jim and his people always did a marvelous job of providing the data and understanding how to cut it the way people needed to have it cut. I also found that nine times out of ten, the problems you were going to tackle – there were no data.

A couple of examples in the 552<sup>nd</sup> AWACS Wing, we had just gotten the AWACS on board in the 1970s. Right off the bat, we were having problems with the surveillance radar. It was experiencing over 180 maintenance man-hours per flying hour. They only had about four airplanes that were on board at the time that had been delivered.

I was contacted as a reliability engineer to go there and find out what the problem was. So I walked in at the wing with my little butter bars (I was a Second Lieutenant). A Senior Master Sergeant there in the avionics shop met me. I told him what I was there for – to solve his problems – and he said, “I already know – I can tell you what the problem is.” I said, “Well, please do.” He opened the door to this room, and there are about four or five airmen there playing cards, smoking cigarettes, and drinking coffee. And I said, “What’s the problem?” And he said, “Look around the room.” And there was nothing but empty bookshelves all around the room.

The AWACS was one of the first generations of aircraft that was supposed to have built-in test (BIT) and fault isolation testing (FIT). The aircraft was going to tell us what was broken and how to fix it and there was no backup plan. We had not bought any technical data. We had not trained our people on how to fix anything because we all thought that the airplane was going to tell us how to fix it. Sure enough, the BIT and FIT weren’t working as advertised.

Here were our guys who had no training and no tech data – they didn’t know how to fix this stuff. We had to hire some of the developers – the engineers who had developed the system – to come sit down and just try anything, “Pull that klystron tube. Try that one.” Well, that didn’t work. It was just hit-and-miss, trial-and-error.

I learned a valuable lesson in that – go talk to the guys who are living with the problem and find out what the problem is. It wasn’t a data problem. It wasn’t an analysis problem. It was just a real-world problem, and there was no backup plan.

**BOB SHELDON:** How long were you at Tinker?

**ROY RICE:** I was at Tinker from 1975 to 1978. The best thing about my assignment to Tinker was meeting my wife, Debbie. We met

in 1977 and married in 1979. I was notified in late 1977 that, next spring I was going to be sent to AFIT to get a Master’s degree in OR.

**BOB SHELDON:** What motivated you to apply to AFIT?

**ROY RICE:** Major John Hertz had told me, “We need to get you in a master’s degree program.” Major Hertz was very good at helping this young lieutenant figure out what he wanted to do next, and how to work the wickets in the personnel system and the education system to make sure that I did go to AFIT and get a degree. If it hadn’t been for him, it would not have crossed my mind for a while.

**BOB SHELDON:** And you picked OR?

**ROY RICE:** Yes, I picked OR, because I viewed OR as problem solving and getting to use math, and that was what appealed to me.

My major at the Academy had been math. They had three tracks for the math majors at the Academy, theoretical, applied, and OR. OR was really run out of the Math Department – now it’s run out of four departments. I had a lot of OR classes at the undergraduate level. I was excited to go to AFIT and pick up a master degree – I thought that was going to be a good opportunity.

**BOB SHELDON:** You were in the OR math track?

**ROY RICE:** Yes, I was in the OR math track at the Academy. When I went to AFIT, it was the graduate OR program – the class of GOR-79D. We were going to graduate in December 1979. We got there in May 1978, and we took a one-month immersion in a calculus refresher and some other classes. I went as a first lieutenant. Of the sixteen guys in my class, the majority of them were already captains. I believe nine of the sixteen in my class were rated. We had C-5 pilots, C-141 pilots, guys who had been instructor pilots, and a couple of guys who had been in fighters. These guys were coming in from an operational background to get a master’s degree, and then they were going to go out to Air Force Studies and Analyses Agency (AFSAA, now AF/A9) or to Headquarters, Air Mobility Command (AMC), and serve in an OR slot.

I moved in as a young junior guy with a bunch of senior captains who could mentor me. And I made some very dear friends. I had some great instructors at AFIT.

**BOB SHELDON:** Talk about some of your instructors there.

**ROY RICE:** Dr. Al Moore in the Math Department – Al was my thesis advisor in reliability – he taught reliability in the Math Department. Even though I was in OR, I could pick a thesis topic in the Math Department, so I picked a thesis topic under him. I had a couple of statistics classes from him. The department head in OR was Colonel Bob Margenthaler who taught several classes. He taught us several real-world application OR classes – a very good instructor. Professor Keith Womer – I think a lot of people know Keith through INFORMS (Institute for Operations Research and the Management Sciences). Keith was our instructor in microeconomics – a very good instructor. Captain Roy Black taught a new thing for us called computer science, where we had to go and type our programs – our code – on cards, put them in boxes, and then submit them to the big mainframe-in-the-sky at night, and come in the next morning to see if our programs had run. That was an interesting time. We didn't have laptops – we barely had calculators.

I also had a classmate Captain Tilford Harp – Til had been a C-5 pilot, was a great mentor, and turned into a very dear friend of mine. I actually proposed to my wife in Til's house – they were having a get-together over there that night. I also had a fellow student who I went to AFIT with and then eventually went to the University of Texas (UT) with – Captain Mike Schiefer. Of all the analysts I have ever known in the Air Force, Mike has to be rated in the top five. He has to be one of the smartest people I ever worked with. His mind was always working. He took very few notes in class – he could just absorb it. He was a very good thinker.

**BOB SHELDON:** Where did he go with his career?

**ROY RICE:** He was in personnel. After AFIT, he was assigned to AFSAA. And he wasn't at AFSAA more than about a week, and General Billy Boles over in the Air Force Deputy Chief of Staff for Personnel (AF/DP) snatched him away from AFSAA and brought him back into the personnel analyses world. A lot of people don't know about his analyses in the personnel field because it's not a glorified career. But he probably applied more analytical

rigor to decision making in personnel than any man who's ever worn a blue suit. He retired the year before last – I believe it was in 2006 – in San Antonio at the personnel center.

Anyone who's ever worked with Mike has said he's one of the sharpest minds – one of the best mentors. He has mentored more junior analysts than you can shake a stick at. Mike was one of the best students at AFIT. Not only did he graduate with a 4.0 at AFIT, but he had the highest A in every class we took. He's just a brilliant man. I've always thought the world of Mike.

A few years later, he and I ended up at UT together working on our PhDs. We shared an office – his desk and my desk were right next to each other. We used to go fishing together, did some auto repair together, worked on Volkswagens, and we rebuilt engines together. Mike is a great guy – one of the great guys you run into in your career that you share a lot with.

**BOB SHELDON:** What was your thesis title?

**ROY RICE:** "Incorporation of Asymptotic Normality Properties of the Binomial Distribution into a Monte Carlo Technique for Estimating Lower Confidence Limits on System Reliability". It was doing a Monte Carlo simulation on some binomial parameters to look at confidence intervals at the extreme low end and high end of  $p$ .

**BOB SHELDON:** Did you have an Air Force customer?

**ROY RICE:** Mr. Joe Meli was the sponsor at Aeronautical System Division, ASD/ENADC – now it's changed to Aeronautical Systems Center (ASC). There were several folks down there who were using it.

**BOB SHELDON:** Did you have a job lined up before you left AFIT?

**ROY RICE:** Yes, I had contacted an old friend of mine when I was stationed at Tinker. We were doing a lot of work with a new model that the Air Force was using called LCOM – the Logistics Composite Model. We had to do it all by mainframe at the time. There were two primary users of LCOM: Tactical Air Command (TAC - now ACC) and Air Force Test and Evaluation Center (AFTEC), now Air Force Operational Test and Evaluation Center (AFOTEC). Colonel Dick Gunkel ran the analysis shop at AFTEC LG-4 and he got me out there. That

was another good tour. I moved in as a very junior captain. My immediate boss was Major Lynn Hardwick, an AFIT grad. There were four guys there in the office who were AFIT OR grads. We did some fun stuff – getting to do some design of experiments and a lot of logistics analysis, working with some of the test programs. The first two programs I got to do test management and test analysis were programs that I had already been working some reliability requirements; they were the E-3A AWACS and the B-1B.

In the late 1970s, President Carter had canceled the B-1A, but President Reagan had brought it back. We were just starting to do some planning for some testing for the B-1B.

AFTEC was where I first met Dr. Marion Williams. I realized real quickly that I had been very fortunate to find a mentor like Dr. Williams. His door was always open, and he was always open to new ideas. Here was this young crazy captain who would come up with some goofy analysis ideas. Marion would help me package those to sell them to the colonel or the general. Marion is one of the bright spots of my career; I luckily ran into someone like Marion as a mentor and got to work with him, and I've been fortunate to have him as an associate and a friend now for 30 years.

**BOB SHELDON:** What's your reaction to moving from the reliability community to the test community?

**ROY RICE:** It wasn't bad; the processes are a little bit different. The customers are a little bit different. In Reliability Engineering you're designing Reliability into the systems; in Test and Evaluation (T&E) you're testing to see if you did your design job well. When you peel back the onion, it's all back to math, and that's the glue that holds it all together. So when we're doing design of experiments, hypothesis testing, and sample sizes, it's still back to math – probability and statistics.

I found the testing community to be one of the most educational jobs I ever had in the Air Force. Because to work in the testing community on new weapon systems, you have to be immersed in what's going on in terms of program-matics on Capitol Hill, what's being funded, and what's not. You have to work with the operators who are going to use these systems. You have to

work with the developers who are the engineers and scientists who are bringing these systems to fruition – who are the program managers. You have to work with the logistics people who are going to support them.

I think the testing community doesn't give themselves enough credit for being one of the most educational career-broadening professions – because you really have to work with everybody. I found it to be a very educational – I learned a lot about the rest of the Air Force.

**BOB SHELDON:** How do you feel your academic background at AFIT prepared you for your work at AFTEC?

**ROY RICE:** I thought it was outstanding. I've always thought that AFIT and the Naval Postgraduate School (NPS) do a marvelous job of supporting the service needs. If the service needs people with strong backgrounds in statistics, time series, or simulation, NPS and AFIT will make sure that happens. I thought AFIT had me well prepared for my job as an analyst in the testing world.

**BOB SHELDON:** Did you use statistical software for all those design of experiments?

**ROY RICE:** We had to use Statistical Package for the Social Sciences (SPSS) to do a lot of that. We did not have desktop computers yet – we still worked with slide rules and mainframes. We had handheld calculators, but they weren't all that powerful. We had to do a lot of matrix manipulations by hand. We were doing an availability study – actually a dormant reliability study on cruise missiles. I came up with an idea for solving this as a Markov chain – because the missile will come in a full-up state, and it will degrade into different discrete states. I thought that it'll do that over time, so why don't we analyze that as a Markov chain? You've got states and we can figure out the transition probabilities. So, if you're going to calculate the steady state probabilities or first passage times, you have to do matrix multiplications. If you've got a 5x5 matrix – back in 1980, you didn't have MathCAD and Mathematica – you had to do it by hand.

**ROYCE REISS:** That was the era of the programmable calculator. Were you busy programming them too?

**ROY RICE:** Yes. We were using Hewlett Packard (HP) 35s, HP45s –there was an SR50

from Texas Instruments. I'll go back to my Academy days – at that time, when you came in, you got a slide rule. And there was a class during the summer to teach you how to use it. During my senior year at the Academy, one of the projects that one of my OR classes did was a cost benefit study on what kind of calculators to buy the incoming freshmen. They were going to get calculators where we had slide rules.

I remember my roommate, Ralph Rhye, a Civil Engineering major, was one of the first people at the Academy to have a handheld calculator. He bought an HP35 for \$225 at the Cadet Store. Today, you've got watches that have more computing power than that thing had. But he bought one of the first ones as a civil engineering major and it had the Reverse Polish logic. The rest of us were still slipping slide rules.

**BOB SHELDON:** At AFTEC, who did you brief your results to?

**ROY RICE:** I hadn't been there too long, and I was getting to use the LCOM model. I had Senior Master Sergeant Larry Babb, who was just an absolute whiz at running this model. He conducted a crash course teaching me more about the inner workings of the model, and how to do analysis with it. I'd only been there a month or two, and I had to brief some results to a NATO (North Atlantic Treaty Organization) council on the NATO AWACS, NATO E-3A, at Hanscom AFB – it was my first trip to Hanscom.

But we were doing a lot of studies at the time on the impact of our built-in test and fault isolation, false detections, cannot duplicates, and retest okays. You're pulling parts off airplanes that the diagnostics say are bad, but the parts are actually still functioning properly. What does that do to your supply pipeline? What does it do to your ability to generate aircraft sorties? It was a lot of fun doing studies.

Briefing some of those analysis results wasn't all that contentious. It was the fact that you had to go to some of the senior leadership of the Air Force and tell them that they had paid all this money for this built-in diagnostic that wasn't working. That got a little contentious.

At that time, our commander was Brigadier General (BGen) Howard Leaf – the commander of AFTEC. He was a wonderful boss. If they had to brief Headquarters TAC or Headquarters Strategic Air Command (SAC), you may spend

a day or two getting BGen Leaf up to speed on the analysis results and how you got them. But once you had him up to speed, there was never a better guy to go with you to run interference because he knew his stuff. He had a mind that was just amazing. He remembered everything. And to go with him and watch how he would brief – or how he would sit there and protect you while you were briefing General Creech, General Dixon, or any of those guys. It was an education and a motivation for a young officer to see a flag officer who was that on top of things and also would protect you. BGen Leaf was a marvelous boss.

**BOB SHELDON:** What years were you at AFTEC?

**ROY RICE:** I was at AFTEC from January 1980 until August 1983. I got to do a lot of tests – a lot of work with the folks out at Edwards AFB – the testing community out there. I learned a lot from Mr. Jan Howell – he ran the Reliability and Maintainability shop at Edwards. I got a lot of exposure to people who had been in the business for a long time, and I got to learn from those guys.

**BOB SHELDON:** What were you looking for at the end of your AFTEC tour?

**ROY RICE:** I had been contacted by my career monitor at Military Personnel Center (MPC). He said, "Why don't you go pick up a PhD?" At the time, I didn't really know if I wanted to go back to school. But they convinced me, "If you can find a school that will accept you" (*Laughter*).

I quickly found out that a lot of schools at the PhD level require you to be proficient in a second language by the time you graduate. Being from Arkansas, English is a second language.

I had talked to a few people who had suggested UT Austin. I contacted UT, and they had been running several Air Force officers through at both the masters and the PhD levels. I did some research and found out that they had a very good OR program and an outstanding faculty. So I chose them, and I applied. Luckily I had scored high enough on my Graduate Record Exams (GREs), and had done well enough at AFIT, that I was accepted at UT. I left AFTEC in August 1983 and enrolled at UT Austin. I tell people I couldn't hold a job – the Air Force just decided to send me back to school again.

**BOB SHELDON:** Who were some of your noted professors there?

**ROY RICE:** I had some of the best professors. Dr. Bill Lesso ended up being my dissertation advisor. I had a dual program dissertation, both with the Electrical Engineering (EE) Department and the OR Department. I was solving the Optimal Power Flow problem with generalized network flow programming. I was solving an EE problem with OR techniques, so I had a dual chairmanship on the committee – Dr. Mack Grady from the EE Department and Professor Lesso from the OR Department.

**BOB SHELDON:** Was Tom Curry there at the same time you were?

**ROY RICE:** Yes. There were four Air Force officers there together. The four were Jim Robinson, Tom Curry, Mike Schiefer from my AFIT days, and me. We all shared an office in the Mechanical Engineering Department. There were also two already there – Captain Stu Kellogg and Captain Mike Baum. Both of them were in the PhD program and were just finishing up, and they showed us around.

I learned a lot from Jim Robinson and Tom Curry. Tom graduated and went back to the Air Force Academy to teach after he left UT. Jim Robinson went to teach at AFIT. Mike Schiefer went back to the personnel world, and I went back to Air Force analysis.

What a bunch of great professors. There are two tracks for OR at UT Austin. You could either be in the engineering school or the business school – I chose the engineering school. In the business school, we had Professors Abe Charnes and Phil Cooper. We also had Professor Leon Lasdon in nonlinear programming – one of the absolute class act gentlemen in the world in nonlinear programming – probably one of the three best, if not the best, in the world.

On the engineering side, OR was in the Mechanical Engineering Department. We had Professor Lesso, who was a wonderful all-round analyst.

Professor Paul Jensen taught Industrial Engineering, network flow programming, and dynamic programming – an absolute gentleman – a wonderful professor who really cared for the students.

Professor Wes Barnes taught optimization, linear programming, and some stochastic courses.

He was a brilliant man and knew how to get the information to the student. He would work you to death – he was a hard professor.

Professor Jim Wilson eventually left us and went back to Purdue. He got his PhD at Purdue and worked with Pritsker up at Purdue. He was a simulation and stochastic processes genius – one of the most organized professors I had ever met. He would come in and lecture on the blackboard—he would write all his notes up there. At the end of class, he would hand us Xerox copies of everything he had just put on the board. He was the most organized man – a great professor. He wanted to make sure we got it.

And Professor Melba Crawford taught us statistics and Box-Jenkins time series. She was very conscientious, intense, and cared for the students – she really cared that we understood and we got it.

We had a real close knit group. I don't think I ever had a bad or wasted class.

**BOB SHELDON:** Talk about your dissertation.

**ROY RICE:** Professor Lesso called me in just when we were to take the requisite three nights of qualifying exams. We had to pass the qualifier so we could start our dissertations. He had called me in with the assumption I was going to pass my qualifiers (*Laughter*). He was looking for a student who would tackle a problem he'd been thinking about for a long time. He said, "I don't know if it can be done, but I've just got this gut feeling that the Optimal Power Flow problem can be solved with network flow programming."

If you know anything about the Optimal Power Flow problem, you've got generating plants that generate electricity. And the power has to go down all these transmission lines to all these multiple cities and different places that are consumers of power. So you've got "sources" and "sinks" – you've got suppliers and demand of electrical power. And there are losses that go down these lines. He says, "It's all a big network. Why can't we solve it as a network?" What you're trying to do with the optimal power flow is to generate the required amount of power at the least cost. Your cost of generation is a nonlinear function that we made linear by piece-wise approximations. So you're talking, particularly out in the western area of the

United States, about a 1,500-node network with supply and demand nodes and all these transmission lines.

The trick to the optimal power flow problem is that – and this is where the EE problem comes in – the power is a complex number. You have real power and reactive power, so you've got a real number and an imaginary number. And at each of the nodes – not just the supply nodes and demand nodes, but where all your lines are coming in and going out – you have to maintain Kirchoff's first and second laws (voltage and current), flow in equals flow out. You have to match voltage and current. The trick there is that the real power – the *real* number on the power that's going down the lines always loses (negative gains) – the gain is always a negative number – you have losses down the lines. With the *imaginary* number, according to Kirchoff's laws and the complex numbers, sometimes the reactive power can increase, and sometimes it can decrease. At each node, you have to make sure that you haven't violated Kirchoff's laws.

Applying some of Dr. Jensen's network flow programming techniques to the EE problem was a little tricky. I had to come up with a mathematical expression for the losses and the gains down the lines as a complex number.

Since I wasn't an electrical engineer, Professor Grady made me take a couple of courses in the EE Department to make sure I understood how to do all this. One day, I was doing some derivation of the gains and losses down the lines. I didn't know it at the time but I had made a mistake in my derivation. I walked into Professor Grady's office, and I said, "I've proven Maxwell wrong." He didn't even look up from his table – he just pointed out the door – "Get outta here." (*Laughter*). Shortly, I found out that I had some sign changes that I hadn't taken into account. So my negatives were positive and my positives were negative.

It took me about three or four months to finally get this derivation down. And once I got the derivation down, it almost looked trivial, and I was a little concerned. I went to Professor Lesso and said, "Here is the secret. Once you do this, it's trivial, and I'm kind of embarrassed." He says, "No, that's what research and dissertations are all about. You found something that no

one else has ever found. It's not a contest of who can derive the longest beta function or who can do triple integration the fastest. You found something no one else has found, and now you found a way to apply it."

So we could now solve the optimal power flow problem using generalized network flow programming – we didn't have to use some of the nonlinear techniques that other people were using that took hours and hours to run. Now we could just solve it. At that time, we were starting to get the little Apple computers that you could plug the little floppies in. And we could actually solve it on desktop computers – solve this big problem in just a few seconds.

We could solve it just fine, but we were approximating the nonlinear objective function with piece-wise linear. So we could prove that we were within x percent.

**BOB SHELDON:** Did your personnel manager have a job lined up for you while you were at school?

**ROY RICE:** Pretty much. There was the division chief's job for OR at the Logistics Management Center (LMC) – now called the Logistics Management Agency (LMA) – at Gunter Air Force Station, which was across town (Montgomery) from Maxwell AFB, AL. I graduated from UT in 1986 and took the job at Gunter.

The director for the analysis shop was a civilian named Ron Hare. Ron had been on the math faculty at the Academy when I was a cadet – I just never had any classes with him. Ron was also one of the best civilian bosses I ever had – he was a GS-14. In my entire Air Force career, he probably wrote the best Officer Efficiency Reports (OERs) I ever got. He was a marvelous writer. He was also a brilliant statistician himself and a good analyst. I learned another lesson there about taking the time and effort to write good OERs for your people – good appraisals. Ron was one of the best.

**BOB SHELDON:** What kinds of projects did they throw at you?

**ROY RICE:** In fact, this is where you and I cross paths, Bob.

One of the first things I worked on came from our deputy director who had been an old F-105 driver in Vietnam. He had retired and worked a lot at the operational level. He came up with the idea to develop a wing-level assessment

model of sortie generation and availability without going to the details of the LCOM model or the big Theater Simulation of Airbase Resources (TSAR)/TSARINA models – could we build a smaller model? At that time in all the services, we were getting the Z100s, the Z200s, 248s, and the desktop computers. Everybody was really interested in automating everything and writing little programs. That's where I built the expected value based logistics capability assessment model (ELCAM.) You (referring to Bob Sheldon) turned your nose up at it when you were out on the faculty at the Academy, and rewrote it in Pascal for an airbase operability model that you were doing.

I also had inherited a big retail level supply program from one of the guys who had just left. It was called the Aggregate Model and it came from Professor Wagner who had done some work at North Carolina solving a large aggregate problem in the inventory field, and it was using Lagrangians. It was a chance for me to go back to my old textbooks and try to refresh on some optimization techniques using Lagrangians. It was a fun project and I got to keep my hands dirty.

At the LMC our job was to tackle logistics problems for the operational bases, not the Headquarters Logistics Command. We got to go to the different operational bases like Shaw AFB and other places like that to solve real-world base level logistics problems: supply problems, maintenance problems, and transportation problems. I got to solve some transportation problems over at Kaiserslautern, Germany, on one of the projects.

**BOB SHELDON:** How did you approach those problems?

**ROY RICE:** At that time, everybody was becoming so enamored with the computer – “Let's automate everything.” When the Apple computers were coming out, Professor Lesso told us at UT “Everybody be careful, because now all of a sudden we're just going to blindly start throwing everything on computers without taking a look at the process that you're operating under. If you're doing something real dumb real slow, why do you want to put it on a computer and do something real dumb real fast?”

Sure enough, one of the projects we tackled in Pacific Air Forces (PACAF) was keeping track

of some of the vehicles across 7<sup>th</sup> Air Force – in Korea and Japan – all over the Pacific theater. There was a system where people would check motorpool vehicles out, and they would fill out triplicate forms and send them into PACAF Transportation. Transportation was trying to keep track of all these things and the Transportation Director at PACAF, PACAF/LGT, wanted us to come over and automate the system.

Two or three of us went over there, and we started looking at the problem. We went to Taegu Air Base (AB), Kunsan AB, and Osan AB, Korea, and we talked to the people out in the field who were managing the process. And come to find out, nobody at headquarters was ever even using the system. They would get these slips/forms and put them in a box. After 30 days, they would throw the old ones away, and that was it. I sat down with a couple of the Colonels and I said, “If you get a report that one of the trucks hasn't been turned back in to the motorpool at one of the remote bases, do you hop on a plane, go over there and find it, and solve the problem?” “No.” What we really found out was, nobody was using this process whatsoever – they were just passing paperwork back and forth. The guys at the bases were solving the problem. If a truck was missing and hadn't been checked in, they would track the individual down and get the vehicle. It was just a bureaucratic process, so it was not really a problem; nobody was really going to use the solution anyway, so my recommendation – our recommendation – to the director of transportation was instead of automating this process, why don't you just do away with it?

We briefed him, and he looked around the room at his senior master sergeants and lieutenant colonels, and they kind of sheepishly said, “Well, why don't we just get rid of the whole policy?” So they ended up rescinding the policy and doing away with the entire process. I didn't really solve any great mathematical problems; we just did away with a process that wasn't being used.

It taught me a lesson that before you just jump in there and start writing a code and building a model and solving a problem, why don't you define the problem first? And come to find out, it was a problem that didn't need

a technical solution, it needed a policy change. Imagine that. So define the problem first.

**BOB SHELDON:** Talk about some of the other folks who worked at the LMC.

**ROY RICE:** Wayne Faulkner ran the Supply Analysis Branch; he did all the supply analysis. All the supply analysts worked for him. Wayne had done his doctoral work at SMU; he never finished his dissertation, but Wayne was a brilliant statistician, knew the supply system left and right. Gosh, he was a smart guy; you could always go get great ideas and bounce ideas off of him.

In the Supply Directorate, we had a couple of great guys. The leader of that supply section was Major Doug Blazer, probably one of the smartest guys in Air Force supply systems you could ever meet. He had a couple of young guys working for him, Steve Reynolds and Bob Burlison, both of them good young captains. I believe Steve ended up going to the University of Alabama and getting his PhD. Again, a bright young man, knew a lot about supply. Those guys could solve some tremendous supply problems.

**BOB SHELDON:** In this job you were closer to the operational Air Force. What was your view of the real Air Force?

**ROY RICE:** One of the things that we always tried to do was to get our young lieutenants into real world problem solving. We would get them right out of the Academy, or right out of AFIT, and they were smart, academically smart, but they had never gone out and solved real-world problems. So that's one of the things we would do is try to get them out there to Shaw AFB, Langley AFB, Nellis AFB, and talk to the customers who were having the problems.

We wanted them to come back with hydraulic fluid and JP4 (Jet Propulsion Fuel, Type 4) on their uniforms; where they really understood where the problems were. That was a fun experience. I had a very bright analyst who worked for me there, Dr. Tom Gage. He's about a generation ahead of everybody else when it comes to forward thinking about new technologies and analytics; brilliant mathematician. He worked for me, but I learned more from him than he learned from me. Tom and I both worked for Lt Col (Dr.) George Orr – one of the smartest men I ever worked for.

**BOB SHELDON:** For the record, I tell people you were in a prison there in Alabama.

**ROY RICE:** Well, we actually were. The office building that the LMC was in was an old prison. The walls were reinforced concrete about three feet thick. There were bars on the windows. My office was actually an old jail cell, which might be appropriate. But it was a very good assignment. Colonel Al Smith was our commander; a wonderful gentleman. I learned a lot from him. Ed Jones was the deputy, a retired Air Force guy – I called him Mr. Ed. A smart man and great leader.

**BOB SHELDON:** Coming up at your end of tour there, what kind of job were you looking for?

**ROY RICE:** The Goldwater Nichols Act had been passed in 1986. In 1988, I got a call from my career monitor at MPC that I was offered a chance to go to the Armed Forces Staff College (AFSC) at Norfolk, Virginia, and get my joint intermediate Professional Military Education (PME), and then probably come out of there with an assignment to a joint billet.

I left the LMC in August 1988, and went to Norfolk to the AFSC. It had originally been a much longer course that had just been cut back to a six months course. Probably one of the best six months I had in the Air Force; I learned a lot about my sister services. We had a great seminar. I learned a lot from my classmates about how the Army, Navy, and Marines do business - and what those little rectangles are with the Xs on top of them.

I learned a lot about the Navy and the Marine Corps. We had an Australian exchange officer, Wing Commander Peter Bennett. I learned a lot about another foreign country and how their air forces and navy work. It was a good experience, learning a lot about deliberate planning. I thought it was a good assignment. Our commandant at the time was a Marine two-star named Major General Jack Dailey; very motivating, a good commandant.

Our three seminar leaders were Lt Col Vickery from the Air Force, Lieutenant Colonel Sprietzma from the Marine Corps, and Captain George Drummond from the Navy. All three were very knowledgeable officers, very joint, very good instructors, and had a lot of operational background. Captain Drummond had

been the air boss on the Libyan raid and had some interesting operational stories to share with us.

**BOB SHELDON:** Did they have a job lined up for you when you went there?

**ROY RICE:** No. While I was there, I was contacted by Army Brigadier General (BG) Dave Robinson and Vince Roske in J8 on the Joint Staff. They wanted me to come to J8 since I was getting my joint stamp, and with my analysis background, they wanted me to head what BG Robinson called his Directed Research Program: how to get the analytical environment in J8 up to at least current, or maybe even get ready for the 21<sup>st</sup> century.

That was lined up shortly after I got there. I knew ahead of time that I was going to be going to the Joint Staff, and I was looking forward to it. I thought that would be a great opportunity as a young major.

**BOB SHELDON:** Let me back up. When did you make your first MORS presentation?

**ROY RICE:** I made my first MORS presentation when I'd left UT and I'd gotten to the LMC, and I had been doing some work on the ELCAM model. Professor Joe Boyette - Joe had retired from the Air Force and had been teaching at Auburn University at Montgomery. He had been stationed there and done some work at the LMC. He was big in MORS, and that was when we had the annual MORS Symposium (MORSS) at Montgomery in 1987.

Joe was the chair of Working Group 19, Logistics, Reliability and Maintainability, and I was his co-chair. And that's when I made my first presentation at that symposium, and I was hooked. What a great opportunity to see all these people doing this great overall work across all these different areas. I was hooked on MORS from the beginning.

I don't think I missed a MORS meeting after that.

**BOB SHELDON:** Were you well prepped by the AFSC for going to the Joint Staff?

**ROY RICE:** Absolutely. As a matter of fact, there's an interesting story. I play a game that's similar to golf; I won't claim I'm a golfer - I'm a hacker. But shortly after I got to the Joint Staff I went out to Andrews AFB one day to play golf, and coming out of the pro shop was General Dailey, our former AFSC commandant. He

had left the AFSC and gone back to Marine headquarters; he eventually became the deputy commandant of the Marine Corps. He recognized me as he was coming out of the pro shop, and we shook hands.

He asked me what my job was, and I told him I'd left the AFSC and had come to the Joint Staff, and his question was, "Did we prepare you for it?" That stuck with me; here's the former commandant, he's not there any more, I'm not there any more, but he was still concerned with, "Did we prepare you for your job?" Absolutely! The stuff that we learned at the AFSC in terms of deliberate planning, what the services do, even the details of building a TPFDD (Time-Phased Force Deployment Data) and matching those to OPLANs (operational plans) in conflict; they prepared us for everything.

I thought the AFSC did a great job, and I was fortunate. Here I moved into a job at the Joint Staff that I was actually prepared for. And the place I was assigned, I was blessed by being surrounded by great people. I had BG Robinson as the J8 at the time who ran the directorate I was in. Vince Roske was his deputy, and of course Vince and I got to be dear friends; the division that I worked in was run by Mr. Tad Clark, and I might also say that Vince was his predecessor, and even before that was Dr. Bill Lese.

With Mr. Clark as our division chief I was surrounded by some of the finest officers and analysts - at that time, Army Major Mike Baxter; Marine Major, soon to be Lieutenant Colonel Zeke Cavazos; Army Major, soon to be Lieutenant Colonel Ken Yealey; and Navy Commander Lee Hackney. She was just another brilliant analyst, and great. I was surrounded by some extremely fine officers and good analysts; I couldn't ask for a better environment.

In a couple of the other divisions that I got to work with, there were so many wonderful people who were doing campaign analysis, the Total Force Capability Assessment (TFCA). They were doing analyses in all theaters using big red arrows and big blue arrows, and then getting to work with the Modern Aids to Planning Program (MAPP) for the J8 organizations in Unified and Specified Commands. Here I got to go see all the analysts at the different CINCs.

It was a great job – probably the best job. I actually woke up in the morning looking forward to going to work.

**BOB SHELDON:** What were some of your major projects you worked there on the Joint Staff?

**ROY RICE:** After a year or so I was moved over to the Force Design Division (FDD). We were working for Air Force Colonel Doug Mang, who left shortly after that, and then Colonel Leroy Barnidge, who eventually ended up being a numbered Air Force commander and two-star. Leroy was a great boss over the Forces Design Division. At that time, General Colin Powell was the chairman, and BG Robinson was our director. General Powell was coming up with the Base Force, and a lot of our guys were doing some of the analysis. It was a very close-held downsizing exercise of the base force. Captain (USN) William Sadler was there working on the Base Force. Also Captain (USN) Wally Massenburg, who just retired at NAVAIR, (Vice-Admiral) was there; I got to be good friends with Wally.

There was also Marine Colonel Paul Pugh, along with the other great guys who were doing a lot of analysis studying how we downsize our forces. How do we go from 18 active divisions to 12? How do we go from 36 fighter wings down into the 20s? How do we go down to 12 carrier battle groups? How do we afford this? It was some interesting analysis; some great work done by the staff officers, and again, you had people like BG Robinson who provided top cover for all the stuff we were doing.

There were also a couple of other things I participated in. On our team was Army LTC Dick Sherwood, Commander (CDR) Vern Wing, and myself; so we had Army, Navy and Air Force, just the three of us; and BG Robinson put us together and called us his analytic SWAT team. The three of us got to do a lot of “fun” analyses; hopefully, we weren’t too much like loose cannons running around.

One of the first significant things that we were involved in was back before the Bottom Up Review Update (BURU). In 1990 and 1991, Congress directed that the Joint Staff conduct a Mobility Requirements Study (MRS), and the folks in J4 took the tasking; they only had a year to do it. J4 struggled with it for a while, and BG Robinson stood up one day and said, “J8 will

take that.” So, with only a few months to go before we reported to Congress, he dumped that on Colonel Sherwood, Commander Wing, and me, and we pretty much had free run to do whatever we needed to do. We got to work with Ms. Debbie Christie and Mr. Jim Johnson and the talented analysts in the Office of the Secretary of Defense (OSD) – it was my first exposure to those guys over there. We also got to work with some of the most talented analysts at the United States Transportation Command (USTRANSCOM) and AMC. We got to work with some of the interesting folks at RAND.

We developed our own optimization approach to that problem. Our job was to develop the strategic lift requirements for the 21<sup>st</sup> century. This was in 1990-1991. We developed an optimization methodology to ensure that we could meet all of our lift requirements at the minimum cost, finding the optimum mix of airlift, sealift, and prepositioning. It was the first time we started looking at what happens if two major scenarios pop off nearly simultaneously.

At that time, Dr. Bill Lese and LTC (Dr.) Cy Staniec and the guys at Program Analysis and Evaluation (PA&E) were doing the two Major Regional Conflict (MRC) studies – two nearly simultaneous MRCs. I think it was one of the first times we were really pulling together force structure analysis and strategic mobility. When you build a force structure, you need to have the mobility to move them around where they’re needed.

**BOB SHELDON:** Was that the one that won a Barchi prize?

**ROY RICE:** That won a Barchi prize and also a Rist prize. We were recognized for the Optimization methodology that we used to determine the optimal mix of airlift, sealift, and prepositioning to meet the strategic lift requirements for the 21<sup>st</sup> Century. Of course a couple of years later, OSD and the Joint Staff had to do the MRS BURU, and then it seemed like every four or five years we’d do a strategic mobility study. I think we did the first one.

It was fun; analytically and operationally, it was interesting. It was also our first exposure to our new deputy in J8 Admiral Dennis Blair. He was a bright thinker, obviously; he was a White House Fellow, a Rhodes Scholar; a great boss to

work for. He later got his fourth star and became US Pacific Command (PACOM) Commander.

**BOB SHELDON:** Talk about your TDY to Russia.

**ROY RICE:** That was one of the other very interesting areas that I got to do some analysis in: strategic stability. Actually, let me back up. There was another study that BG Robinson tasked us to do and we learned a valuable lesson about making sure we defined the problem correctly. BG Robinson came in one day and asked CDR Wing and me, "I need to know, if I'm going to downsize my strategic triad – bombers, Intercontinental Ballistic Missiles (ICBMs) and Submarine/Sea-Launched Ballistic Missiles (SLBMs) – what should my triad look like ten years from now? What would be the optimal mix of bombers, ICBMs and SLBMs, ...not only delivery vehicles, but warheads?"

So Vern and I spent a considerable amount of time writing a concise problem statement. We took "this is the problem we're going to solve" to BG Robinson; we had to work several iterations. Finally, he said, "That's it. That's the problem I want you to solve." We had to go out and do a lot of research on warheads and treaties and all that sort of stuff to make sure we're maintaining target requirements and we're not violating treaties. Those were the constraints to our problem.

We developed a clever optimization approach and came up with the solution, and we walked into BG Robinson's office with, "Here's what your triad should look like ten years from now." I thought we had done a great piece of work, and he did too. He looked at it, and as soon as he looked at it, it dawned on him. He said, "I've asked you the wrong question. I *do* need to know what the triad looks like ten years from now, but I also need to know year by year what is it going to look like? How do you build down to it?"

So now we went, "Okay, that's slightly different." We had to go back and reformulate the problem, reformulate our methodology, and solve it again. But it was interesting to us how supportive he was that you've solved the problem I've asked you to; I just asked you the wrong problem.

So now we went back and did it, and that was very enlightening for me to have a boss like

him, and like Vince Roske and several other folks, where they were very involved with the methodology and the solution itself. We could go into their offices and say, "Okay, boss, here's what I'm doing." That was a lot of fun.

Back to the Strategic Stability problem. The strategic stability thing came about when Admiral Crowe had been the Chairman back in the late 1980s. He and Marshall Sergei Akhromeyev (Soviet Defense Minister) and General Mikhail Moiseyev (Chief of the Soviet General Staff), of the Soviet Union, had several meetings and were talking about us needing to have some exchanges and get better relationships with each other at the military level, nothing political. So they had decided to get together a bunch of analysts (analysts are innocuous, they don't do policy, they're not policy wonks). Let's just get them to talk about numbers and forces and systems from an analysis standpoint.

At that time, Admiral Crowe retired and General Colin Powell came in as the Chairman. He designated BG Robinson, in J8, as the leader of our delegation. We were talking with the Soviets, particularly the Center for Operational and Strategic Studies (COSS), on the Soviet General Staff. The Soviet delegation had decided that we should talk about Strategic Stability.

We didn't quite know what that was, but anyway, we had our first meeting in December of 1990. The Soviets sent a delegation headed by Lt General Sergei Bogdanov and Major General Vsevolod Medvedev. There were about 12 Soviet officers, and we had Navy, Air Force, and Army analysts, Majors and Lieutenant Colonels, from the Joint Staff to talk with them. We were prepared to talk about tactics, techniques, and procedures (TTPs), and modeling, modeling tactics, and weapons systems, but they wanted to talk at a higher level of Strategic Stability, so we were caught a little off guard.

Our first meeting was a good introduction for us to get to know each other. My counterpart was a Lieutenant Colonel, I was a Major at the time. It's funny, at our first introduction, we discovered that we all tell the same jokes. On the Soviet side, their Army guys told the same jokes about Air Force guys that we do, almost the same jokes with the same punch lines. The infantry guys tell the same jokes about the armored guys.

We also share some of the same “life” problems. The Soviet Majors and Lieutenant Colonels would all say in private, “I come to work real early, and I do all this analysis, and I don’t get home until real late, and my boss doesn’t understand the analysis that I do.” They complained that their teenage children were starting to rebel; listening to loud Rock & Roll music, taking up smoking, etc.

They first came to meet with us at the Pentagon in December 1990. We took the Soviets to the inner courtyard of the Pentagon for their first visit there. It was funny to talk to them later, because we took them out there, and of course, at that time, in the center of the courtyard was a hot dog stand. And there was a jazz band at lunch out there playing, people sitting around in the sun drinking sodas and smoking cigarettes and eating hot dogs.

They had envisioned that in the inner courtyard of the Pentagon there would be nothing but statues of MacArthur and Eisenhower. And here was a hot dog stand with a jazz band. It kind of blew their minds. We took them in to see General Powell; so here we were walking down the corridor next to the Chairman of the Joint Chiefs with a bunch of Soviet officers in uniform. Surreal!

We had another meeting scheduled with them in Moscow for June 1991. CDR Wing and I started doing some research into some work that Lieutenant General (Lt Gen) Glenn Kent had been doing on his First Strike Index. We did some research into that, and some of the other folks in that community who had been doing some work in deterrence and stability. CDR Wing and I took it a bit further than Lt Gen Kent did to include things like utility theory; looking at if you do so much damage and destroy so many targets on the other side, what value do they put on that? What’s the utility of you doing damage to them, and what’s the cost of them doing retaliatory damage to you?

We did an analysis with a giant nomogram that you could determine, based on numbers of warheads and delivery vehicles, your missile defense systems, and targeting strategies, how much damage you could do to them and they could do to you. It was little bit of Game Theory in a bipolar world. We came up with what we called a Stability Index. We could actually quan-

tify Deterrence and Strategic Stability. That was some fun work. Our delegation went over to the Soviet Union in June of 1991, about two months before the coups when Yeltsin was brought to power. The Soviet General Staff from the Center for Operational Strategic Studies was still headed by Lt General Bogdanov and Maj General Medvedev.

There was Soviet Brigadier General Lizitzen, who was a brilliant mathematician himself. This is a little off subject, but he told me something one time that stuck in my mind. He said, “I never got in trouble for something I didn’t say.”

We went to the Soviet Union to discuss the work that Commander Wing and I had done on how to optimally build down your strategic triad, and the work that we had done on the Strategic Stability modeling. I presented those two briefings in the Kremlin to the Soviet General Staff. And here I am standing there giving this briefing. Vern had done a good portion of work if not most of the work, but I was the one that was fortunate enough to go brief it. I’ve got two screens, one with English and one with Cyrillic. I’m giving the presentation in English, and there’s a translator, Soviet Lieutenant Colonel Valeri Bondar. As I’m giving this briefing and he’s translating it, going through my mind is, “Let’s go back 16 years, to 1975, when I graduated from the Air Force Academy.” If somebody had told me, “Sixteen years from now, you’re going to be standing in the Kremlin giving a briefing to the Soviet General Staff on how to downsize their nuclear forces, and also how to downsize numbers of warheads, to maintain a stable and deterrent situation,” I would have thought they were nuts.

So this is going through my mind while I’m there in the Kremlin, and I just found it completely ironic. Here you are at the end of the Cold War. At the time we didn’t know it was the end of the Cold War, and here this country boy from Lonoke, Arkansas, is standing in the Kremlin giving a briefing of some OR work that we had done at that level. It was humbling to me to be over there.

The idea of General Powell’s Base Force had not really even been made public yet in the United States. General Powell had not come out with that yet publicly, but BG Robinson

briefed the Soviet General Staff, the Center for Operational Strategic Studies, on how we were going to downsize the Army, the Navy, the Marine Corps, and the Air Force.

General Bogdanov, who had been an Army armored officer, obviously knew a lot about the US military. He was flabbergasted as BG Robinson was briefing the Base Force. He asked BG Robinson point blank, "Are you telling me that you are going to deactivate the Second Armored Division at Fort Hood?" He knew about the Second Armored Division. He was an old armored officer in the Soviet Army, and his question was, "Do you really expect us to believe that you, the richest country in the world, can't afford a large military?"

I raised my hand – I'm the junior guy going, "Ooh, let me answer that!" BG Robinson reluctantly said, "Okay, Major, go ahead and answer the question." And I said, "General Bogdanov, it's not that we *can't* afford a large military; it's that we *choose* not to. We choose to provide things for our people, consumer goods, as a matter of fact." And of course, that was foreign to them.

Little did we know two months later, Gorbachev was gone and Yeltsin came in, and they took their first steps toward democracy. That was an interesting trip where we were in the Soviet Union talking OR stuff, and their guys were OR guys, so we weren't policy guys, we weren't negotiators, we were just a bunch of analysts talking about systems and force structures and that was a lot of fun.

**BOB SHELDON:** Did you talk to them about any OR issues, about how you analyze force structure?

**ROY RICE:** Yes, we talked about some of their techniques and our techniques. They know a lot about optimization, obviously; they've been in the business as long as we have. They showed us a model they used to analyze Strategic Stability. We had to have it translated from Russian to English, and they were doing things like summations over various indices. Force indices, and effectiveness markers. It was interesting looking at one of their models that they had described mathematically. It was a linear function of summations of all these variables with coefficients, what they called Coefficients of Commensurability. I was looking at and follow-

ing their description of this model; it's a bunch of terms with different summations. I was following pretty well, but there was this one term; a summation over a separate index.

So I asked my counterpart, "I can follow you all the way except to this one. I don't understand." And General Bogdanov interrupted, and he said, "That's for *preemptive* strike." And the room got quiet, and I said, "General Bogdanov, 'preemptive'? I thought it was Soviet policy not to have preemptive strike." He said, "That's Bogdanov policy."

General Bogdanov also had a quote that I've used often. As we were talking about Strategic Stability and Strategic Deterrence, I was trying to make a point, and General Bogdanov pulled me off to the side and he said, "Major". This is all through the translator, Lt Col Bondar. He said, "Major, you have to understand two things about deterrence."

And of course, I said, "Yes, sir. What is it?" And he said, "You can never deter someone from (a) doing something they *never intended* to do, and (b) doing something they feel they *must* do." I thought that was very striking. He said, "You people in the West, you think that you have deterred us from attacking and gobbling up Europe. You didn't deter us; we never intended to do it. Why would we do that? We never intended to do that." He was a very interesting character. General Bogdanov and General Medvedev, very interesting guys. I found that very rewarding.

**BOB SHELDON:** Any other Joint Staff war stories you want to tell?

**ROY RICE:** Lots of them. I really got to work with the services. It was my first experience with trying to get the Joint Staff and OSD and all the services to play nicely together, and I thought we did very well. I got to work a lot with the guys in AFSAA. I did more work with AFSAA when I was in the Joint Staff than when I was in the Air Force.

I got to work with Center for Naval Analyses (CNA). I worked with the Army Staff's Deputy Chief of Staff for Operations and Plans (DCSOPS) and Deputy Chief of Staff for Intelligence (DCSINT.) I worked a lot with the Marine Corps and it was rewarding to me to see how people really could come together and do some great analysis and share information and share

data and learn a lot. I was continually having to learn how the other services intended to deploy and employ their forces.

I got to work with AFSAA Colonels Dash and George DiGiovanni, and work with you guys in the air-to-air branch, Bob. There were some really clever people in the Center for Army Analysis (CAA). I found it very rewarding; again, I had some great bosses. Just before I left the Joint Staff, Rear Admiral Lautenbacher had taken over the J8.

It was refreshing to go in and brief things to a two-star Navy Admiral with a PhD in Applied Mathematics from Harvard, because you could go in with all the Greek squiggly stuff and he was a step ahead of you. Now he runs National Oceanic and Atmospheric Administration (NOAA). He was a great mathematician himself, and as an analyst, it's refreshing to go in and be able to talk mathematics and analysis with a flag officer who's a step, or let's say three steps, ahead of you.

**BOB SHELDON:** Where did you go after the Pentagon?

**ROY RICE:** Colonel Joe Faix had been a professor of mine at the Air Force Academy way back in the 1970s. He was now a Colonel running the Air Force Office of Aerospace Studies (OAS) at Kirtland AFB. He contacted me about a year before my PCS (Permanent Change of Station) date. I was at the Joint Staff from January 1989 to January 1992. In 1991, Colonel Faix contacted me and said, "How would you like to come out here and be my deputy? I have an empty billet." I said, "I'm not going to be leaving for a year." He said, "I'll keep it open for you if you want to come out here."

I had enjoyed working with Joe for years, and I knew their mission was called Development Planning. They had some good folks out there, so I decided to sign on; it was time for me to get back into the Air Force, so I PCSed out to Albuquerque. It was my second assignment to Albuquerque. Both of my daughters, Nicole and Tamitha, had been born in Albuquerque on my first assignment to AFTEC, so now we were moving back to their birthplace.

I moved out to the OAS as the deputy director under Colonel Faix. Shortly after getting there, we picked up a new mission. We worked

for Air Force Systems Command (AFSC)/XR, Requirements. At that time, Systems Command and Logistics Command were merging into Air Force Materiel Command (AFMC). General Yates was the first AFMC Commander. We worked at that time for Brigadier General Lester Lyles (he was later AFMC Commander); truly, a gentleman; class act, wonderful boss, brilliant man.

At that time, all the services were being thumped by OSD to get our stuff together in terms of Cost and Operational Effectiveness Analyses (COEAs), now called Analysis of Alternatives (AoAs). I can remember being in Colonel Faix' office with our technical director, Mr. Jerry Collier, and Brig Gen Lyles was on the phone. He said, "Gentlemen, you have just picked up a new mission. You are now the COEA agency for all of the Air Force." So it was now our job to help all the Major Commands (MAJCOMs) in the Air Force organize, plan, execute and report their COEAs on all the major weapons systems that were being developed. It also gave us the opportunity to work with other services in terms of joint COEAs, and also to work with the users defining requirements, and with the testers who were going to have to test it, because the COEAs bridge the gaps between requirements definition and OT&E. We did a lot of MOE (Measures of Effectiveness) work.

I got to get back and work more with Dr. Marion Williams and the folks at AFOTEC. [Note: AFTEC changed its name to Air Force Operational Test and Evaluation Center (AFOTEC).] I became very close with Clayton Thomas. At that time, the Air Force was just establishing the AF/XOM organization to try to start putting some standardization into the modeling, simulation and analysis. Lieutenant General Ted Campbell had taken over XOM. The relationship between XOM, AFSAA, my office in AFMC at OAS, and all the MAJCOMs, was a chance for me to work with more analysts and learn more about how the acquisition world worked, and start having some influence in weapons systems acquisition.

OAS has an interesting history. Back at the end of World War II, when we brought together all the rocket scientists from Peenemunde, the Von Braun bunch, half of the Von Braun team

went to Huntsville, Alabama, and the other half went to the desert southwest under Operation PAPERCLIP. They had eventually worked their way up from Bliss to Alamogordo, and now to what used to be old Sandia Base, now Kirtland AFB. That was the beginning of the Office of Aerospace Studies. Many of the old German rocket scientists, Dr. Bruno Manz, Dr. Hans Gevelhoff, many of those folks were still around, and I got to meet a lot of them. We brought them in for anniversary meetings. Brilliant minds; people emphasizing the importance of interdisciplinary work. Here were guys who were physicists who became analysts, and the natural melding of the minds. It was just wonderful, the way that they approached problems.

Our tech director at the time, Mr. Jerry Collier, was a wonderful gentleman. He was always on an even keel and genuinely cared about his people; I enjoyed working with Jerry. I still maintain contact with him. Dr. Dave Dinwiddie had been our original tech director and had come back to the organization; it is always wonderful working with a brilliant mind like Dave's.

Some good guys ran the divisions. Jim Hale; I enjoyed working with Jim. He wasn't really the analyst's analyst, but the guy had more common sense than any six people on the planet. He always got things done; knew how to manage his people, and knew how to get the most out of them doing analysis work. Chris Feuchter was also one of the old heads who taught me a lot about executing analyses.

I got to work in the Air Force analytic community again. Going from my joint job back to an Air Force analyst job, I got to spend more time with Clayton.

**BOB SHELDON:** You taught COEA courses.

**ROY RICE:** Yes. One of the things that we decided to do was engage the MAJCOMS in the Air Force, because there was no standardized process for how you do analysis. A lot of the study directors were not analysts themselves. They were great operators. We had decided right off the bat that we had to develop a training course for training people with really two purposes in mind: How to do analysis in general, and specifically how to do COEAs.

I got about six of OAS' GS-13s and 14s together, and we put together a three day course that we took all over the Air Force. We ended up training well over 1,800 people in the Air Force. Everything from how do you develop a study plan to how do you put together a study team. We tried to put some policies together on what a study plan should look like. AFSAA already had a format that they had been using for years, so we stole from that; a few techniques on how you report your results.

We took it on the road. We briefed Air Combat Command (ACC), AFMC, and Space Command; we took it all over the place to train study directors and staffs. Every time there was a new COEA about to start we would pull the whole study team together with the study director and teach the course.

**BOB SHELDON:** What would you consider a COEA success story?

**ROY RICE:** The first couple of air-to-ground munitions studies ran into some problems. Some of the folks – and I won't mention any names or commands – some folks were developing their own scenarios that made their own weapons systems look pretty good.

We did some really poorly, but there was one example, actually three examples, at ACC where you had three air-to-ground munitions, the Joint Direct Attack Munition (JDAM), the Joint Standoff Weapon (JSOW), the AGM-130, and all three of those had each other as alternatives in their COEAs. Well, sure enough, you had the JDAM COEA, you had the JSOW COEA, and you had the AGM-130 COEA.

Guess what? Each one of them claimed that they were better than all the others. ACC had to go in and brief General McInerney, and the Air Force Council. After they came in over about six or seven weeks with each of the three COEAs saying that their munition was the best alternative, they got smacked a little bit. It was pretty obvious that they were setting up scenarios that favored their chosen weapon. They weren't being as objective as they could, but the Air Force got that straightened out quickly.

I give some credit to Natalie Crawford, at RAND. She had the ear of General Loh, the Commander at ACC. I wasn't there, but I heard a story that she told General Loh one time, "What's it going to take? Is it going to take the

killing of a program for people to understand the importance of doing a COEA correctly?" If that's not exactly how it went down, I apologize. Natalie is just a superb analytic mind. That's one of the things that she, along with many others, helped us with COEAs in the Air Force – and the other services were doing the same thing.

Everybody understood that we had to do the COEAs right or we weren't going to stand a chance, and I see that has now evolved. Yesterday (*at the MORS Symposium*) the leadership of the analysis community gave a presentation on OSD's analytic agenda; not only from a force structure standpoint, but even when we do AoAs, if you don't have approved scenarios you'd better be careful.

I think we had evolved through that and we did a much better job; it was a lot of fun watching that happen. We had some great study directors who didn't know much about analysis, but real quickly understood after the training that they were going to have to rely on those analysis resources at the ACC Studies and Analysis Squadron; AMC's XP analysis shop that Dave Merrill runs; and the analysis shop at AFMC XP. Rely on your analysts at your MAJCOM, because they can really do a great job for you, if you manage it correctly.

I think the Air Force – and I know the other services, too – we made great strides in really getting our act together in COEAs.

**BOB SHELDON:** What brought you up to the point where you could go around and teach how to do analysis to the rest of the Air Force?

**ROY RICE:** I just look at it that no matter who I was teaching these analysis courses to, I had made more mistakes than these people will ever make. Walt Whitman once said, "Learn from the mistakes of others, because you'll never live long enough to make them all yourself." I think I've made them all myself. I've made more mistakes than most people have, but I had a mentor many years ago who told me to, "Go into every situation with the attitude that you're going to learn something from everyone in the room."

When I went out to teach – even today when I go out and teach some of my OR classes – I try to learn something from everybody in the room. I found that very easy to do. If you go in there with the attitude that you already know every-

thing, then you're not going to be effective as an instructor. It's much better if you try to learn from them. I think I've learned as much from my classes as they have from me as an instructor.

**BOB SHELDON:** This is coming up to the culmination of your active duty Air Force career at Albuquerque. Talk about your retirement decision.

**ROY RICE:** I got a phone call from Maj Gen Roy Bridges, who was the AFMC DR, at the time. He was our boss at the OAS. He called me in 1994 and he said, "Roy, I'd like to congratulate you. You've just been selected for Air War College." And I said, "Well, sir, thank you very much, but let me get back to you on that."

I went home and talked to my wife. We had two daughters at the time who were getting into middle school; my wife had been a military brat, and she had moved around all her life; had been to a couple of different high schools, and had been uprooted many times. We had decided that we didn't want to do that to our daughters, and I knew that if I went to Air War College I would probably come out on the Colonel list – I guess I'm being presumptuous. Maybe I would and a year or so later when I pinned on I'd be making two or three moves in the next four or five years.

I had just decided at that point that, for my family's sake, I would just as soon go somewhere and put roots down. I called General Bridges up the next day. I really expected to get hammered, but Maj Gen Bridges, being just an absolute gentleman, told me, "Roy, I understand. We all have to make those decisions." He was very magnanimous about it. He told me, "Make me one promise, though." I said, "Yes, sir; what's that?" He said, "Don't ever look back and say, 'Well, what if I'd stayed in and made Colonel, or whatever?'" He said, "Don't do that! You've made a decision, and now just make it work. Look forward and make the best of it." Luckily, whenever you make a decision and there's nothing but good alternatives, those decisions are easy.

Let me also back up to one of my first assignments at Tinker AFB. I worked for Colonel Billy Bowden – he later became Major General Billy Bowden – another gentleman from Arkansas, and one of the first mentors I had. He told

me a piece of advice one time; he said – and I’ll do this in my best Arkansas accent – he said, “Roy, decision-making is easy. It’s living with the consequences that’s tough.” That was another piece of advice that has stuck with me.

Maj Gen Bridges had gotten me an Air War College slot, and I just withdrew and put in my papers to retire. I retired in 1995 with 20 years and 27 days in the Air Force. In my 20 years I never had a bad job, never had a bad boss, and never had a bad assignment. I was very fortunate.

**BOB SHELDON:** How did you select your post-retirement job?

**ROY RICE:** The location was actually my wife’s decision. Debbie had been a brat, and I told her, “We’re about a year out. You’ve never had any say-so at all in where you’ve lived. Your father moved around when he was in the service, and then you married me, and we’ve moved around all these places. You decide. Where do you want us to retire?” She said, “Well, how about somewhere in the southeast, east of the Mississippi River but south of Kentucky?” – no offense. (*Roy Reiss is from Kentucky.*)

We had been stationed in Montgomery, Alabama, and she had some relatives up in northern Alabama near a little town called Cullman. Being fortunate to be in the OR community, having worked COEAs and getting to work with the other services, I got to know a gentleman from the Army, Colonel Tony Brinkley. He had run a lot of the COEAs in the Army and had been very well-connected; he had retired and had gone to work for Teledyne Brown Engineering (TBE) in Huntsville.

Also, one of the old professors from the Academy Math Department, Dr. Ray Mitchell, was working at TBE and an old Academy classmate of mine named Dale Bugby was working at TBE. Tony contacted me and said, “Why don’t you come down here for an interview?” They were bidding four or five contracts at the time where they were going to need some senior analysis help, so they contacted me.

I flew down there for an interview, they made me an offer, I accepted it, and I moved there in April 1995. I left my family in Albuquerque for six weeks so our daughters could finish up school, then I went back there and brought them to Huntsville, and we’ve been there since

the summer of 1995. I found the job, but my wife actually picked the location.

**BOB SHELDON:** Talk about your work for Teledyne Brown.

**ROY RICE:** I started to work there as a senior systems analyst, as an OR guy, working for Tony Brinkley. Tony was the guy who ran the whole directorate there for modeling, simulation, and analysis. A bunch of great folks; working everything from Army projects, to National Aeronautics and Space Administration (NASA) projects, to missile defense projects, to Air Force Projects, to Navy. It was just a wonderful experience to be thrown in with a bunch of young kids who had been doing this. I was very fortunate.

Tony’s tech director was Dr. John Regner. Tony has retired now (*and passed away since the interview...I miss Tony very much*), and John is now our director of all modeling and simulation. (*John has been promoted to Vice President of Defense Programs since the interview...the company made a fantastic move by promoting John*). John is one of those national assets whom I wish the rest of the world knew about. Early in his career, he worked at the Institute for Defense Analyses (IDA); then he did a lot of missile work in Huntsville working for TBE. Been with us now for 25 years; has an OR degree, and also a PhD in nuclear physics. A brilliant man; besides being a company asset, he truly is a national asset.

I had been at TBE for about a month or two, and an old friend of mine from the Air Force contacted me. It was Lt Col Ken “Crash” Konwin, who I’d worked with on the Joint Staff and who had also been at AFSAA. He was now at the Joint Strike Fighter (JSF), at that time called the Joint Advanced Strike Technology (JAST) program.

Crash called me up and asked if I would consider coming up and providing a little bit of help because the JAST program was going to start doing what they call an Interim COEA. He said, “It won’t take but about 10 percent of your time for just a few months.” Well, that was 12 years ago, and I’m still supporting the JSF (F-35) Program Office. I’m the lead supportability analyst for the program. Right off the bat there was a chance to get back into working some DOD acquisition work, doing some analysis – I’m still doing it!

**BOB SHELDON:** Let's backtrack. You talked about going to your first MORS symposium, and presenting a paper, and being a working group chair in 1988. What were your roles in MORS after that?

**ROY RICE:** For the next several years I was a working group chair and made several presentations. When I got to the Joint Staff, BG Robinson was one of the sponsors. BG Robinson won the Wanner Award while I was there. I got to go with him and with Vince Roske, to all the MORS meetings, and I did a lot of presentations. After I had retired, I was still very active in MORS.

I was still just doing presentations and going to the symposia. Right after I retired, about 1995 or 1996, Dr. Bill Lese and Clayton Thomas nominated me for the MORS Board of Directors. At the same time, Mike Bauman (TRAC Leavenworth) had nominated Tony Brinkley for director and neither one of us got elected; and we found out that each other had been nominated. It's really the only time I've ever seen Clayton Thomas – I wouldn't say angry, but I would say very stern. I had approached Roy Reiss and Clayton and said, "Look, it's probably not a good idea to nominate two guys from the same company, and Tony's my boss. More people in MORS know him than know me; he'd probably be better for MORS. Why don't I back out and y'all not nominate me?" Mr. Thomas, I've never seen him with a stern look on his face like that day, and he got in my face and put his finger in my chest, and he said, "No. You are not going to pull yourself out. We're nominating you for a reason."

He was very stern about it; but he wasn't angry. As far as I was concerned, I was getting an order from a five-star. Clay was the "Yoda" of all Air Force analysis, and when Clayton Thomas put his finger in my chest and says, "You're not going to back out." I said, "Yes, sir." So the next year, Roy and Clayton nominated me again, and I got elected to the board.

**ROY REISS:** Actually, you'd been in the 1995 symposium; you were a composite group chair.

**ROY RICE:** Yes. So I got my first taste of volunteering for additional responsibilities for MORS. At that time, the leadership of MORS were Christine Fossett, Fred Hartman, and Jerry Kotchka.

**ROY REISS:** Jerry Kotchka was the overall program chair.

**ROY RICE:** It was those folks who had been the presidents.

**ROY REISS:** That was here at the Naval Academy. We had recruited Roy, Jerry and me, as part of the group to evaluate the restructuring of the working group composite groups that had been done a couple of years earlier. One of Roy's tasks as composite group chair was to come back with recommendations to the board about adjusting that restructuring.

**ROY RICE:** Yes, Sue Iwanski had done some great work in that area, too. And you were on the board; a lot of the folks were. A year or so later I was the chair of all the Working and Composite groups; I had also been a Working Group Advisor. We started groups called the Senior Advisory Groups, the SAGs, and then I was nominated for Vice President for Meeting Operations (VPMO) and I got elected.

That's really what got me involved in meetings; I mean meetings, meetings, meetings. It also taught me a lesson that one of the best things the entire board can do for the incoming President is to make sure there is a full slate of meetings. That's our lifeblood. It also just reinforced something that we had already known, that it's the working group chairs that make this thing work. Being the VPMO was a great experience. Then we went to West Point, and I was elected as the President-Elect.

**BOB SHELDON:** Let's walk you through your MORS year as President.

**ROY RICE:** It was interesting that I took over from you (*Bob*) as the President at the Air Force Academy, now I'd gone full circle. The year 2000 I took over from you in June, 25 years after I had graduated from my alma mater there.

I was also a little afraid when we had our first meeting of all the VIPs before we went into the Plenary session. The Superintendent of the Air Force Academy came in, and I was trying to avoid him because I was afraid he was going to look at me and go, "Roy, you still owe us some tours." I thought he was going to make me go march some more tours. I had marched my share at the Academy. That's a little known and uninteresting fact; I marched over 200 tours when I was a cadet. I managed to be in the wrong place at the wrong time on a few occasions.

Then we conducted the 69<sup>th</sup> MORSS here at Annapolis when I was the President. I'm proud to say that we set the record – it's still a record – for the largest attendance, and then I turned the reins over to Tom Allen; it was a great year. I learned that if you've got a good Executive Council (EC) and a good Board of Directors, just provide them a little bit of steerage and stay out of their way. I was the luckiest guy because I had a great EC, and I had a great Board of Directors. I didn't have to do anything; just stay out of their way.

**BOB SHELDON:** What was your most notable special meeting of the year?

**ROY RICE:** They were all good; we had an Experimentation meeting down at Norfolk where we were tackling some issues we'd never tackled before, this whole experimentation thing. I'm not sure we really accomplished anything, but boy, it was something new. That one was a lot of fun.

I also gained appreciation of the role Sponsors play in terms of setting the agenda, and how much we rely on the Sponsors' Reps and the Sponsors to help keep us, as the leadership of MORS, in tune with what's keeping the Sponsors awake at night.

I think I scared most people away. When I came in as the President, Dick Wiles retired as the MORS Executive Vice President, Julian Palmore left as the editor of the *Phalanx*, and Greg Parnell left as the editor of the *MOR Journal*—everybody was bailing out on me. "Roy's taking over. My gosh – let's leave!" In fact, I remember Vern Bettencourt as a Past President coming up to me and saying, "You won't have any trouble as a President. Just rely on Dick Wiles. Oh, my gosh – Dick's leaving. You're in trouble!"

I believe that MORS works for its members. Obviously, the Sponsors are great benefactors, and one of the last things I would even want to do as the President of MORS is upset the Sponsors. I would never want to embarrass them, or poke a finger in their eye, but my philosophy was we didn't work for the Sponsors. They provide a lot of guidance – Lord, they kept me out of trouble.

I also learned to rely on Natalie. As a Past President, Bob, you know that as well as I do. Natalie, Brian and Cynthia, the entire staff, will keep you out of *trouble*. Lannie Elderkin, our le-

gal counsel will keep you out of *jail*. She's one of those people who very few people in MORS know about; she's behind the scenes, but she is absolutely integral to this society. She's one of those people I kept on speed dial: "Lannie, am I doing the wrong thing?" I would like for her to get more credit; you know she's wonderful.

Speaking of MORS legends. I want to back up a second. One of the things that I got to do when I was on the Joint Staff working for BG Robinson was meeting and working with Wilbur Payne – Wilbur, of course, being a legend and the first DUSA (OR). Wilbur had retired, and he was doing some consulting work for Los Alamos National Laboratory, and the Joint Staff, we were doing some work with Los Alamos Lab.

On several occasions before Wilbur passed away I got to work with him; what an absolute pleasure. A brilliant mind; one of the most organized – an extremely good writer. You've probably seen some of his writings. He's one of those people who could sit down with about 30 thoughts in his head, and go, "Now how am I going to connect A to B to C to D...to Z in a logical fashion?" He could sit down with a pencil and a legal pad and write very eloquently nine, ten, 12 pages from point A to point Z, and never have to go back and edit it.

One time, that was it, and you could read it. I'm one of those people who has to go back and edit it 30 times. You could read his first pass through and you would go, "It's brilliant. It's eloquent. It's succinct. You couldn't do any better." He was an extremely wonderful writer, well organized. And besides being a brilliant analyst, there are all the "Wilbur stories". We could spend days telling Wilbur stories. One of my favorite Wilbur stories is in the modeling and simulation world everybody talks about building tools that are user friendly, Wilbur used to say that "if you build a tool that even idiots can use, then rest assured that idiots will use it." That was one of my favorite Wilbur quotes.

**BOB SHELDON:** What were the highlights of your symposium here at Annapolis?

**ROY RICE:** I remember, Admiral Clark, the Chief of Naval Operations (CNO) was our keynote speaker, and Colonel Mike McGinnis, from West Point, was the program chair. As Colonel

McGinnis was going to introduce the CNO, Mike had to jab, "Beat Navy!" And then when the CNO finished his keynote address, he had to come back with, "Mike, I can't let you get away with that. Beat Army!" And everybody in the audience, 1200 people in the audience, they're all laughing.

I had to get up on stage now and present some of the mementos from MORS to the CNO, and I grabbed his hand and I turned around to the audience and said, "You know, as an Air Force Academy grad, it always does me good to hear Army and Navy guys banter with each other about Army-Navy football. I just think it's real *cute*." At that time the Air Force had been maintaining the Commander in Chief trophy for years, which isn't true now. Navy's been dominating.

Anyway, when I said that, everybody in the audience was laughing, and I looked at the Admiral – he was still shaking my hand – and he had a grin on his face but he darn near crushed my hand. He didn't think it was that funny. He still kept a smile on his face, but he really put a squeeze on my hand. I also remember just watching how everything operated so smoothly with Mike McGinnis' team.

As the President, I could just step back and watch the whole thing. We've got such good people, such good volunteers, that it all comes together. I was also looking forward, knowing that this was going to be my last time where I had to do MORS business as leadership. I knew that for the next several years I could get back to attending some of the working group sessions, and really attend a lot of the presentations that I had been missing for so many years as the VPMO, as the President-Elect, as the President.

When you're here as the President at MORSS you just have to attend so many different things – meetings with the Sponsors and meetings with this and that, you don't get to go to too many sessions. I was looking forward to the time when I could now go back and start attending Working Group sessions.

Let me also say one of the most memorable things about being President here at Annapolis was Dick Wiles. The December Board of Directors meeting is when we elect the Fellows. Dick had just retired from MORS and was nominated for election as a Fellow. It was a no-brainer. Of

all the people who were nominated, there was only one elected, and it was Dick Wiles. At the 69<sup>th</sup> MORSS at Annapolis, I had the distinct honor of announcing to the entire membership and bring Dick up on stage by himself there at center stage so he could be recognized as a Fellow. I was very proud of getting to do that.

During my year is when we went through the 35<sup>th</sup> anniversary for MORS; getting to preside over that was very pleasing for me. As the President-Elect and President, gosh, we had such great board members and Executive Council.

**BOB SHELDON:** Your year as Past President; the awards process and putting together a slate. Was that an easy job for you?

**ROY RICE:** Putting a slate together for the next year's officers was nothing. You had nothing but great choices. I also remember that year not wanting to just disappear. That's when you (*Bob*) and I started putting together the ideas for that Tutorial on the New Techniques.

That was fun, putting together a new idea for a new kind of workshop at Johns Hopkins University Applied Physics Laboratory (JHU/APL). Even though my years on the board and as President and President-Elect were coming to an end, there's always more to do. I think that since then, I've been co-chair of two or three different Workshops. Pat McKenna and I were co-chairs at the Workshop at United States Strategic Command (USSTRATCOM). There's always plenty to do to stay involved.

**BOB SHELDON:** And you and I were inducted as Fellows –

**ROY RICE:** We were inducted as Fellows at Quantico. That was about the only time I think I was ever speechless at MORS. I was out of town TDY. I was at the Houston airport. I called back to my office to check my voice mail and there was a message to call Ted Smyth, who at that time was the MORS President.

I thought, "Oh, my gosh; I've screwed something up. What does Ted want? I owe him a monthly report or something." So I picked up the phone and called Ted and said, "Ted, this is Roy. I'm down at the airport in Houston. What did I screw up; what do I owe you? I'm probably behind on some report." And he said, "No, I just wanted to congratulate you for being elected as a Fellow." It absolutely caught me off

guard. I had nothing to say; I was not expecting that.

It's such an honor, and the first thing – I'm sure it happened to you, too, Bob – the very first thing that popped into my head was Clayton Thomas, Fellow No. 1; it's one of those events that makes you think – "We are not worthy." I'm still humbled to be in that group with Clayton Thomas and Wilbur Payne and Wayne Hughes. People in this society who are known by one name – Clay, Wilbur, Wayne, Marion, Gene, Seth, Jackie. You say those names and everybody knows who you're talking about. In my mind, they are the Yodas, they are the Jedis; it was very humbling.

**BOB SHELDON:** Then MORS honored you with the Wanner Award.

**ROY RICE:** Andy Loerch surprised me on that one. It was December, 2005, and I was in Washington doing some work. Andy tracked me down on my cell phone and asked me, "Are you going to be at the symposium in June out at the Air Force Academy?" I said, "Yes, Andy, I'm going to be presenting at two or three different Working Groups," and he said, "Well, I'm going to need your help." I said, "Sure; anything," because he's the Immediate Past President.

He said, "I need you to come up on stage during the plenary for the Wanner Award." I was thinking, "Okay, it's one of those things where we elected somebody for the Award and they're not going to be able to attend, so Andy's going to want me to come up there and accept it on their behalf." Seriously. I said, "Well, who won? Who am I accepting for?" He laughed and said, "You moron, it's you." It was one of those things completely out of left field. I did not expect that, and I know I sounded like an idiot to Andy.

That was the second time I was speechless. Again, the first thing that popped into my mind was Clayton Thomas. That's an extremely humbling experience to be in that crowd. It made me even more humble last night at dinner when we gave the Wanner plaque to Walt Hollis; you just kind of look around and say, "I hope nobody notices I'm not supposed to be here." Very unexpected, very humbling, but very rewarding.

**ROY REISS:** You also received the Air Force Analyst Lifetime Achievement Award.

**ROY RICE:** That was another one out of the blue. It was October 2006 at the Air Force Operations Research Symposium (AFORS). Colonel Roxann Oyler, who works for Dr. Henningsen in A9, had called and asked a couple of questions about what I was doing in October, because I've been teaching some OR classes for A9. And then Roy Reiss called me and said, "You're planning on coming out to AFORS, right?" And I said, "Yes, as a matter of fact, Roxann wants me to come out and teach this little one-day non-technical course in OR. We'll just be talking about OR techniques and what kind of problems they solve."

Then Roy said, "You are planning on sticking around for the banquet the last night, aren't you?" I said, "Well, no; not really. I was planning on giving my course and then catching a flight out." He sternly said, "No, Roy, you were planning on staying for the banquet, weren't you?" I said, "No, Roy; I'm only going to get out there on Tuesday and I'm going to..." He interrupts me rather loudly, "Roy, you're not listening to me. You're going to stay for the banquet and the awards, aren't you?" And I went, "Okay, yes, I am." So I got the hint.

**ROY REISS:** Finally.

**ROY RICE:** Yes, stick around. The first thing that popped in my mind was Clayton. In about 1993 or 1994 right after the MORSS at the Air Force Academy, we were going to stick around for a day and have the AFORS.

A couple of years later we started giving the Lifetime Achievement Award. The first recipient was Frank Campanile from ASC at Wright-Patterson. I worked with Frank many times over my career. I call him the analyst's analyst, and he was just getting ready to retire. Jim Shedden and a couple guys out of ASC put together a great nomination package. We had the first AFORS at the Air Force Academy, but we didn't have the Lifetime Achievement Award until a couple of years later.

Then when we turned around the next year and went back to the Air Force Academy, that's when we gave the Award to Clayton Thomas and to Tom Allen. Now you've got mentors of mine – Frank Campanile and Clayton Thomas – as the first recipients. In 2006, when Dr. Henningsen called me up on stage in front of these young analysts and presented me with

the Air Force Analysis Community's Lifetime Achievement Award, well, it doesn't get any better than that.

**BOB SHELDON:** What advice would you give to these young Captains, these young analysts, early on in their career about how to grow up and be a hero like you?

**ROY RICE:** I go back to one of my mentors. In every situation, every meeting—I don't care if it's just a meeting in the office, if it's an analysis meeting, whatever meeting you go to, go with the attitude that you're going to learn something from everybody in the room. You can truly learn from everybody. Take diverse assignments. I got to work in logistics, in force structure, in testing. I got to work across many system acquisitions. I was lucky enough to have a broad experience in many areas.

It still boils down to mathematics. You still have to apply the mathematics of our trade, but if you go in with the attitude that you are going to learn from every situation and learn from every person in the room, you'd be surprised how much you pick up. On the other hand, if

you go in with the attitude that, "I'm going to criticize and pick apart everything that everybody else is doing," to me that's defeating. That's negative. That's not positive.

**BOB SHELDON:** Any parting shots?

**ROY RICE:** We encourage our membership to get involved with MORS. Be a working group chair. Be an advisor, be a composite group chair. Get involved, get involved! And eventually you too will be recognized and possibly be elected to the board.

MORS is going through some changes with the restructuring, the contracts, Sponsors, with all that. I think everybody needs to step back and take a deep breath. Like Clayton used to say, "This society will prevail."

We are a collection, a group of professional people. We will figure out how to have a professional society. It may not look like it does today; there will be some changes; but we will figure out how to have a gathering of our profession. We'll do that. We'll figure out how to make it. So let's not get crazy; let's not everybody panic. We've had 40 wonderful years.