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Vincent Russo: The Cold War Aerospace Technology History Project

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Vincent J. Russo

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Dr. Vincent J. Russo
Interview
Cold War Aerospace Technology History Project

Interview Conducted by Squire Brown
Special Collections and Archives
Wright State University
Dr. Squire L. Brown: Today is August 16, 2006. We are talking with Dr. Vince Russo. This interview is being conducted in the studios of the Center for Teaching and Learning at Wright State University, as part of the Cold War Aerospace Technology History Project. The interviewer is Squire Brown. Thank you very much for talking with us today, Dr. Russo.

Dr. Vincent J. Russo: You’re welcome.

Brown: Dr. Russo, you were a participant in the development of technology for the Air Force during several decades of the Cold War. Will you please provide a synopsis of your professional career, beginning with your university education, and please include a few remarks as to why you chose the engineering discipline.

Russo: Okay. Well, let me start with the last part of the question first, Squire. I was always one of these, at least my mom and dad told me, I was always one of these very inquisitive kids—would take things apart, loved toy trains, you know. I’d always build trains and take them apart. So I think from the early days, I had this interest in engineering.

It was kind of interesting how I ended up going to the college I went to. I played football in high school, and in the high school I went to, it was a small high school in sort of the rural, or the not-too-good parts of Pittsburgh—I’d put it that way—where I grew up. I was one of the few kids who could pass the academic requirements and actually play football. In the end, I had to get a semi-scholarship to go—football scholarship at the University of Rochester in upstate New York. They had several different engineering programs, so my first decision was what engineering did I want to pick? And I picked mechanical. I’m not sure why. I just think it was my nature. I know I hated chemistry, so I knew that much, so
I went to mechanical engineering. And then I signed up with the ROTC—Air Force ROTC at the time—because the draft was still going on back then. This is 1958, when I graduated from high school and went on to college in 1959, in late ’58. Enrolled in mechanical engineering, enrolled in ROTC, got my degree—four years.

And probably one of the most important decisions of my life happened when I graduated, but it was not a decision I made. I had figured after four years of ROTC, I’d come into the Air Force as a second lieutenant, they’d send me someplace—probably a flight line mechanic, you know, maintaining airplanes someplace like that. But there was this colonel who ran the ROTC detachment, calls me in his office one day, and said, “Vince, I got good news for you.” He says, “We’re going to send you to Wright-Patterson Air Force Base and get your master’s degree at AFIT.” And my reaction is, “What the heck is AFIT?” AFIT stands for the Air Force Institute of Technology. This colonel had looked at my records, and maybe he saw something in me that I didn’t see at the time, but he said, “I want you to go to AFIT.” You know what my reaction was? My reaction was, “Oh no, I don’t want to do that! I’ve already got four years of college. I don’t need any more education. I just want a job and get on with life.” And he said, “No, sir, you’re going to AFIT.” Well, sure enough, that’s what I had to do, you know. The Air Force told me that, and that’s where I was. So I got sent here to Wright-Patterson Air Force Base. I put I think it was eighteen months at AFIT getting a master’s degree. They even picked the career field that I had to get the master’s in. I didn’t even have a chance to do that. But they selected materials engineering. Turns out there weren’t a whole lot of need of materials engineers in the Air Force, so they graduated two classes and cancelled the program.

So I put eighteen months there, and then my first assignment out of AFIT was to go to work in the Air Force Research Laboratory, what it’s now called. Back then it was the Materials Laboratory that we went to work for. I spent six years in the military as an officer and got out in 1968 as a captain. And during that time frame when I was in the military, I used to take a lot of courses. Actually the courses were taught here at Wright State, the very first building of the whole Wright State campus. I think it was called Allyn Hall if I’m not mistaken. The professors from Ohio State used to come down here and teach courses, and I would take courses in engineering. I started in metallurgy. Then after doing this for five or six years, you get to this point where you have so many credit hours, you ought to either quit doing it or go finish it. Fortunately the government had a program, and I think it still does, when I converted over to a civilian at that point. They had a program called Long Term Full Time training, and they sent me up to the Ohio State campus to finish all the requirements for a Ph.D. So I ended up getting a Ph.D. in metallurgical engineering in 1974.
Then after that, I was in different elements of the Materials Lab. I moved over to the Flight Dynamics Lab for a while. I think that’s where you and I got to know each other. I spent about two or three years there, spent two or three years down at the Propulsion Laboratory, went back and then in the late ‘80s, early ‘90s, I ran the Materials Lab for the better part of eight or nine years. I was in charge of it. And then in ’98, I think it was, I was really thinking about retiring. I had gotten to the point I had turned fifty-five, you know, was ready. But I got an offer to go down and become the Executive Director to the Aeronautical Systems Center, which was the organization that builds all the airplanes, or buys all the airplanes for the Air Force. And I spent the last five years of my career down there, which was a wonderful assignment. I retired several years ago, and I’m loving every minute of retirement. So, there’s a quick history of my life.

Brown: So your entire professional career was with the Air Force here at Wright-Patterson Air Force Base. Is that correct?

Russo: That’s correct, Squire. I would say seventy-five to eighty percent of it was with the Laboratories and then twenty-five or thirty percent or something like that was in the Acquisition. Because I started out my career early on being in one of the Program Offices down at Wright-Patterson, the C-5 Program Office.

Brown: Is that unusual to spend an entire professional career at one location?

Russo: You know, when I was doing it, the answer to that question would have been no, it wasn’t unusual, because it was one of the strengths I always used to say of Wright-Patterson Air Force Base, where they had a corps of civilians who had been there, done that, seen this, seen that, you know. We worked on several different programs, and, I was on the C-141, the C-5, the B-2, the F-15—the F-16, rather. So we saw a lot of different things, and we were able to keep this ship somewhat level with this civilian corps workforce. And then they brought the military, who were in there to bring the real world problems. So I used to think it was a perfect match between stable, well-depth, civilians who have a lot of depth in their subject areas but then they were matched with military who were very broad, had the real-world problems. And I thought that was a beautiful, beautiful arrangement. Unfortunately, as you know, that’s changing. That’s changing. But that’s another story. That’s another story.

Brown: The context of this interview is the Cold War. The Cold War is commonly defined as a period of political and military rivalry between the United States and the Soviet Union. Did you specifically consider Soviet technologies in formulating your work?
Russo: I think actually we did, but not as directly as I think a lot of people would imagine we did. We were always aware of what they were doing. We were concerned that we were staying ahead of what they were doing. In my career field, which was materials and aerodynamics and that kind of stuff, I think we were always fairly much ahead, so it wasn’t a case that they had leapfrogged us and we were trying to catch up. We were ahead. We kind of knew we were ahead, and our vision was to stay ahead as far as we can, or get even further ahead.

I can only recall one time when there was a Russian technology that we became aware of that caused us to make a significant shift in the investment pattern that we were doing. I mean we were investing in things, as I said, that would keep us ahead. There’s only one, because I’ve been thinking about this. There was only time where I saw a dramatic shift in an investment pattern because of a threat we saw coming during the Cold War, and that was the advent by the Russians of very large, land-based lasers, which they believed, which we believed at the time, could shoot down satellites or damage satellites at least, maybe someday even damage airplanes. Then at that time, and I think this was in the late ’70s, mid to late ’70s, we took on a very, very aggressive program to develop what we called laser-hardened materials—materials that could withstand the effect of a laser and sort of protect the pilot and protect the airplane. We found that the most vulnerable part of our systems was in fact the pilot’s eyeballs, because if you could put a laser on an eyeball, as you know, you could do a lot of damage. And so during the late ‘70s and early ‘80s, we spent a lot of money in developing really exotic, I would call them exotic, materials that would protect eyeballs against lasers, and as most of you know today, that’s pretty common technology. But it was rare that we would make these major shifts like that, at least in my career.

I know we would keep in touch with the Foreign Technology people who were supposedly always on top of what the Russians or anybody else was doing, and they would visit us periodically and give us reports and sit down with us and say, you know, “We learned that they’re doing this. Does that make a difference to what we’re doing?” And I think that went on, I’d say once a year at least we’d sit with these guys. But again, nothing earth-shaking ever came out of that as far as I can recall.

Brown: Did you have confidence in the material that you received from the intelligence organizations? Did you regard that their word as credible?

Russo: I did, sure. I mean I had no reason not to, to be honest with you. I had no reason not to. I never physically myself saw all the evidence. I always like to tell some stories though. These guys, you know, in the Materials Lab in the ‘70s and ‘80s, and still today, was the premier aerospace materials organization in the world, and when we had some of the best analytical capabilities anybody could ever imagine, and it was
inevitable every once in a while someone knocks on the door and says, “Hey, Vince. What is this?” And they’d give you this piece of material. Either it fell out of the sky or some farmer dug it up in a farm field, and someone was trying figure out “What is it?” Everybody would hope, “Oh man, this is this special material that either the Russians had invented or some alien invented or something like that.” Inevitably, in my thirty-some years there, every time we would face one of these pieces of material, we could figure out what it was pretty easily. And it was usually something we were aware of, or we were even using ourselves that could have fallen off one of our own airplanes for all we know. So we’ve never, in my history there, we’ve never ever found a material or something that was so revolutionary that would shake us up. And that was like over almost a forty-year period.

Brown: That leads to a related question about technology in general. And certainly anybody familiar with the history of the engineering organizations at Wright-Patterson can provide numerous examples of new technologies that were emerging and finding applications on Air Force airplanes, combat airplanes, airplanes that were intended to be superior to a potential adversary. What were some of the technologies of the Cold War that provided the Air Force with an advantage over the Soviet Union?

Russo: Well, let me start with the one I have the most personal knowledge about, and that’s composite materials. We started researching these materials in the, oh, 1960s, early 1960s. Came out of a study called Project Forecast, where a group of smart people got together and tried to project what the future would look like. And we invested a lot of money in these things in the ‘60s and the ‘70s, trying to make them into structural materials because they were lightweight.

Brown: Can I interrupt for a minute, please--

Russo: Sure.

Brown: --and ask you to define a composite material?

Russo: Oh, sure. A composite material is sort of like a combination of two materials. The layman’s way of explaining it is “string and glue.” I mean, you could think of a resin—the glue, like an epoxy, typically. Embedded in that are fibers, long thin fibers that strengthen the material much more than the basic epoxy itself would be. And they had a lot of potential for aircraft because, first of all, they are very, very lightweight. Compared to aluminum or steel on a density basis, they were way better than anything we were using at the time. The other tremendous advantage to them was that they didn’t corrode. But they were expensive.
Brown: So these fibers were not metallic, they were some other material?

Russo: No, they were usually carbon. We started out with boron and found out boron was too hard to make, so we moved over to graphite or carbon. So they were really carbon fibers in an epoxy matrix is the easiest way to think of them. And you would build up different layers. You would orient the fibers in the directions that you knew the loads were coming and stuff like that. But these materials didn’t corrode, either, and that’s a big issue with airplanes, because most of our airplanes were made out of aluminum at that time, and they corrode and they cost a lot of money to maintain. Well, the trouble with composite was they were very, very expensive. You were talking hundreds and even, in the early days, even thousands of dollars per pound. So it would have very, very limited use. But we kept working on it, we kept working on it.

Well, there was another property that we hadn’t thought of when we started this material, but this is the technology, I think, that made the difference during the Cold War—the stealth technology, particularly with the F-117 and the B-2. Those airplanes could not have been built without composite materials. You could not have maintained those shapes, those stiffnesses, with the conventional materials we thought about, so because of this breakthrough in the material, we then developed these stealth airplanes. Some of us think that the B-2 was the one that broke the camel’s back, you know, because if you now can bomb people without anybody even seeing you coming, that’s pretty dangerous. So it was that. I like to take pride in the fact that, hey, if it wasn’t for the material that we had invented back in the ‘60s and ‘70s, you couldn’t have done that in the ‘70s and ‘80s. So we spent a lot of money on that, a lot of time on that. I think it was probably one of the biggest game-changers during the Cold War that I’ve been familiar with.

I’d probably say one of the others was a lot of the high-temperature materials work that went on in support of jet engines. You know, the military airplanes that we fielded back in that time had some really fantastic performing engines, and, you know, they were able to do supersonic dashes, hold Mach at high levels, do a lot of turns, so it gave us an advantage. But you couldn’t have done that either without a good engine, and you can’t build a good engine these days without a good high-temperature material in the back-end there.

Brown: Can you please cite a specific material that found application?

Russo: Let’s see. I would think some of the nickel-based super-alloys were the ones that I know. I remember us spending a lot of time on trying to understand how do you up the temperature capability of them, how do you make them a little less expensive. Again, these exotic materials like composites and super-alloys, they’re expensive. But they give you the performance edge, and during that time, to be honest with you, Squire,
performance was driving almost everything. You know, we knew we had
to perform better, so I would say the ‘60s, ‘70s, and the ‘80s, everything
we did, performance was by far the number one criteria. If you could save
an extra hundred pounds or you could develop another little increment of
thrust on an engine, that would be the idea.

During the late ‘80s and ‘90s, we start worrying about “Wait a
minute, now.” I remember in the mid-‘80s, early ‘80s, we got into what
was the B-2 really going to cost. What was it really going to cost, when
you start thinking about now taking this material and putting in and
making a whole airplane out of it. The numbers got kind of scary. And so
we had to do a lot of work trying to figure out how to reduce those costs.
So we’d lend, we went over to automation and how do you put these
things down, get the labor out of it and stuff like that. Expensive.

Brown: So that would have been a manufacturing technology?

Russo: Yes, it was. It was efforts to reduce the labor intensive, because
most of these materials were literally, at least back in the ‘70s and ‘80s,
were literally built by hand. You had to lay them in molds that conformed
to the geometries you want. You’d put, literally, put them down by hand,
ladies and men with white gloves on, you know. It was kind of a sterile
environment because you couldn’t get contamination on the materials
because it would affect its performance. So you could see where the cost
would come from. Then we started moving to automatic machines that
would lay it down as tapes. We would get three-inch wide tape and try to
build the part up that way and things like that. We spent a little more
money on reducing the cost, but I don’t remember what the numbers with
the B-2 ended up costing, but my only comment is, “Well, it was worth
it.” You know, if I think it had a big effect on the outcome of closing
down the Cold War, and I think that was well-worth whatever we spent on
that.

Brown: I think the public would recognize the B-2 as a product of a
defense contractor—

Russo: Right.

Brown: —a commercial firm. Where did those contractors get their
technologies, and what was the relationship between the Air Force
laboratories, between your organization, and those defense contractors?

Russo: Okay. Well, to their credit, the contractor this time was Northrop
that built the B-2. Just as a little background first before I answer the lab’s
relationship. The way the Air Force does business today, and did business
back then, was we had what we called program offices. We called them
SPOs—S-P-Os, System Program Offices. There was a SPO for every
airplane the Air Force ever dealt with, as far back as I can remember, and I go back to the C-141 was the first one I was on. So every program, every program—C-141, C-5, F-16, F-15, B-1, B-2—all these airplanes had a SPO. The SPO was a cadre of somewhere between two- to four-hundred people in the Aeronautical Systems Center—which was not the lab—the Aeronautical Systems Center, who actually did all the engineering, the acquisition, the financial management, and ran the contracts between the SPO and the contractor—in the B-2 case, Northrop—but whoever the contractor was. Those were the guys that interfaced with the contractor. Our job in the laboratory was to interface with the SPO, particularly the engineering part, to make sure that they were aware of the latest technology and to give them advice to which directions the contractors were taking. We would spend a lot of time sitting with the key engineering personnel in the SPOs, making sure that they knew everything we knew.

And it wasn’t just the materials guys doing this. All the labs at Wright-Patt, and there were five of them, and all of them were doing the same thing—making sure that the Program Offices were well aware of what they were doing, hopefully using their systems occasionally to test out some things, you know, bring new technologies to the system. But it was always the SPO that was in the middle because they ran the contract. We would talk directly to them. Occasionally we would fund the major contractors through our R&D money. So the way the contractors learned about our work was through our dialogue with them. They would go to conferences together. We would fund them occasionally.

Now the question I always wondered was when you bring a new technology to the airplane, what percentage of that technology can you really trace back to say that was the Air Force labs that did that versus where the contractor did it on his own? And there were times when the contractor did do it on his own, you know. He invested his own money, developed a technology. I don’t want to guess which was which, but they were both important.

And the other part of that is why the contractors were always interested in what we were doing. It’s because we could integrate across what all the contractors were doing. That’s one of the things I loved about my job, particularly when you get into senior management positions. Every contractor in the country would come and talk to you about what they thought was important. And again Boeing walks in the door, and they leave. Lockheed walks in the door, they leave. Northrop walks in the door. Pratt—so you get a really broad perspective on what the contracting community out there—who, as you know, actually build the airplanes for us—what they are interested in, what they think is important. And there, you take all that stuff, and then you integrated it. We integrated it, and say well, geez, if you listen to all these guys tell you about what’s important, it seems like we ought to be going this versus that way.
That was very important in how we structured what the technical programs we invested in. You had to listen to the contractors tell you what they thought they could do, and you had to marry that with what the Air Force thought they wanted, you know. You would get these requirements documents. We want to fly this way, that way. But they were very high-level documents. You never got the “Vince, go invest in composite materials.” You would never get that. You would get, “We want something like this.”

Then you listen to all the contractors, and then you’d listen to your own scientists, you know. Some of these guys are really smart. I mean, some of these guys were. We had in my organization almost half the organization had Ph.D.’s. Half the organization. I mean there aren’t too many organizations in the country where you could point to half of them having PhD.’s. And they were smart. They spent a lot of time in their science areas. They attended conferences. They did hands-on research themselves. So they were always right at the edge of the state of the art.

So you would get these requirements from three different directions. You’d hear the contractors. You’d hear the Air Force, and you’d hear your own people. And everybody always used to ask me, “Well, Vince, okay. Now you got it, how do you make the decision? How do you decide where to invest when you get all these requirements?” And I always used to say, “I sure the heck wish there was a formula I could plug in, you know. A times B equals C plus D, or something like that.” There was nothing like that. I used to tell people you would hire guys like me and a few other key people, and we’d sit in a room and listen to all these things. And you almost had to trust our judgment that where we wanted to invest the money made the most sense for the Air Force.

Number one criteria is, what did the Air Force need? What was the most important to the Air Force? And then you tried to balance all those other inputs. So that’s how we kind of get it. Then we would try to take that to the System Programs and make sure they were aware of it, and hopefully they would then implement it on their contract.

Brown: The remarks that you just made are important to scholars who are interested in ideas and inventions and how those originated. And some scholars have suggested that successful technology development is characterized by a network of participants rather than a hierarchical structure. From building on the remarks that you just made, was it your impression that in the path from concept to maturity, did this network have a role to play versus the hierarchical Air Force documentation?

Russo: Yes, that’s a good question, Squire. I wish the network had played more. Okay. In my tour, it was more hierarchical. It was. But you could see where if you could figure out how to do it more horizontally rather than vertically, you most likely could get a better product. At least
most of us believed that. All the literature you would read, all the scientific breakthrough would tell you that, but we had trouble doing that.

I mentioned earlier we had five laboratories here at Wright-Patt. They were all in the vicinity of, oh, anywhere from three- to seven-hundred people each, you know, each one was. But they were very discipline-oriented. There was Materials. There was Flight Dynamics, which included the airplane, the physical airplane. There was Propulsion, which was the engine. There was Avionics that handled the electronics. And there was one called Human Effectiveness which had all the human elements. Well these five things were all the five things you needed to build an airplane. You needed the materials. You needed the aerodynamics. You need the propulsion. You need the avionics, and you need the human. We had laboratories devoted to all five of those things, but the airplane is the sum of those five, not any one of those, right? Not any one of us could build an airplane by ourselves.

But back in that time frame, they were in fact five stand-alone laboratories. We all reported to a headquarters organization that just was sort of an oversight organization, did not force what I would call the horizontal integration that probably should have happened. But there were tries at that, you know. We used to. They would send guys to different, like they sent me to Flight Dynamics where I met you the first time. Then they’d send me down to Propulsion, just so we would learn a little bit about each other’s programs. And that obviously helped, because when you take into account the other people’s programs, you could do something different. But it was not very formal. It was not very formal, and it was not well-structured. There were, I’m sure, people who can give you wonderful examples where it happened, but when that happened, it was because two guys got together and they liked each other and they said, “Boy, we could something really great together.” And that’s when it would happen, but not very formal.

I think the Air Force recognized that in the late ’80s, early ’90s, and started looking to restructuring the laboratories from these highly disciplined, stand-alone, functional organizations to more integration. They’re still struggling with that here in 2006, let me tell you. I led the efforts in the late ’90s that created the Air Force Research Lab that tried to put them all under one umbrella. It’s starting to catch, but I’ll tell you it’s tough, it’s tough. It’s tough to do, but it’s the right thing to do.

But back to your question, not enough of it went on in that time frame, as far as I can tell. But if you look at the results, we won the Cold War, so you can’t be too critical here, you know. Even though we didn’t do what maybe a lot of people wanted us to do, we still succeeded.

Brown: Let me lead you then in the other direction so that in the transition of technology into products, normally, in the economic model we work in, we think of ultimately customers. So who represented the customers for
the Wright Field laboratories? Were those the operational commands or was there someone else that represented a customer?

Russo: I think I always used to look at it as it was the program offices, because they were the guys that got the real requirements from the real customers. So when the Strategic Air Command needed a new bomber or the, what was it, the Tactical Air Command back at that time, they needed a new fighter, the guys they would turn to would be what was called back at that time something, the Air Force Material, or Air Force Systems Command, Air Force Systems Command. They would turn to those guys, and the Systems Command would get all these requirements and say, “Okay, we’re going to create a Program Office to go build this airplane for you.” So I always viewed the Program Office as the prime representative of the customer.

Sometimes, though, they were a filter, too, you know, so what I used to try to do is make sure that the guys on the other end were saying the same thing that they were. And I don’t want anybody to take that negatively, but they had a job to do. They were told to build this airplane. They were given a certain amount of money. They were given a timeframe. They were given a cost. And they had to produce. And if you did much to perturbate their plans, it caused them grief. So if you walked into an office and said, “Well the customer thinks I need this new radar and the one you’ve got is not as good as the one we got up here in the laboratory,” they would say, “Well, that’s very nice, Vince. But we don’t have the money to put that better radar on, and, you know, we would change it, have to change our schedule.”

And so there was always this built-in resistance because of the program structure which was laid down by the users. The ultimate users to me are the guys that go fight the war, so they were laying down the requirements. The Program Office was trying to respond to them, and here we were trying to bring to them things that would perturbate all that. And so there was this natural tension. But sometimes when the argument is compelling enough, you know, you’d win. But it wasn’t easy. It wasn’t easy. So the lesson learned here—get involved way up here in the very front end of these programs and bring the best you have.

Now the down side of that is that these darn programs take a long time to develop. I mean some of these programs were, I mean, five, six, seven years in the development, and you may start here with what you consider the latest state of the art technology. By the time you got down here to production, well this is obsolete already, you know, because technology’s changing, particularly in the electronics and avionics area. I mean, it changes so darn fast that you could start out building something and by the time you actually, or designing something. By the time you actually built it, you were dealing with old technology. And so it was always a dilemma, how do you keep the technology fresh along its path
but not disrupt that procurement cycle that the SPOs were going through too much? It’s not an easy job.

Brown: Do you think in a situation like that, that the Air Force leadership, which in terms of individuals might change several times during a program development, during the life of a technology, do you think that the Air Force leadership was sufficiently supportive of the laboratories, that they recognized this long time to maturity, that they provided laboratories with support during that time period?

Russo: I tell you, Squire, it was up and down. It was up and down, as you could probably guess, depending on who was in charge at the right time. There were times that, you know, that the guys in charge could not do enough for the labs. There were other times when some people were in charge would like to do away with the labs, steal those thousands of people and make them go do something else. So it was up and down.

But if you step back from that and look at a forty-year perspective, in the one way I always look at this is, I always tell people, follow the money, you know. No matter what anybody says, follow the money and look what the money was doing during that forty-year timeframe. And your conclusion would be, it was relatively stable, relatively stable, particularly at the basic research. We did this very basic research we used to call 6.1, but this would be like, you know, scientists in the laboratory at a university inventing something really, really new. So we did basic. Then we did what we called 6.2, exploratory development, which would sort of be the next level, which most of the labs dealt with. And then we did the third level, we called advanced development, or 6.3. The third level was when you got really close to the system. But if you looked at the first two levels which are what I would call the core, the funding for that core over forty years was relatively stable. It varied between something like 1.7 and 2.2 percent of the Air Force’s budget. Well, you know, it had ups and downs, but it was stable.

What I liked about that—it allowed us to invest in long-term programs. You know a lot of this kind of research that we deal with is not something you’re going to get done in four or five months. It may take four or five years. In the materials business, we used to say it took fifteen years to get a material from somebody who invented it, really new idea, to actually it was ready to go fly on an airplane. It took the better part of ten to fifteen years to do that. Well, if you don’t have patient capital during those ten to fifteen years, you’re going to have starts and stops and starts and stops. So I think that was one of the strengths of the laboratory. They had what I used to like to call patient capital. We could invest. We could plan long-range. We could strike up a contract with somebody or some university that we think was on the cutting edge, and we could support them for a long-enough period that they would produce something that we could use. Not very many organizations do that, you know. You think
about other funding organizations, what’s inside the federal government, and they vary all over the place. My favorite one was DARPA. You know DARPA—what was the greatest idea of the day, well, let’s go do that, you know. And we need that, too, but you need patience.

And if I could say one thing that I think kept us going during the ‘50s through the ‘90s, and maybe you could argue helped win the Cold War, was we were patient. We were patient to allow things to develop. It was not a conscious decision by the Air Force to do it that way, but it was the consequences of the way they budgeted for science and technology. So I think they did it right. I still think they’re doing it the same way.

But back to your question, it varied all over the map. I mean I remember sometimes we’d get a new general coming in, and he’d want to change everything and throw everything out, but we all knew he’d be gone in a year or two, and we’d have to ride this one out. And the next thing you know, you got another general coming, loves you every minute of the day, and dragging you all over the country. So, you just had to learn to roll with it. This is why I believe that this set-up that we had with the stable civilians who had lived and breathed this for years provided a sound base to tolerate these ups and downs. Otherwise, I mean I don’t know how you run organizations if you keep changing leaders every year or two. You know, organizations will just fall apart.

Since I’ve retired, and even while I was still working, I did a lot of studying of organizational health, of what makes organizations good and what are traits of really good leadership. And it’s clear to me, number one is constancy of purpose. If you ever had anything about an organization or leadership, it’s constancy, because it takes time to develop these things, and if you’re too impatient and you change every year or two, you’ll be in trouble. So I would say historically, we had constancy of purpose. And the Cold War was the purpose, you know, so we knew what we were doing. We knew why we were doing it, and that was the purpose.

Brown: Let me take you back to a time early in your career, and remind ourselves of what it was like, particularly in the 1950s, certainly a time of the Cold War. It was common to find articles in the open literature describing weapons of future warfare, and those scenarios generally featured missiles, long-range missiles, robots of some kind, spacecraft in orbit, unmanned airplanes. Did this vision of the future, a vision in which it seemed that the time of the airplane had passed, did this vision turn out to be correct?

Russo: Well, if you phrase your question, did the time of the airplane had passed, I’d say absolutely not. I mean that, I would say, “No.” Not only no, but you know what kind of “No.” Back then, those visions, though, were helpful because they stretched you.

I participated in a couple of these visioning sessions that the Air Force ran. The first one that I was aware of I did not participate in. In
early, I think it was in the early ‘50s, they had something called Project Forecast. When they got the best brains in the country together, sent them off for several months, and I don’t know where they went, and did just that—sit around and envision what would the future look like, what could you predict twenty or thirty years from now. And they predicted some good things. For instance, they predicted composite materials. Matter of fact, it was Project Forecast that in the ‘50s that led us, what they thought that maybe we, maybe it’s true, maybe we ought to go look at it, so it led us in the ‘60s and ‘70s to start, start doing this.

Well, in the 1980s, the Air Force decided to do Project Forecast II. And I led one of the panels of Project Forecast II. Well, I’ll never forget, though, the beginning, and they had like three hundred people. We were holed up in some place that, I don’t know, you may have participated in that, Squire, in Washington, D.C., for six to nine months of traveling back and forth. What a hectic time of my life. But anyway I’ll never forget at the start of the Project Forecast II, they went back and reviewed for us what happened in Project Forecast I, and showed you what these guys had predicted and what had materialized. And it was shocking how good they did. I mean it was shocking to me. I couldn’t believe it, you know. They predicted big, large airplanes with wide bodies that could carry tanks. Aw, come on, back in the ‘40s and ‘50s? Well, we had the C-5, you know. They predicted a lot of stuff like this. I think they did that just to incentivize those of us who were doing Project Forecast II to say look, when you get to 2006, someone’s going to look back and say look how good these guys did. Well, I haven’t seen that happen yet.

But we participated in the study called Project Forecast II where we start predicting what the future would be. The big hitters of that have not materialized yet, things like the space elevator, which was always my favorite. These guys had a way of getting things into space that didn’t need rockets. Energy in a bottle, you know, these negative energy devices where you could store enough energy in a bottle to power the whole city of New York and stuff like that. Well, it’s really some far-out things they predicted that haven’t happened.

There are some other things they predicted that have happened, like the unmanned vehicle. I mean back in the ‘80s when we were doing Project Forecast II, the Air Force was not too keen on uninhabited vehicles, you know. They were going to be, the pilots were going run them all. Well, today, that’s a totally different story. So that was clearly one.

And the other one we predicted was the great increase in performance and reliability, primarily of jet engines. And over the last thirty years there has been tremendous improvements of that kind of stuff. I was trying to think what the heck else we predicted that actually came true. Nothing jumps to my mind.

But back to your question, I think the age of the aircraft is not over by any imagination. I was party to a Presidential commission in 2003.
The title was “The Future of Aeronautics in this Country.” And it was exciting and scary at the same time. It was exciting because the technologists could show all the future. You could do the same thing Project Forecast I and Project Forecast II did. My favorite of that was the private taxi, the air taxi, you know. I sit in my home and I dial up something, and next thing you know, a vehicle lands in my backyard, no pilot or nothing, but it lands in my backyard. I get in and say, “Take me to Grandma’s house,” and it takes me there. Well, I mean, that’s the future. They predict that could happen. They predict a lot of these unmanned vehicles doing incredible things that you couldn’t think of—space travel for tourism, you know, all these kind of things that were predicted in that report by the Presidential commission are still on the table.

So there’s not a loss of potential for aeronautics in this country. What I see happening and what’s scary to me, though, is that we’re losing the edge to maintain it, or the interest to maintain it. My best example is NASA, and I jokingly tell a lot of people, and maybe somebody reads, looks at this and years from now will see it happen, but I think they almost have to take the first “A” out of NASA. It’s not the National Aeronautics and Space Administration. It’s the National Space Administration. That’s okay. But who worries about aeronautics then?

And I think our country is going in the path that is starting to rely too much on foreign fabrication, or foreign manufacturing of our aeronautical systems. We seem to be willing to give that up. We haven’t given up the space access, but we seem to be not as interested in protecting these incredible edges we had. And I would argue that this incredible edge we had in aeronautics helped us win that Cold War, I mean, because you just scared the heck out of these guys with some of these systems we could field. And I see us losing that. I see us losing that edge. It worries the heck out of me. I haven’t figured out how to deal with it. The Air Force is the only organization today you could look out that says where they’re still keeping some level of investment in aeronautics, but let me tell you the percentage is down dramatically. Back in the heydays of the Cold War, I would say if you looked at all the budget that the Air Force put in and our science and technology, eighty percent of it would have been aeronautics, maybe even more. Eighty percent of it would have been around aeronautics. If you look at it today, it’s less than forty percent. And the trend is going down. So if the Air Force isn’t investing, and there’s no first “A” in NASA, where’s this country going? You know, it’s one of my personal peeves that I see this happening, and it worries the heck out of me.

Brown: Another time frame that’s important and perhaps has lessons for us today, and that takes us into the 1960s and the conflict in Southeast Asia, the Vietnam War. Looking back on the history of that, we realize that it created some unanticipated demands on the Air Force, an Air Force that primarily thought in terms of nuclear warfare, the Soviet Union. Now
we were involved in a different kind of conflict. Do you recall what the effect of that, the events in Southeast Asia, what effect that had on the laboratory programs?

00:42:35 Russo: It did have an effect. It did. What the effect was is to draw us much more near-term. Things you had to solve yesterday. Problems that they experienced with some of these systems that we had fielded that weren’t intended to be fielded the way they were ended up being fielded created unanticipated consequences, and we had to go solve those problems. The Southeast Asia environment, you know, most of our thinking had been wars in the, in Central Europe. Well, the environment was totally different. The frequency of sorties that had to be flown was different. The environmental effects on the systems was different. And so we had to come up with quick-turnaround solutions for those kind of things.

We paid a little bit of price because you did that at the sacrifice of that nice patient capital I talked about earlier. When you knew some of that patience had to go by the wayside. But it didn’t last that long. It was like a two-, three-, four-year window where we were doing that. And then you’d get back to the more core stuff. But it did affect things. It did affect things. The war today affects what the laboratory does. You worry about different things because you now see problems you sometimes didn’t anticipate. That clearly was true in the Vietnam era.

The other consequence of the Vietnam era was a lot of the scientists that we had, the military ones at least, got yanked out kind of suddenly, so you lost some skilled people too at the same time.

00:44:04 Brown: Yanked out for?

00:44:05 Russo: To go support the war more directly than the research. I think that, but the focus of it more near term was the big, big consequence. And that’s to be expected. I mean, that’s what we were there for, you know. I used to tell people because at that was the time I started getting into the management, and I started telling people, my goodness, if we can’t solve these problems for those poor guys over there fighting for our safety, what the heck are we doing here, you know? Inventing something new for somebody fifty years from now? Who cares? Let’s make sure we do this first, and then let’s also worry about the future.

So it was always a question of balance, you know. How much do you invest in solving today’s problems versus how much do you invest in the future? And that was always a tough deal with it, but when you get wars like that and when you get sudden things that you hadn’t expected, the resource was there to go solve those problems, and I think they did a pretty good job. I think they did a good job.

End of Video Tape One
Brown: Let me suggest that this would be a good opportunity to take a break.

Russo: Okay.

Brown: -for a few minutes, and then we can get a sip of water and pick it up again.

Russo: Sounds good. Thank you.

Brown: Dr. Russo, the workforce at Wright-Patterson Air Force Base is unique—unique in its heritage that dates it from World War I, the engineering division at McCook Field near downtown Dayton. It’s extended up through World War II through the Cold War. It’s a unique blend of military officers, of civilian technical specialists. It’s also a government agency, which brings particular responsibilities. Taking all of those issues into account, how would you describe the culture of the work environment within the laboratories?

Russo: It was great. I mean, if I had to pick one word, I would use the word great. It was interesting. You talked about the heritage a little bit. I think that’s one of the things that made it great. It was guys like us that were sitting there saying we’re following the legends of the aeronautics business, and if you love aeronautics, you’ll know that everything of importance in the subject of aeronautics probably has its roots at Wright-Patterson Air Force Base in Dayton, Ohio. All the way back to Orville and Wilbur—in 1903, they were here.

But we traced our history back to I think originally the laboratories in 1917, McCook Field, as you pointed out. And that’s quite a legacy, that’s quite a legacy. If you followed your discipline, most of us would do this and we would sort of get ingrained, you could watch every step of the way, every big improvement in aeronautics would be traced back to Wright-Patterson. Not only the military, but the commercial. I always used to tell people that if it wasn’t for a lot of the military work that we invested in here, you wouldn’t have a lot of these commercial airliners and commercial capabilities that you have today. You know, my favorite example is the, the 747 is the C-5, was Boeing’s version of the C-5, you know. I was on the early days of the C-5 evaluation and Boeing lost. Probably the best thing that happened to the Boeing Company, they lost.
And they said, “Heck, I’m going to go build that airplane anyway. It was such a good idea.” And look what they did with the 747. But the technology in that airplane, I mean, you could trace ninety percent of it back to things that we’d done here. And that was what’s fun about working in organizations like the base. You had this wonderful, wonderful heritage. I mean it’s so cool to go out to Huffman Prairie and stand on the ground that Orville and Wilbur flew on, or go into that museum or talk to some of these guys who were around here in the ‘30s and the ‘40s. It was just a wonderful, wonderful working environment.

Plus, in addition to the heritage, you had this sense of purpose. You know the Cold War did provide a sense of purpose. But it wasn’t just the Cold War. I used to look at it more defending the country. Now the Cold War just happened to be the problem at hand, but, you know, back earlier than that it was World War I and World War II, you know, and the Korean War. So there was not only this tremendous, tremendous heritage, but there’s this wonderful sense of purpose, you know. What greater calling could you have than go defend your country? And you didn’t have to put a uniform on and carry a rifle to do that, you know. I felt that us in that workforce were doing our fair share to help the country.

The other nice thing about it was we were able in the laboratory environment to get some pretty good equipment. We would get our hands on some of the latest state of the art equipment. We had the budgets that allowed us to do that. So we were always exploring the cutting edge. Well, anybody who’s been in science anytime in their life knows that that’s where you want to be. You don’t want to be back here filling in the gaps. You want to be out here, out front. Well, we would always push ourselves to be out front. I’ll give you my favorite example of some. We learned that some company developed a new fancy scanning electron microscope, well we had to go have one, you know. So we’d have to go buy one, and then we would give the older ones to the universities, you know, or somebody else. But we would always stay on the cutting edge with equipment so that we knew, you know, we were doing as much as anybody would do.

The computers would be the other good example, you know, massive parallel computing systems. When they start coming on board, we would always make sure we had availability, either access to them or we owned them ourselves. So that the culture or the environment that you worked in was just really neat—the sense of purpose, the history, the technical capabilities were always good.

I talked a little bit earlier about this balance between military and civilian. I also thought that was good. It’s unusual. I mean where else can you turn in the country to find a mixture like this? At Wright-Patterson and during those time-frames, I would say eighty percent or more were civilians. And most people think well this is a military installation. Well, it’s not a typical military installation. It was eighty percent of the people were civilian. The military would be in most of the
very, very senior management positions, but the civilians would always be there as the deputies or sometimes we would run the bigger organizations. And there’d be a few military at the bottom, you know, the young lieutenants as they came in, they would get some hands-on experience. And it was just a wonderful mixture, because you got the vitality of the military and the stability of the civilian work force. I just thought that was neat. And I don’t know where else you can go to get that kind of thing. So if you ask me about the workforce, I think it, it was great. The environment was good to work in.

I have to say the pay wasn’t the greatest. You know, you can’t have it all, and I used to tell the young guys that we used to try to recruit, I said, “What’s important to you?” You know, you have to think about what’s most important. You could probably have made more money as a brand-new materials engineer graduating right out of college if I’d have gone to work for some company. I don’t doubt that I could probably have made more money, okay. But I don’t think I’d have had as much fun. I don’t think I’d have been, had this sense of accomplishment and contribution as most of those guys who did that had. So I feel glad that, I’m glad I did it. I used to recruit, I used to be a fairly good recruiter, you know. I used to love to recruit the young kids, and even if they didn’t stay with us, my argument was, “That’s okay. Come work for us three or four years. At least you know what we’re about. You want to work for some company later on, you could always help each other.” And we did a lot of that, and that was good.

The other thing about the workforce, Squire, that I think was really good was the education level. The other nice thing about working for the federal government was they really believed in investing in the people and in educating them. I have to use myself as an example. First of all, I got my master’s degree through AFIT. I was a lieutenant at the time. Didn’t cost me a dime, right. I mean they were paying me a lieutenant’s salary. And then they send me up to Ohio State to get this Ph.D. They paid all my tuition, all my books, all my fees. I was married, had three kids. They moved us to Columbus. They moved us back. The government invested in people, in degrees. So you were dealing with a really high quality workforce, and most of the people had advanced degrees. And it wasn’t just engineering. This is one thing I learned later on in my career when I moved down to the Aeronautical Systems Center. I mean, there was these people, half of them had MBA’s, you know. When you’re talking about the business of buying airplanes, well, you better have some smart business people, right? Those people who knew financial management, people who knew how to do contracts, people who knew how to do program management—they’re just as important as the engineers. I used to think the engineers ruled everything, but it’s not true, you know. You can’t do it by yourself; you need some help. And that part of the workforce, I think, was about the same quality as the engineering
workforce. So you put all that together, and I would say it was first-class. It was first class.

00:07:42 Brown: Your remarks on being on the cutting edge of technology pose another interesting question somewhat in the opposite direction. It’s common to read in management textbooks that if an organization goes on for a long time, it tends to become conservative, may lose its aggressiveness. From your observations, how did the laboratories at the base maintain their aggressiveness, avoid this problem of conservatism?

00:08:20 Russo: You know, Squire, I go back to this military-civilian mix. I think that helped a lot. I think that helped a lot from that, to prevent that from happening to us, because when you would bring in some new general or some new colonel who had a totally different view of the world than maybe you did, it would cause you to stop once in a while and say, “Now wait a minute. Am I doing this right? Am I doing this right?” So I think that’s one way we prevented that, by having this influx of the military ones who would question what you were doing. And if you can’t justify it, then maybe you weren’t doing the right thing. So that helped.

I think the other thing that helped, though, was the sense of purpose—the defending of the country, the Cold War, the ability to go home at night and say, well, I helped, I’m helping. But there was, to be honest with you, a lot of what you were worried about, what your question inferred. There was a lot of that, that people would get stuck in a rut. And you would tell them, “Well, let’s quit working on this because we think this has a higher payoff.” Uh-uh. It’s too hard. It was very, very hard sometimes to get people who were working down this road to say, “Well, yeah, we, we sort of milked that as far as we can do it. Maybe it’s time to switch you over here.” That’s always hard, because people build careers, you know. They’re well-recognized with their peers across the country as the world’s expert in “Brand A” and now all of a sudden you want them to become a world expert in “Brand B.” That’s not easy, that’s not easy. But, you know, so you had some of that problem. And there wasn’t a whole lot you could do about it because sometimes you get these guys in their fifties and maybe even early sixties and you’re telling them to take on a whole new career. How do you do that? How do you do that? So you, you sort of let them, you know, finish out their career logically. You maybe cut back a little about the investments you’re making. They don’t have as much of support maybe they had when they were the cutting edge of the technology. But it was a tough job.

So, back to your question, part of it was true, part of that was happening, but I don’t think it was as bad as people perceived it to be. I used to really get mad when people said, you know, your guys weren’t flexible enough. You weren’t looking to the future. I didn’t like that. And I think that the influx of the military helped that, helped keep that from happening.
Brown: As a senior executive, you were in close contact with higher headquarters, with officials in the Pentagon, perhaps even up to the level of the Secretary of Defense. And during your time, during your service in the Air Force, you observed a lot of changes in the office of the Secretary of Defense. Do you remember some individuals who were particularly notable for the initiative that they brought, perhaps for the changes in system acquisition that they brought to that office?

Russo: Let’s see. Let me start earliest in my career. I think I said earlier my first real exposure to running a system program I got assigned to the C-5 program office back in the late ’60s. I had spent a little bit of time supporting the C-141 before that. Then they moved me and spent full-time for about three years on the C-5.

Brown: Let me stop here just for clarification. What types of systems were the 141 and the C-5, please?

Russo: Oh, sure. The C-141 was the cargo airplane, the first relatively good-sized one. The C-5 was the sort of like the follow-on to the C-141, and it was about, what, three times the size. It was the first really big airplane, 747 size.

Brown: Both of them with jet engines?

Russo: Cargo. Both jet engines. Both cargos. Both designed pretty much to move the Army, to support the Cold War, you know. So you’ve got the Army stationed all over the place, so we did a lot of work with the Army about how big does it have to be to design to get the tank to roll on or how many trucks can you get in to it? And can you carry the soldiers up above if you’ve got the trucks below and all? So we did a lot of work with them. But at that timeframe, Robert McNamara, as I recall I think he was Secretary of Defense, came up with this acquisition policy he called “Total Package Procurement.” And, Squire, I’ll tell you, for those of us who were in the trenches at the time—I was down there as an engineer in this program office—you’d have to wonder what the heck some people were thinking about. And I’m going to tell you the consequences—I would like to call it the unintended consequences of decisions made up here when it gets down to the engineers who do the day-to-day business.

The concept called Total Package Procurement was one that almost told the federal government “Hands off.” You cannot tell the contractor to do anything. All you could do is sign a contract, you know, make sure you have a really good contract, really specify your requirements, and then just sort of stand back, send them the money, and sort of watch over and make sure that nothing was crazy. But if you saw him doing something that you knew could lead to a problem, nothing you
could about it, because he was responsible for it, and he would pay the consequences. Okay, so that was the concept of Total Package Procurement.

Now let me show you what happened when you got that down to an engineer. I think I mentioned earlier that I was on the C-141. Well, we learned a lot of lessons about materials, what not to do with them, you know. Don’t use this alloy because it doesn’t work, or don’t do that because it won’t work. Well, it turned out that both the C-141 and the C-5 were built by the same guy—Lockheed, down in Marietta, Georgia. Well, we start getting on the C-5 and start looking at their designs, Lockheed’s philosophy was to take what you did on the 141, multiply by three. And the other thing you need to know, they had a weight bogey. In the contract was a weight. If it exceeded this weight, they were going to lose money. So everything that was driving it, anything they could ever think of was “get below the weight bogey” because they would make money.

Well, there are certain materials that we knew of back, this is back in the ‘60s, that just don’t perform well in corrosive or humid environments. They’ll crack, they’ll break, they’ll corrode. We knew a lot of this kind of stuff, but they’re really strong, okay, so therefore they’re lightweight, so you can build systems and they are very lightweight. But we knew they wouldn’t last long. We just knew they wouldn’t last long in the environment, but there was nothing we could do. I just give you an alloy, just for the history. It was an alloy called 7576, no, 7075-T6. It was an aluminum alloy that we just knew had wonderful strength, wonderful ductility, and it had all the right mechanical properties. But it was lousy in the environment. You either had to paint the heck out of it or put it where it wouldn’t get any salt on it, all that kind of stuff, because it was just terrible. We knew that. We had the experiences on the C-141 and some other airplanes that we knew at the time, we’re using this out. We knew that.

Lockheed decides to pick this alloy to build the critical part of the landing gear, a big-, it was called a yoke. The thing was, I mean, it was half the size of, it was huge, you know. And I remember a bunch of us in the Materials Lab saying, “We can’t let this happen. This is, we can not do this. This is crazy. We know we put those airplanes, next thing you know they’ll be falling on the ground. They’ll be cracking. We can’t let this happen.” We go to Lockheed and explain it. They said, “Oh, no, no. No, no. We’re going to paint it. Don’t worry about it. Nothing’s going to happen.” You know, they refused because they knew there’d be a tremendous weight penalty if they switched to another alloy that didn’t have this problem with it.

So I remember sitting there one day saying, “What can we do to convince Lockheed’s management that they’re making a mistake?” So a fellow engineer and I decided one day, “We need to go buy one of those yokes and put it in the real environment and show them.” So sure enough, we did this. We got the, we found some money. We went to buy one, and
at that time it only cost like a hundred thousand dollars, but still, it’s a lot of money. We bought one. We built this big gigantic tank for salt-water just to simulate corrosion. We buy this big old yoke. We had it machined by the same guy that was doing this for Lockheed at the time. We bring it into the laboratory, and the idea at the time was that you would put it in and you would take it out so you would simulate what would happen in an environment. You put it in, take it out. We put it in. We took it out. We put it in. We took it out, and it cracked. Two times. Two times! It was amazing. It just didn’t crack, I mean, you could visually see the cracks on this piece of material, and this is what we were going to build our airplanes. Well, we were just beside ourselves. I mean, we were going crazy. We can’t let this happen. Well, to our credit, I think we finally got to the right people, not only in Lockheed, but at the contractors, that convinced them well they had to pay a weight penalty so they fixed it.

But the problem was that was a lot of work to do for something that we knew, but this Total Package Procurement concept that, that McNamara had come up with, said “Well, I don’t care what you know, you can’t tell them to do anything.” Now had we had the old systems, we’d have said, “You ain’t using that alloy, guys.” But we couldn’t do that. But we finally had to convince them. So the procurement sometimes has these unintended consequences, these high-level decisions.

Now back to your question about other things that maybe people at the really high level have influenced the technology that we were working on at the time. We used to jokingly say there are two ways to get programs initiated in the Air Force. One, you fight like heck from the bottom up and get it through the budgeting cycles, and that’s typically a two or three year process. That’s one way of doing it, and that’s the standard way to do it. The other was to convince some four-star general or secretary to the Air Force that it was a good idea, and then have him tell you to do it. And you’d get it done next week. And there was a lot of that that happened, you know. I can’t remember a whole lot of Cold War examples. The closest one I remember happened probably in the ‘90s when someone, I forget who the secretary was at the time, says “We need,”—the Predator was just coming on board, a remote, you know, the Predator is the remotely piloted vehicle that takes all these pictures—and someone says, “Well what good is taking a picture unless we can kill somebody?” So someone said, “Why don’t we put a missile on the Predator?” And some secretary, I forget who the secretary was, or the four-star, called up ASC and said, “I want you to do that.” And yet, you know, we did it in a matter of months. Money flows. Once they say they want it, the money shows up. It gets done.

It was hard, though, for guys like me in the management structure—I was sort of like in the middle of the management structure at that time—to get words to these guys at the top. So you know how that normally would happen when the secretaries or the secretaries of the Air Force, or the chiefs of the Air Force? They would hear either from the
contractor or through their users, and they would be turned on to something that was really, really important. And we would get direction to go do it. That happened, but not a lot, okay. Not a lot. I would say five, maybe ten percent of the budget would be directed that way. But it wasn’t a big deal. It wasn’t a big deal. And usually they were fairly good ideas, you know, so we didn’t fight them.

The other things that happened in the procurement arena in the ‘70s and ‘80s when they started doing the acquisition reform was the word of the day, you know. And we were always looking for different ways to improve upon the acquisition of systems. And it’d start getting unfortunately layered this on top of that, and it got more and more and more complicated. And it got harder and harder, and as a consequence, the timeframe to do these procurements got extended. That, combined with the Congress, you know, saying, “Well, we don’t, we’re not going to give you that much money this year. We’re going to give you less.” The worst thing you could ever do to big, these big programs is juggle with their funding, because then they have to go back to the contractors and renegotiate. You know, you sign a contract that says, well, we’re going to build twenty airplanes a year, and then you come back two years later and say, well, it’s not twenty a year, it’s only ten a year. Well, the ten will cost you almost as much as the twenty would have cost you because they have to go back and redo all their procurement and all this kind of stuff. And we would go through that all the time. And it was just hard.

And I always used to feel bad because it would come across as the guys here were messing up, and I knew all these guys. I knew all these generals that ran all these programs, and they were all good guys. And some of them got accused of being the problem, but when you really looked at the problem, the problem was well above what was going on here. I mean, sure, we messed up once in a while, but the really big issues like change in budgets or changing procurement philosophies were not decided here, they were decided up at the headquarters, either in D.C. at the Air Staff or elsewhere, Congress. So, we very seldom made those big critical decisions that dramatically changed the direction programs were going. They were usually made for us.

Brown: In 1989, we begin to see the first events that would characterize the ultimate demise of the Soviet Union and the end of the Cold War, 1989, the vivid pictures of the Berlin Wall coming down. As this classic Cold War threat began to recede, was that a surprise to you, or had you anticipated the end of the Cold War?

Russo: You could see a little bit of the potential of it happening. I would say it was somewhat a surprise because it happened so abruptly it seemed to me. I mean, it wasn’t one of these deals where you could see it going, going, going, and finally you see it went away. You could see maybe going like this [gestures] and then all of a sudden, it went like that, you
know. [gestures] It’s just all of a sudden we wake up and there goes Reagan, telling them to tear down the wall, you know. Gosh. And it did. And so I would say, yes, it was somewhat of a surprise at how fast it happened. You could maybe see it was going to happen, but how fast it happened was shocking. Pleasantly, pleasantly shocking.

The other thing I have to tell you about that is, you know, once that happened, a lot of things got made more available to us. So there were all kinds of organizations in that time that were going over to Russia to try to find out what was going on and see if they could take advantage of some things that were going on. And everybody and their grandmother was doing this, right. There was an organization sponsored by the National Science Foundation that gathered up some of the smartest materials guys in this country, in our country, and sent them over to Russia for a long period of time, months, to find out what was going on and then bring it back to us, back to the DoD in particular, to see if there was something that we could take advantage of.

And you know what? I can only remember one technology that we felt that they were ahead of us in, and it was some electro-optical material that they were developing that had some wavelength properties that we couldn’t duplicate with the materials we were working on. And that did affect, so we said well, forget about our material. Let’s go look at their’s. But, you know, when you consider all that money they were investing to not find a whole lot of things that you felt we weren’t aware of, I think, says something positive for us, that our intelligence was pretty decent, because they were giving us good indications of where we had to be investing our money and there were very little surprises. There was very little that was going on there that you would say, “Oh my God, why weren’t we doing that?” Other than that one example I can remember, and it was kind of a small application, remote. Really good material, I’ve got to admit it was really good material. We looked at it and said, “Okay, guys, why didn’t you think of that?” You know. But, yeah, we can’t think of them all. But it verified what I had said earlier that I think we were well ahead, and probably widening the gap in the late ’80s. I think we were widening the gap between us and them. And I think they recognized it and figured this was futile.

Brown: So then, a couple of summary questions, then, if I may. Reflecting on your remarks this morning, would you like to offer kind of a summary statement of the significance of the laboratories, of the work at Aeronautical Systems, at the location we think of as Wright Field—the significance of those institutions to the ultimate success in the Cold War.

Russo: Well, let me preface my remarks by saying I’m a little biased here. I would love to say we won the Cold War for you guys. I won’t go that far. Airpower, airpower was a key element of winning the Cold War. I think everybody will agree to that. Airpower. We were the heart of
airpower, so therefore we contributed. And the heart of Wright Field, I always used to say, the heart of Wright Field was the laboratories. The acquisition guys were the face. They did the real work, but the heart, the think that made it beat, made it viable, made it keep it alive was the laboratories. You know, and I always used to tell people if you worry about the future of Wright-Patterson, number one you better worry about the future of the laboratories. Because if they go away, what’s the rationale for all the rest of this stuff?

So, as I reflect back on it, I take a lot of pride that I was at least, had a small part in helping with that, but there’s no question to me that Wright-Patt and what we did here in the aeronautics business was one of the key elements. Now, some people will argue with you that it may be the missiles scared the heck out them. Well, we didn’t do a lot of missile work, so. But the airplanes. There’s nothing like flying airplanes over people, and, you know, the threat of what they could do and all that kind of stuff. So, as I look back on that, I think we were one of the key elements that made it, made the success of the country in that timeframe.

I worry is that going to continue into the future? I don’t know. I worry a little bit about that, because as you watch the more recent wars and the role of airpower, it wanes, you know. During the Kosovo timeframe, during the Central Europe wars, it was it. Now if you look at what goes on in the Gulf or if you look more recently with, with the Israelis did, you can’t do it all by airpower anymore. You can’t do it with airpower alone. If you were fighting wars like the big European conflicts we used to worry about all the time, airpower had a bigger role. In these more global, or more guerrilla kind, or urban kind, what is the role of airpower, you know? You still need it, but it doesn’t seem to be as dominating. Nothing like the foot soldier on the ground, and that’s scary, because I don’t view that as our country’s strength. But it seems to be what we need in the future, so we better learn how to deal with it. So we’ve got to make better friends with the Army and the Marines is what I tell them.

Brown: That brings us to the conclusion of the prepared questions to cover. Is there anything that we’ve dealt with this morning that you would like to elaborate on? Or perhaps an observation, something in your experience we’ve not touched on that you would like to share?

Russo: One of the things I haven’t talked too much about, Squire, and I probably should say a little more about was the role of the universities during that timeframe. You know, we didn’t do all the research here. One of the things, you remember I said earlier about this basic research, which we called 6.1, and I think at the time I used the analogy it’s like a university professor in the lab? Well, that was an important element of what we did, and I don’t think I gave it enough credit. We would do some of that ourselves organically here at the base, but we never had enough
quantity to make a difference. We had enough to stay in sort of like the leadership positions, but we had to augment that, a lot of that, with the universities. And there are a lot of some of these breakthroughs that if you really followed the trail all the way to the very bottom, you could probably find some graduate student or some, some Ph.D. candidate or maybe even some professor who had the bright idea, you know, and got some things started, and then it filters up, and then we take it over and see it happening. So I think we can’t underestimate that. I think that’s healthy, though. I don’t see that going down too much, but I think that’s fairly healthy. I think that’s good.

And the other thing, you’ve got to give a lot of credit to the contractors, too, because we’re only as successful as our contractors are. We never built an airplane in my career at Wright-Patterson. Now they did back in, I think, in the ‘20s, but we never built anything here ourselves. It was always through the contractors. And it’s a fine line between trying to be close to them and making sure they were doing the right things versus we are the government, we do have some fiduciary responsibilities, we have to stay, you know, keep a close distance between the two. So it was a fine line to walk. That’s getting harder and harder to do in today’s environments. Back then, we had a lot more ability to interact with contractors. They would visit us all the time. So you had a better feeling for what was going on. Today it’s getting harder and harder to do. They put all these restrictions and ethics in procurement and all this kind of stuff. I mean, they’re all necessary, but they all happen because one guy or two guys messed up and then everybody has to pay the price of it. So you have to figure out how to get this nice relationship between the government employees and the contractors, but you’ve got to be careful that you don’t get too close. And so that’s something I think. But you’ve got to give them a lot of credit, too. We didn’t do it all ourselves.

What I always would tell people—our job is to lead the direction we want to go. So we had to have scientists and engineers who were the best—among the best, I shouldn’t say that, they wouldn’t have to be the best, but be among the best—among the best scientists and engineers in the country to help lead us in the right directions. They would do some of the work, but you had to get these university guys, you had to get the university, or the contractor guys to line up. I think that was the biggest thing we did, providing that kind of leadership in terms of what directions to invest your money. Whether or not it was materials, propulsion, aeronautics, avionics—whatever it was, we had enough people around who knew what the cutting edge was, knew what the potential beyond that was, and tried to lead people down that path. I think that was our biggest contribution to winning the Cold War.

My biggest disappointment? I have to tell you this one is we never won a Noble Prize. Now I smile when I say this because when I was running the Materials Lab in the late ‘80s and early ‘90s, I believed I had scientists working for me that were doing work the equivalent of what
some people had won Noble Prizes for, okay. And I had a guy working with me, my chief scientist by the name of Harrisberg [name?], who I’m sure you remember, Squire. He was a curmudgeon. A lovely guy, I loved him. And he believed this, too. And he, Harris, was a premier scientist. He was probably one of the best metallurgists, titanium metallurgists, in the whole country. So he was a premier scientist. And he and I got together one day and said, “You know what? We need to win a Nobel Prize,” because, as you know, if you can win a Nobel Prize in an organization, every boat in that lake rises above. So we set about to do this.

But the first thing we did was to try to verify were we doing the kind of work at the quality level that would, would, would be equivalent to the guys who did win the Nobel Prize. So we hit on this idea to bring in somewhere around, I think we ended up with seven or eight Nobel Laureates who worked in the subject areas similar to what our people. We would bring them in. We would pay for them. We would bring them in for like three days, and we would set them down with our best scientists in that subject area. And we would let the Nobel Laureates sit there, you know, watch us do experiments, read our lab books, try to find out what the quality of the work we were doing. Let them judge the quality of work we were doing. And typically we’d do this three or four days and, like I said, I think there was six or seven of these different ones. Over about a two year period, we brought these Nobel Prize winners in. And to a man, they all said the same thing, because at the end of their visit with us, they would sit down with Harris and I and tell us what they thought. And six of them, six Nobel Prize winners in a year and a half said, “Vince, the quality of the work that is going on in your laboratory, the quality of the equipment that you’re using”—matter of fact, some of them said the equipment is probably better than they had, but the quality of the work was at least as good as they were doing when they got their Nobel Prize. At least as good as they were doing. “But,” they would add, “you’ll never get one.” I said, “What are you talking about?” “You’ll never get one.” And this is the sad part of the story. I hate to end on a sad story so I’m going to have to think of a good story. The sad part of the story was even though that you could show that the quality of the work was equivalent to what it was these guys got their Nobel Prizes for, you’d never get one because you are a government laboratory. A government laboratory. Particularly a defense laboratory. There was something about that culture that said, well, you can not possibly be doing work equivalent to the Nobel Prize, even though the people who won it said you were. So we never won one. It’s my biggest disappointment. We’ve never won a Nobel Prize. I really believe we had about six or seven people there, and not just in the Materials Lab, I’m sure we could have gone to other parts of Wright-Patt and found other people like that. I was just worrying about Materials at the time. So that was my biggest disappointment, that we never did that. It may happen some day. Came close to one of the guys
down at the Phillips Lab in Albuquerque in space optics. He was an example. He’s probably better than most of them, but he hasn’t won it either. But he came as close as anybody, I think. So that’s the big disappointment.

I think if I reflect back on the forty-two years I, well it was actually forty-one years I served out here at Wright-Patt, I loved it. I always enjoyed going to work every morning. It was a good job. It had all the elements you liked. You got to see what was going. We had our people problems like everybody else had people problems. I used to tell everybody, “Look, we’re a cross-section of the workforce of the country. So if you got crazies in the workforce of the country, you’re going to have crazies out there, you know.” We’re just a cross-section. We weren’t any better. We weren’t any worse. Except for education part. I would say the education element was probably a notch above most organizations you could think of; but I can’t think of too many others than if you went to a university itself that would have a higher percentage of Ph.Ds than we did. So it was a wonderful environment to work in. You felt a sense of history. One of my last acts—I don’t know if you’ve been down in Area B recently, in the front gate when you see this picture, this statue of the Wright Brothers 1909, the airplane which was the first airplane bought by the military—I was part of the group that figured out how to do this, and all this kind of stuff. It was so much fun to do this. As part of that, we start doing a lot of research in history. And I like to tell people, and I think this is a nice way to end this interview, we ran across a lot of history documents. We had our history office searching some things, and one day one of the ladies comes up to me. “Dr. Russo, Dr. Russo, I’ve got to show you this.” And what she showed me was a document called the Creed, the Creed of Wright Field. It was written, I think, in 1948, or in the late ‘40s. But as best we could tell, a guy who had sort of like the equivalent job I had before I retired. He was like the senior civilian for the Wright Field at the time. I can’t even remember his name, but he wrote a creed. Now can you imagine this? A creed of how he wanted people, and there was a line in the creed that I’ll never forget. And the line said, “We follow the splendid vision and unswerving purpose of those great pioneers of the sky, Orville and Wilbur Wright.” I loved that saying. “The splendid vision and unswerving purpose of those great pioneers of the sky, Orville and Wilbur.” I just loved that, and I think that’s what my thirty years, you know. It got me to the end before I realized it, but I think that’s what it was about. Those kind of visions were really important. So I think that sort of characterized Wright Field. I think that creed, I hope, still is in a lot of people’s hearts, but it’s hard to make sure that that’s still happening. “Follow the splendid vision.”

Brown: Thank you, Dr. Russo, for your comments, your observations, your reminiscences. This concludes the interview with Dr. Vince Russo, August 16, 2006.
00:37:12 Russo: Thank you, Squire.

End of Video Tape 2

End of Interview