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James J. Mattice

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James J. Mattice Interview

Cold War Aerospace Technology History Project



Interview Conducted by Squire L. Brown
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Oral History Transcript

Project: Cold War Aerospace Technology

Interviewee: James J. Mattice

Interviewer: Squire L. Brown

Transcriber: Lynda Kachurek

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Interview One

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00:00:07 Squire Brown: Today is August 24, 2006. We are talking today with Mr. Jim Mattice. During his professional career, Mr. Mattice was in leadership positions in the laboratories, within the acquisition community, and in the Pentagon. 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 so much for taking time to talk with us today, Mr. Mattice.

Mr. Mattice, in your career, you were a participant in the development of technologies for the Air Force for the several decades of the Cold War. Will you please provide us with a synopsis of your professional career, beginning with your university, and some explanation, if you can, of why you selected the discipline of science as an undergraduate.

00:01:09 Mattice: Okay. Well, I grew up in the Pacific Northwest and graduated from the University of Portland, Portland, Oregon, and came to Dayton, Ohio, in 1959 as a brand new second lieutenant graduate from the ROTC program. I am sort of a product of World War II. I grew up in the West Coast, where World War II was very much a reality, a sense of possible invasion by the Japanese in my earliest years. And that military orientation, the need for a strong national defense, and a sense of loyalty to the country and to the military was ingrained in me very early on. And, in fact, we lived on an Army post—Fort Vancouver, Washington—during the war years.

So it was logical for me to be attracted to the ROTC program at the University of Portland. And my parents had a strong sense of wanting me to do better than they, as we all do as parents. And so I was always curious about why things happened, chemically, so the pursuit of a degree

in science, specifically chemistry, prior to coming to Dayton, was sort of a logical thing.

During the ROTC years, it became evident to me that you could be a chemist in the Air Force. In those years, General Bernie Schriever was involved in the building of the missile race, a strong sense by General Schriever of the importance of scientists and engineers in the uniformed military, to the point where he would more than once when talking to officers say, “You can be a General in the Air Force and be a scientist.” And frankly, in those days, you could. Not many, but in fact, you could, so the idea of technically trained officers rising to leadership positions in the Air Force was almost a given. A legacy of Theodore von Kármán and “Hap” Arnold, the earliest leaders of the modern Air Force in the civilian military partnership of the Air Force when it was born in 1947.

So with that, I sought an assignment to Wright-Patterson Air Force Base, which really represented the pinnacle of R&D, both capability and mission in the late ‘50s, early ‘60s. Very much a sense of the Cold War and the threat of the Soviet Empire, and in fact, I clearly remember in rather strong contrast to modern times, coming to Wright-Patterson where the single strongest influence was the program, were the programs that were undertaken in response to Sputnik.

So there was very much a space program active in Dayton, at Wright-Patterson. So the idea of what is currently a very strong emphasis mission-wise to aeronautical systems, while not present, there was very much a balanced mindset and program. The laboratories in particular were Air Force laboratories, and they were disciplined based and supporting the needs for Air Force aeronautical space and space systems as well as the various weapons systems. And everybody was involved. My first assignment was a space project, developing thermal control coatings for the Navy Transit satellite, which is another theme—jointness—which was instilled in me early. At that time, the laboratories reported to the commander of what is now the Aeronautical Systems Center, but that role was much broader, in my view, than it is now, although we’re returning much more to that with the recent changes in the acquisition system.

00:05:31 Brown: Your initial assignment was to one of the Air Force laboratories, the Materials Laboratory. When you arrived, was it apparent to you that you were a participant in the Cold War? How did the laboratory leadership convey to you a sense of the Cold War and your role in the nation’s defense?

00:05:50 Mattice: Right. Well, in fact, while I was initially assigned to the Materials Laboratory, it was by happenstance since I more likely being a chemist would have been assigned to either the Aeronautical Research Laboratory, an organization which no longer exists, or the Air Force Aero Propulsion Laboratory, because I had done some work in fuel chemistry,

and on grants when I was still in college. But it was a cold day, so I took the path of least resistance to where I thought I was going, ended up in the Materials Laboratory, and one of the civilian leaders there happened to run into me in the hallway and took me aside and made sure that I got no further, a kind of a testimony to the fact that some things are life-determining. In my case, it was in terms of my Air Force career. I don't what it would have ever happened had I made it down to Building 18, to the Propulsion Laboratory, which is where I was headed that morning.

Nonetheless, the sense in the laboratories that the Cold War represented a real threat and the projects in which I became involved, which had to do with coatings of various types—thermal control, corrosion protection, thermonuclear flash protection—all had a very clear unquestionable mission-relevance, and we pursued them with a real degree of diligence. It was not all what I would call high science and technology, a lot of it was practical. Those early experiments in preparing the paint scheme for the Transit satellites was literally mixing Dixie cups of black and white paint to get the proper checkerboard square type of layout on the satellite that would achieve the thermal balance. Likewise in the area of thermonuclear flash protection, we were using adaptations of Sherman-Williams paints to see if we couldn't modify those formulations to achieve room temperature cures because we couldn't bake big airplanes and the types of chemistries that in fact would be both thermally and nuclear resistant to allow a bomber to penetrate, deliver its weapons, and return safely in the face of thermonuclear flash. So in my mind, there was no question. And at that time, the nation was still responding to Sputnik, which was seen as a very substantial threat from space, for which we had no counter even though we didn't really know what the nature of that threat was. So everyone was highly motivated. The Transit was a follow-on satellite to the early Vanguard, which in fact was the response, but there was no doubt that the Cold War was in fact a war. We weren't so sure how "cold" it might be, because the Air Force was really, would be the first line of defense with respect to the counter to any attack from the Soviet Union.

00:09:18 Brown: You mentioned that you came to Wright-Patterson as an Air Force officer, a lieutenant freshly commissioned in the ROTC program, and I'm sure you quickly observed that the workforce at Wright-Patterson was this interesting mixture of civilian and military personnel. Later you elected to transfer to the civil service. Can you tell us about this interesting mixture, how effective it was, and what prompted you to make the transition to the uniform service into the civil service?

00:09:55 Mattice: Yes, I think most young officers who come to Wright-Patterson, and certainly back in those days there was a very high influx, far more than we enjoy now, are somewhat surprised at the extent to which the R&D component of the Air Force is in fact civilianized. It varies across

the Air Force, as you know, with the operations out at Kirtland being dominated more by military, but at Wright-Patterson, it was most of the military were young officers. On the other end, many general officers ran major acquisition programs, but the general heart of the R&D establishment was in fact civilian dominated. My first supervisor was a civilian, and as were many of my supervisors.

While this was sort of a little surprising since I thought I was coming naively to a traditional Air Force base which had this research mission, it didn't take long to figure out that the civilians were really the enduring and deep technical component of the work force. Many of them had been former military, so they had a good sense of military requirements and the nature of the military customer. They had been in the business for many years, so they were excellent mentors. They were able to select from a broad array of incoming officers, so work-force shaping was far more easy at that time because we were getting physicists and chemists and engineers of all sorts. And in fact I think on balance there were probably many more technically trained officers than there were official manpower authorizations, which was good because most of us would serve our three years and then leave or remain as civilians.

So it also turned out to be one of the most effective recruitment programs in hindsight, again another process which we have lost much of because we don't get nearly the numbers as we once did, unfortunately in my mind. But management could observe an officer for three years. He was technically trained, he or she, blue as it were, loyal, wouldn't be military otherwise, and their capabilities would become obvious, and if that would be the kind of person one would want on their civilian R&D team, you could offer them a position. If not, you didn't have a slot. It was pretty simple. Very effective, and in fact in later years as we looked back, when I then was a middle-level, mid-level manager as a civilian to try to figure out what were the components of our more high performing people, we discovered quite by accident that well most of them had been former military. They came from all walks of life, all areas of the country, so Wright-Patterson was a tremendous technology melting pot, and as an institution, the laboratories were one of the largest laboratories in the world, depending on how you count it, around five thousand people, the Wright-Patt element, the dominant part of that by about fifty to sixty percent.

So the civilian-military mix, the mix of skills which I think made interdisciplinary approaches to real problems which were well-known as problems, really made Wright-Patterson, and particularly the R&D component in Area B highly effective, and I think the results speak for itself in the Cold War systems—space, aviation, fighters, bombers, what have you—are all products of Wright-Patterson Air Force Base in one way or another. Although industry produces the technology, the technology transition, the systems engineering that goes into the baseline set of requirements for industry to respond to, were clearly centered here. And

many of the people that didn't remain here actually went out to industry across the country and so they knew Wright-Patterson, they knew the technology and acquisition system, and I really do believe that that dynamic was one of the perhaps less tangible components of a Soviet Union's decision based on economics to give up the Cold War.

00:14:56 Brown: In the early years of your career, when you were principally a scientist in the Materials Lab, can you characterize your assignments, characterize them in terms of how much your own initiative, your own ideas came into play, how much your supervision was effective in relaying assignments to you, how much you might have gotten from peers elsewhere, either within the Air Force or, perhaps, within industry?

00:15:27 Mattice: Well in general, and I think my experience was typical, it's at least what I observed in the divisions and branches around me, we were given a general area of need. In my case, the challenges of the space environment and the atmospheric environment on the surfaces of Air Force systems, and we were organized by application, so I was in the coatings business. Beyond that, my supervisor would assign me a specific area of exploration, but that really by design only occupied about half my time. I was then challenged to think about that problem or a similar problem or another problem and pretty much to the extent I felt comfortable to design the experiments and to establish the objectives. So we had a great deal of flexibility. We were required to rigorously document in the sense of our notebooks and everything, truly using scientific method, so we were accountable in that fashion. But management took the view that they launched us, but out there in the big ocean of technology and the world, constrained by of course the Air Force mission and in some cases our sister services if that in fact was the project area, we were given pretty well free reign.

We could also choose the degree to which we wanted to work in teams or in individuals, and I think that was probably somewhat dependent on the immediate supervisor who recognized that personalities make a difference. And I did actually some of both. In my group, we typically had seven or eight young lieutenants, and we were from various walks of life. It turns out I was one of two chemists. The others were either electro-optical people, engineering of one type or another, ceramics, and this made for tremendous, we would challenge each other, from our perspective, on the work each other were doing. Although we lived in really antiquated facilities, Building 32 is still a historical site. It was even more historical then, because it was more true to the history, one of the red brick buildings down the hill, of course.

But within those historic walls, the laboratory made heavy investments in terms of equipment, and one of the ongoing issues was the ability of the researchers to obtain supplies and equipment. And the continuing dilemma of the Air Force supply system geared to a worldwide

logistics situation, being able to quickly respond to a scientific and technical organization led to all forms of creativity to obtain supplies through other means, contracts and so forth, and there was a continuing tension in terms of trying to make the supply system work for you versus other means, and including, on one occasion, night raiding to borrow a piece of equipment from a colleague, whom of course you would tell the next day you borrowed. But you actually worked both systems. I can recall ordering a simple vacuum pump once through the supply system, and then the experiment changed, so I didn't need it, but it was still in the system. Two years later the pump arrived.

But, I think the environment was one of we didn't need fancy buildings. We did need good equipment, and there was a real dedication, at least in the Materials Laboratory, but I also believe in the other labs, that that was what was really important. You needed to give the scientist and engineer the tools, and the rest would pretty well take care of itself with good supervision and a clear sense among the leadership of, you know, we are engaged in a Cold War and we want to work hard to make sure it stays cold. And being able to either preempt or respond so decisively would be part of precluding the hot type of war, and I think history has spoken for itself.

00:20:13 Brown: After some years as a principal role of a scientist, you were promoted to senior leadership positions. Please describe for us the scope of your responsibilities, and, and as you were selected for these leadership positions, do you believe that you had sufficient knowledge of the Air Force needs to set project goals and priorities for your organizations?

00:20:38 Mattice: Well, I progressed, of course, through the ranks of supervisor, first, second level, branch chief, and I would define my first senior leadership position at the division chief, deputy division chief level, which for me was in the Manufacturing Technology program of the Air Force. A very unique program, which had come into the laboratory system in 1961, having been a program remnant of World War II. It had several components, Air Force owned facilities which we were trying to sell, but more importantly, recognizing we are a high-tech Air Force, this program made investments largely in industry to be at the leading edge of technology in the manufacturing arena where those kinds of programs were too risky for industry to take on for themselves. And this was a program that was different, yet part of the laboratory system, but at the time it was procurement funded, through the aircraft, missile and space and other munitions, ground support equipment, acquisition funding accounts, so it was technology but manufacturing technology, procurement funded as opposed to R&D funded. So it was an unusual program.

And the laboratory at the time it came in made the wise decision rather than let's see how we can use these funds for our traditional

purposes, let's move some of our good technical people into this program and make it a first-rate technology program with a slightly different focus, aerospace manufacturing. I attribute the wisdom of the laboratory leadership at the time to making that decision because the next level did not want to do that. They wanted to rip off the dollars and the people for their own purposes. And so I was one of the first three or four middle, mid-level managers that went into that, and I shortly thereafter moved to the position of deputy division chief and ultimately program director and was in that program about eight years.

So my first senior leadership position was a bit unique in that I rose to the level of a director of an Air Force program. Only about one-third of its content directly related to the laboratories. The other two-thirds represented, related in turn to the depots, which are large manufacturing complexes that we were trying to modernize, and the aerospace industry, with the idea being industry develops and we transition into the depots and we get leverage.

And so I had to represent that program directly to the center commanders of the acquisition centers, the depots, and so it was not unusual, two times a year in fact, I would report directly to the commander of Air Force Systems Command and to the senior military leadership in the Pentagon of the Air Force. The fact it was procurement funded, it was almost viewed as loose change, because it was about \$100 million a year—then-year dollars, this is in the early-to-mid '70s—you know, among billion dollar accounts, and so I had management and fiscal latitudes that few other program managers had.

I guess I must have done that reasonably well because then I was selected to move over to another laboratory, the then-Flight Dynamics Laboratory, now Air Vehicles Directorate, to be deputy director, where I was in fact promoted to the position of Senior Executive Service. And there I was introduced to the world of flight vehicles. That was a pivotal move for me, because it showed me that A) I could make a transition. In the manufacturing technology program, I was still in the Materials Laboratory although in a unique part of it. And I didn't realize at the time how much different it was until I moved, and I was successful there. When I moved to the Flight Dynamics Laboratory, an entirely different culture, I was amazed to learn that things I had learned about bringing people together in the Materials culture didn't work so well. And so I had to adapt, and I had to learn to listen to those leaders who in fact were very helpful to me in understanding that culture. That was a culture rather than of materials science—physics, chemistry, stuff—flight vehicles, flight control, aeromechanics, structures, and, and vehicle equipments. All led by very strong leaders who, as everyone did, had to fight the budget process in their own program interests, yet find a way to collaborate on what that laboratory did extremely well, which was fly experimental vehicles.

And so that was a tremendous experience for me. And a key move, because I was then very curious about the rest of the Air Force and the Department of Defense, and as luck would have it, since I'd been in two labs, I was asked then to move up to the position of the Air Force Wright Aeronautical Laboratories, the consortium of labs that had been formed, as the deputy director of that organization. And when I asked, "Why me, Lord," it was because you are the only member of the Senior Executive Service who's been in two of our former laboratories. So I began to learn the value of career broadening. And at that time, with some good mentoring by my bosses, set five-year goals for where should I go next, what challenge should I take on, in order to fulfill what I had set as a notional career objective of the highest position of science and technology responsibility in the Air Force, a position to which I then did actually go to, not necessarily by choice, but it's ironic sometimes, a self-fulfilling prophecy.

00:27:28 Brown: As you moved through these various assignments and were promoted to higher grade, did you receive any special training? Did the Air Force support you so that you had the necessary skills and background knowledge to take on these jobs of high responsibility?

00:27:51 Mattice: Yes, in fact I would say throughout my career, the opportunity for virtually any type of specialized senior leadership or technical training was in fact available. Much of it was competitive. I was a Sloan Fellow and went to Stanford University in 1966, and I clearly remember at Wright-Patterson, let alone the rest of the Air Force, there were about fifty candidates, and you had to go through a very rigorous screening process, personal interviews, and the Air Force ended up sending two people to Stanford that year. And typically one or two to Stanford and the other Sloan program, MIT, and so it was competitive, demanding, and the weakness of it is that the Air Force unfortunately, and I don't think this is Air Force unique, doesn't do a very good job on deciding how they want to utilize you when you return. I was very fortunate in that I had a mentor named Dr. Al Lovelace, who subsequently went on to NASA, and who let me know up front, "You're not coming back to your old job." And when I came back from Stanford, he placed me into a succession of staff assignments to understand the mechanics of the budget and program planning process, and that served me well as I moved to other positions, because I had a balance of line and staff experience. I also was well-mentored. I had a circle of people I could turn to for advice.

And the Senior Executive Service, as a special service in the federal government, does afford its people both optional and mandatory training. For example, upon selection or upon being close to being selected, you must go to a thirty-day in-residence program at the Federal Executive Institute, which is a very demanding, unique program that is based upon the Constitution, and thoroughly examined one's personal as

well as professional life. It can be life altering, or career altering, and you form associations with other agency executives, typically thirty-five or so agencies participate, so the opportunities for the education and training and leadership development are, I believe, unparalleled. That tour to FEI in the '80s led me to desire to be the Air Force Chair at that institution as my last assignment with the Air Force, which in fact I did between 1995 and 1997.

00:30:50 Brown: At some year, you left the laboratory environment and moved into the acquisition environment, at first with development planning, can you characterize the responsibilities there? And in particular can you relate those again to the Cold War environment and the demands that the Soviet threat might represent?

00:31:16 Mattice: Right. I was assigned to be the head of the Aeronautical Systems Center development planning organization, affectionately known as XR, which does the concept exploration for new systems, or at least did in those days. Also, is the interface back with the laboratories on technologies that can be factored in to conceptual designs. And as other duties assigned, it shepherded the international programs as well as having a very good at the time, organic design and mission analysis capability. I was asked to take that position because again I had been the only member of the Senior Executive Service who had been not only in more than one laboratory but that was also responsible as the deputy director to the commander for all of the Wright-Patterson labs. I think my experience with the manufacturing technology program which had a broad programmatic interface with industry in structures, electronics, propulsion, space systems, and so forth, contributed to that.

So it was logical to be asked to do that because we were going back and forth on the notion of the relationship of the laboratories to the acquisition center. At various periods in my career, it would report to that command. Or other times, it would report to a laboratory director, either in Washington or locally. And so that ebb and flow, I think, taught commanders of the center that we needed to have somebody, and it turned out to be XR was a good choice, who worked to build the bridges between the laboratory complex and the acquisition complex, because it no longer worked for that commander. And frankly, I think he recognized that whether they worked for him or not, that was still an abyss that had to be bridged.

And as with my moves across the laboratory system, the cultural differences between the laboratory and, and the development planning organization were just immense and very instructive. Technologists either think of disciplines or technology equipments. Development planners think of concepts and performance. So a materials person would think of strength and modulus, a development planner thinks of turning radius and range payload. And these languages are very difficult to integrate. So one

of my lessons hard learned was get people to understand and agree how they're going to communicate from their different perspectives, and teach the value of patience in being able to really comprehend what another community is doing if you're depending upon it.

00:34:25 Brown: In XR and the development planning function, you're much closer to the future of the Air Force, creating future systems. How explicitly were you required to take into account the threats represented by the Soviet Union?

00:34:43 Mattice: Well, first of all, in creating the future, the moniker of the Development Planning Organization on their shield is "in eis manibus futuris,"—"In these hands, the future"—and that, as you well know, is a deeply held value. And I think wisely so because in an organization whose primary mission is to manage the programs that have been authorized, appropriated, and budgeted for, today's problems, mainly of a program management nature, some organization has to be free of that, hopefully, to focus on the future. And, in fact, I can remember the development planners would periodically have an open conference in futurists, who were sometimes viewed as crazies, but came in with interesting ideas, unconstrained by military thinking. Not even aware, necessarily, of what Air Force requirements were, but what were they writing about in the futurist magazines, about unmanned systems and flying carpets and things like that, many of which violated the first law of thermodynamics, but gave us a lot to think about. So the whole business of the future at that time, I would say, up through the mid-'80s, was in the genetics of the military, civilian, laboratory, and acquisition people, because acquisition people buying an F-15 back in the '70s, are the systems still flying today, although, you know, they'll be replaced.

The tremendous change to the acquisition system brought on by the Goldwater-Nichols laws and the simultaneous implementation of the PEO, Program Executive Officer, process coincidental with the integration of the former Air Force Systems Command and Logistics Commands in to what is now the Materiel Command, over time changed that dramatically. In my view, not for the better, and I suspect that view is shared by many and not shared by some.

But well-intended was the notion that we have to do better to manage that which is authorized and appropriated and budgeted for us. No question the challenge to manage major programs was magnified by many failures, many problems unforeseen, and unless one looks even wider on not only defense systems but public works, one can conclude that the Defense Department is singularly poor at this. Well it turns out history has shown they're not. You only need to look at Grand Coulee Dam, the Bay Area Rapid Transit System, and a host of others to discover like major defense systems, these are very challenging, management challenges and technology challenges.

Nonetheless that triple hit, if you will, coincidental with the Wall coming down, the beginning of the end of the Cold War, caused the Department of Defense and the Air Force and the other services to become very short-term focused. A sense because the Cold War may be over, we don't have to worry anymore about the future threat. A typical post-any war, including World War II, drawdown, and all of these dynamics, though heavily debated, seemed to repeat themselves, so I think we have come through near the end of the Cold War up to the War on Terror with a very, very fundamentally changed system, and not always for the better.

I think we're beginning now to revisit, reexamine, reconstitute some of what we began to take apart, but it has permeated the system. The natural dynamic for getting new people, ease of transitioning from military to civilian, which for a period of time became almost anathema, versus when I was doing it because it was a reasonable thing to do—if I've got military that are going to get out after their service, why not keep them if they're the best? So I think we'll get back to and create new ideas and processes, but I think we've come through a very substantial set of unintended consequences as a result of those three factors coincidental with the demise of the former Soviet Union.

00:40:16 Brown: The role of intelligence organizations is frequently cited as essential for setting program objectives. Which intelligence organizations assisted you the most in formulating projects and providing management guidance? And did you ever specifically initiate a program in direct response to a Soviet capability?

00:40:40 Mattice: Well, of course, at Wright-Patterson, the primarily intelligence organization at the early stages of my career was the Foreign Technology Division, affectionately known as FTD, which had an intelligence mission across the board including informing the laboratory people, technical people as well as managers, of what the state of technologies of our counterpart technologies were, not only in the Soviet Union, but worldwide, friend and potential foe.

And that was a very dynamic interface. FTD had representatives in all the laboratories. We were briefed annually on the overall state of technology, particularly in Soviet aviation, at very high security levels. If we had a need for answering a specific question or getting translations of Soviet literature, we simply called.

And in turn, FTD had specific missions where they would staff groups to go to foreign air shows. I was asked, for example, to be part of the team that would go to the Farnborough Air Show, back in the early '70s I believe it was. And we were assessing the state of, my focus was to assess the state of any composites technology we could observe. Well the most broad application of composites at that time was the British Harrier. And while we knew a lot about it, worked cooperatively with the Brits in the development of advanced composites, structures—aircraft structures—

there were things they didn't share with us, and so we would have an opportunity to see the equipment up close and personal. And in fact in those days of course, Russian airplanes weren't flying, but we would encounter periodically Soviet intelligence agents who would be there doing the same things, and occasionally let it be known who they were.

So we had a very dynamic interface, and many, many people actually transferred to FTD and back and forth. So part of the natural career progression at Wright Field was with the intelligence communities as well as the acquisition, and on occasion even before Materiel Command, the Logistics Command headquarters here.

So it was a dynamic one, up to and including the present version of that, which is the National Air and Space Intelligence Center, that put us then through them in contact with other agencies such as DIA, CIA, as required on various topics. At the time, CIA did not have an obvious technology—science and technology—program and so the Air Force and the other services were asked periodically to give technology state of the art briefings to CIA officials, to help guide their targeting of technology acquisitions. And we did that once or twice a year on specific focused areas.

00:44:33 Brown: From Wright Field, your next assignment took you to the Pentagon. I believe you were one of the very few individuals who made the move from Wright Field to higher headquarters. What position was that? And was it helpful to have had a background at Wright Field?

00:44:56 Mattice: Well, first of all, of course, many military made that move as part of their normal career exposure. Relatively few civilians, I think, from the laboratory system, I was probably one of the very few. I can think of Gary Denman [name?] who went to be director of DARPA, a component of the Pentagon. But there were few of us, and I would have to say that it was directly a result of my career profile at Wright-Patterson, including experience in the labs, development planning. And at that time, then, I had risen to the position of Executive Director to the Commander, sort of the Commander, Vice Commander, Executive Director represented the so-called front office of the Aeronautical Systems Division, at the time.

And Secretary Don Rice, then Secretary of the Air Force, was looking to establish a new position in the Air Force as Deputy Assistant Secretary for Research and Engineering. That was motivated at the time because DoD, under the Director of Defense Research and Engineering was challenging the services to consolidate and in the interest of preventing duplication, having more efficient execution of programs. There was a strong move on for the consolidation of particularly science and technology efforts within the services at DoD level. And so Dr. Rice's charge to me was, "You are my DDR and E and I'm sending you into combat to prevent undo consolidation." And with my counterparts

from the Army and the Navy, we were able to work with the DDR and E and I think prudently improve our ability to coordinate, cooperate, and in a few cases, co-manage programs, and prevent what might have been, I think, the disintegration of some of the components of the service of science and technology program.

So that was the motivation. It was, so for me, it was a new challenge, a new job. And so I was able to make of it what I might. And although I was a Deputy Assistant Secretary, technically reporting to the Assistant Secretary for Acquisition, my actual report was to the Secretary of the Air Force. And this was really a unique opportunity because I, on a regular basis, would in fact interact with him and his successors, and it put me in to a role of representing the Secretary at times with the Chief, because the Secretariat's staff is separate from the military chief of staff. And of course in a civilian-military shared power, there are complexities, and also representing the Air Force particularly with NASA, the Department of Energy, and other agencies. So it was a very broad, although my main responsibility, by title, was the Air Force science and technology program and systems engineering policy, I didn't do systems engineering. The Field did that. But I was responsible for the policy, and this was, again, another challenge because I experienced at Wright-Patterson, the different institutional orientations of the engineers and scientists in the laboratory versus the engineers in the program offices.

00:49:05 Brown: At that level, within the Pentagon, was it apparent to you that the Air Force had a strong support for technology programs, that the Air Force relied upon advanced technology as a key to its superiority against the Soviet Union?

00:49:26 Mattice: Well, Secretary Rice, who was an engineer, had been formerly the president of RAND Corporation, formerly head of Project Air Force, had I think an almost unique insight into the role of science and technology in supporting not only the current Air Force but the future, literally creating the future. And that was a legacy in Secretaries of the Air Force that I had not appreciated existed, and it was largely because the leadership, both military and civilian, up through the late 1980s, early 1990s, literally went to school on and understood the legacy of Hap Arnold and Theodore von Kármán. Folks like Bernie Schriever, who by then of course had retired, were talked about and studied in the schoolhouses of the military and civilian counterpart institutions in the government.

Sadly, when this coincidental Goldwater-Nichols, PEO, beginning of the Wall coming down, downsizing, etc., raised the question of, "well, just how much technology do we need for the future given that we won?" That emphasis began to decline. Secretary Rice left about a year after he brought me to the Pentagon because of a change of administration. Dr. Sheila Widnall, an engineer from MIT of world reknown, came in and

maintained that legacy, but after she left, I believe it began to decline. And we were, many of the senior military and civilian, particularly military, who had been brought up in the legacy of Arnold and von Kármán, who were products of the Air Force Systems Command as a part of their experience, with it now gone, and some ten, fifteen years later, general officers lacking that experience base, we begin to see what, I fear, has become a trend over now the last ten or fifteen years, of the lack of appreciation of the role of science and technology. Why can't industry just do it for us? If we need basic research, why don't we turn to the National Academies of Science? These are tough questions, because you have to really keenly describe the role of the scientist and engineer and the laboratories in particular, and strong systems engineering on the acquisitions side, and what was taken for granted during my early years, is no longer, was no longer taken for granted. I think unfortunately now is not taken for granted, although there are exceptions to that. And I think in the last few years, the Air Force has tried to recapture that, but we have a ways to go.

End of Video Tape One

[on audio file

00:52:40 Brown: At this point, we will take a break from our questions. We'll resume the interview shortly.

00:52:42 Mattice: Okay.]

Start of Video Tape Two

00:00:00 Brown: Mr. Mattice, the Air Force acquires weapon systems from defense contractors. Why was it necessary for the Air Force to have the laboratories at Wright-Patterson working on technology development? Why not rely solely on the commercial sector for aircraft and missiles?

00:00:22 Mattice: Well, yes, that's always a tough question, and until you step back and realize that by law the process under which the Air Force or any government agency acquires systems or materiel is a competitive one, one driven by program management concerns over risk management, adequacy of resources, and the like. And since the funding for major acquisition programs is scrutinized heavily with the intent that we only fund the minimum required to buy what we need, industry by and large is driven to as low a risk, as low a price as possible while still providing the capability. But the capabilities that our war-fighters seek really are high-end capabilities, so sometimes there's this disconnect between perceptions as to resources required versus what might be more desired, and that

difference is in the level of technology and technology maturity that can be applied to satisfy the need.

So industry is driven to well-in-hand, risk-averse program management, organizations tend to be in that mindset as well, and almost without fail, we find that we get, when we get into developing and demonstrating the prototype equipment, we find that we didn't think of everything. And so some new technologies have to be accelerated. In a few cases, they may not be even readily available, and so they have to be planned for inclusion late in the program. On balance, the technology community becomes the fall-back position and really the smart buyer consultant to the program offices and to Air Force leadership, in order to make sure that we can bring the new technology to bear affordably. That's a difficult challenge, because it's also true that a given technology that is significant, and I would cite advanced composites in my own experience, typically takes at least ten, more likely fifteen to twenty, years to realize its full potential. The advanced composites program was born in 1965 in the laboratories, and it wasn't really until the middle '80s, until it was used as a major contribution to aircraft structures. And even then, the acceleration of its utilization in the B-2 bomber was done completely as a parallel effort to the mainline effort which was a metal airplane, which in fact could not meet the requirement.

So we have many, many examples of where after the initial technology adaptation for weaponization experienced great difficulties, and I can think of very few programs where that wasn't in fact the case, the laboratories had to come into play, and it was technology that was being nurtured, not seen yet as required, that had to be called upon, in order for the program ultimately to be successful. One only need look at the F-16. The baseline F-16 was a very plain, simple design, lightweight fighter it was known at the time, but it really took for it to meet its ultimate design requirement, digital flight control, advanced materials, propulsion, second, third, fourth generations of turbine engine technology, as we loaded more and more stuff—weapons, countermeasures, and so forth. And those technologies, in fact, are traceable directly back to laboratory technologies which were not necessarily intended for that specific application. And that is not an exception. That's the norm. So clearly, though it is not fully recognized, I believe the laboratories play a fundamental role in the acquisition process. It's just earlier than is recognized by the stewards of that process.

And the same is true of the development planning organization. There are probably not many people today that realize what has become the F-35 today traces its, its legacy design-wise back to the Air Force and Navy development planning organizations, which, when I was in the Pentagon, indicated to Air Force leadership—the Chief of Staff and the Chief of Naval Operations, and the Secretaries of the services—that we in fact could if we design with a clean sheet of paper develop a multi-role fighter—that was MRF in its day, that you too recall—that enabled for the

first time in a long time for Navy and Air Force leadership, military and civilian, to commit to the concept of what has become today the F-35 in the Army, Navy, and Marine Corps variant. The development planners, it can be demonstrated, made that initial assessment, the design trades, and said, “Yes, we can do it, if we start right.” And, of course, we have many examples of joint systems where we didn’t start right. We tried too late in the game, and the system that emerged, though it was useful, was clearly not what the hope was. An example would be the F-111. A fine system in its own right, but never realized in its original, in the original plan is a joint carrier-based Navy and Air Force long range bomber.

00:07:08 Brown: In your position in the Pentagon, reporting to the Secretary of the Air Force, you occasionally had an opportunity to testify before committees of Congress. Can you describe that experience for us please?

00:07:26 Mattice: Well, it’s an experience. And I might say that sort of my baseline level of testimony was twice a year before the authorizing and appropriating committees of the Congress for the, for the military budgets. Typically those were in panels, where not only I but my counterparts in the Army, the Navy, sometimes DARPA, and led by the director of defense research and engineering, and clearly our purpose was to present and defend the case for the science, a robust science and technology budget. In my position, I was also responsible for systems engineering policy, and I was occasionally called upon to testify before a committee hearing on a major weapon system, such as the F-22, where a question might be, “Why do we need hard tooling for essentially a prototype airplane?” And the other kinds of testimony involved, which was kind of unique to my position, was jointly with NASA on the National Aerospace Plane program, NASP, which was a different committee. It was actually the science committee which oversees the NASA budget. Those experiences taught me a couple of things. First of all, the purpose of testimony is not for you to testify but for the congressional members of the committee to make a statement. And while they’re interested in what you’re saying, they clearly have a political agenda, and this is the forum for presenting, arguing, and documenting that. More often that not, we were supported in what we were asking for, within reason. We often found ourselves in the middle of political debates where the politics were not always relevant, but often they were. And it was sometimes unnerving for a member to ask you a question and then get up and leave, because he could look at your answer on the record, and you had provided a statement in advance and therefore were not really presenting that statement. You could if you desired. But generally it was to help the member query you clearly to strengthen the case for that member. And of course the members disagreed, being from different parties within the committee.

So it was a fascinating experience. And what helped a lot was media training and also developing a position on the part of the

department and sticking to that. On occasion, we would be asked, “What are your personal views?” And of course that question is inappropriate. There are rules of engagement, but if they can lure you into a personal statement which may differ with your Secretary, that, you know, may support a political agenda. And so one has to be very calm and, and respectfully decline. I can recall on one occasion being, being asked, “Well what it take to have you express your personal views?” The answer is, “Subpoena me as a private citizen,” and of course, they don’t want to do that. So it was really, to me, a very enjoyable process, given that I was well-prepared. The Secretariat and the Air Force have excellent coaches, excellent media training, and we would sit in mock hearings and make sure that we understood what our role was, what our service position was, and on occasion, we would reflect differences among the services, how the Navy sees something, how-, and that’s okay. So I thought it was a process with a great, high degree of integrity, excepting the fact that the political aspect is part of our system, and it’s all on the record, so I felt, found it to be open. There may be other agenda behind the scenes, but we stuck to the facts and tried to be well-prepared, and it seemed to always work out pretty well.

00:12:10 Brown: Through the decades of the Cold War, several men who served as the Secretary of Defense are remembered for initiatives to change how weapon systems are developed or acquired. Did the office of the Secretary of Defense have a significant influence on the Air Force laboratories or the Air Force acquisition community at Wright Field? And do you recall any particular Secretary as especially effective?

00:12:39 Mattice: You’re talking Secretaries of Defense, now. Well, I had, of course, in my Pentagon tour the opportunity to work under Les Aspin, who subsequently passed away, and then Bill Perry, whom I had the opportunity to get acquainted with in his earlier Pentagon assignments when I was, actually when I was in the laboratories, and in particular Head of the Manufacturing Technology program. And so I had a rapport with him, and he was the Secretary that was there during most of my Pentagon time. And Bill Perry was an exceptionally bright, very keen insight, a good engineer, and was very supportive of DoD as well as the services, science and technology, programs, systems engineering processes, and was also heavily engaged in the acquisition reforms that were just beginning to really be launched.

I did observe from that standpoint the tremendous that can occur between what the Secretary may intend by way of reform and what gets implemented. A good example would be in specs and standards, which were generally done away with as a matter of acquisition reform. It was never the intent of the Secretary that they be eliminated but rather that they be wisely used and minimally used, if in fact commercial practices could be substituted, and if in fact the spec or standard could be one of a

performance type. But in the government, and in the Defense Department in particular, when we're talking about specs and standards for everything from ashtrays to chocolate chip cookies to B-2 bombers, you know, broad application of policy to those, and many levels in between, is exceptionally difficult. Especially when you're going, when it's occurring through changes of leadership and of course we were bringing on the whole, from a process standpoint, a whole new acquisition system, separate from the reforms, the process itself fundamentally changed under the Goldwater-Nichols legislation.

Nonetheless, and of course Bill Perry got heavily engaged in the international and national businesses that the nation was facing, and so had less and less time as Secretary to spend on things like technology and acquisition, but nonetheless maintained a keen interest. And his deputy, deputy secretary, John Deutch, was a completely different person, and emphasized other things.

But clearly the secretaries have a role. To go back, way back, Robert McNamara utilizing the C-5 and F-111 airplane programs, which I was a part of developing case studies along with colleagues, we saw there the effect of the Secretary of Defense in effect becoming the program manager. And that case study is available at the AFIT Center for Systems Engineering website, an interesting study because I believe we captured it in reality as to what was good, bad. On balance, it created tremendous difficulties for those systems though they were ultimately successful with tremendous hard work by the, by the engineers and by the laboratories, in spite of severe managerial constraints.

So yes, the Secretary has on occasion, I would say, based again purely on arm's length observation, that Secretary Rumsfeld has less impact on the science and technology acquisition end of the business and reasonably so, given that he is so much out in front in the War on Terror. So I think it becomes a matter of personal interest. Clearly Bill Perry's own career goes back through deep science, technology and engineering interests. He was a long-time member of the Defense Science Board, in and out of government, as was Secretary Rumsfeld, but their foci and scope of interest are clearly different, driven by, you know, the problems that faces the department and the nation. And the same could be said, of course, for the service Secretaries.

00:18:14 Brown: Mr. Mattice, the Cold War seemed to come to a rather swift end, beginning with the withdrawal of Soviet forces from Eastern Europe in 1989, and then the political disintegration of the Soviet Union in 1992. Did the Air Force anticipate the collapse of the Soviet Union and the end of the Cold War? And did you personally foresee the end of the Cold War?

00:18:41 Mattice: Well, I, of course, I don't speak for the Air Force, but my observation, and again I was in the Pentagon at the time that this was all

really, the impact of it was beginning to be felt. My sense is that people were pretty well taken by surprise at the swiftness of the decay of the Soviet empire. To the point where I didn't believe it for a while, you know. This must be a ruse. And the full impact of the actions that Gorbachev and the Soviet empire were taking were not at all believed to be as total as they turned out to be. I suspect the same sense was even held within the leadership of the Soviet Union. It was probably pretty well known that the, you know, the Russian military didn't want this to be happening because they as loyal Soviet soldiers and airmen were as dedicated to being victorious as we were. But the fact is, it really snowballed, as it were, and I was surprised. Everyone that I became in contact was surprised. I did have an opportunity to have a brief chat on this with Secretary Rice, the Secretary of the Air Force in 1990. He indicated he was very much surprised, and I'm not sure it, to this day, is fully understood, just how it happened so swiftly. I think what history has been written and probably has yet to be written was that Mr. Gorbachev, you know, did it with intent, and at considerable risk, personal risk. And did it on the basis of a firm belief that the direction the Soviet Union was going would lead to its economic divide, demise, if not military.

Another factor were a set of technologies which we understand the Soviet military had concluded would be extremely difficult to cope with, a combination of stealth and other strategic capabilities, would have caused them to make such huge investments in, in preparing to cope, coupled with the worldwide economic arguments that I think Gorbachev believed, caused the military and non-military economic realities to suddenly reinforce the reality. And boom it happened. But I think to everyone's surprise. I suspect even to President Reagan's surprise, even though he firmly believed that one day we would win this Cold War. I'm not sure he believed he would do it, you know, while he was President.

00:22:17 Brown: If you were speaking to a future historian, how would you describe the significance of Wright Field during the Cold War?

00:22:26 Mattice: Well, I believe that what we all affectionately know as Wright Field, which is that Area B component plus some of its outlying units in other areas of the base, really represented the capstone research, development, and acquisition organization and skill base of the Air Force, if not the Department of Defense. When there were challenges to technology assessment, and I include in that the foreign technology component, which by technical legacy were very, very well integrated with the Wright Field part, I believe that the Air Force when it had a problem, would frequently say, "What does Wright Field think?" When something needed to be checked out, it got sent to Wright Field. When in the acquisition world, the Air Force Systems Command was struggling with program management, concepts of operation, they would always pilot an initiative at Wright Field, sometimes to the chagrin of space and missile

world, which had developed its own culture with the support of aerospace corporation and electronic systems center, with MITRE and Tyndall, of course, which has a proud legacy in the weapons area.

But I think back in those days, there would be few that would challenge Wright Field as the place where it really happens, or teaches us how to happen. Clearly the position of commander of the Aeronautical Systems Center or its predecessors, and I go back to Wright Air Development Center, was the capstone career for a three-star general. A position, which in Air Force Systems Command, if you hadn't occupied, you would probably not become a four-star.

So I think the evidence is very clear. Is that true today? Not nearly to the extent. Clearly Wright Field has gone through a very substantial evolution. It is still an incredibly large, capable, diverse, organization by any measure. I'm not sure that the Air Force leadership, both in the operational side as well as the Pentagon side, would necessarily say, "If I've got this tough, unique problem, the only place I would turn to first is Wright Field." I don't know that that would be the case. I still think that it's a very critical capability, but I think it's one now we have to rebuild upon, if in fact, Wright Field will resume its position of dominance. If that in fact is a useful thing. Perhaps it, having shared that responsibility and credit with other organizations, may well be a good thing. Don't always have to be number one. But things clearly have changed.

00:26:22 Brown: Before we close for today, is there anything else that you would like to mention that we have not covered?

00:26:30 Mattice: I think perhaps the one thing that I haven't been queried on directly or addressed is really what I would call the people component, the leadership development component. I benefited tremendously by both self-determined and non-self-determined career mobility and mentorship, in moving through both laterally and ultimately vertically in the Air Force. And so today when I see that mobility for folks either in or seeking to be in the Senior Executive ranks as being a mandatory requirement, I do have some mixed feelings about it, because the way I observe it being implemented is in some cases, not all, but some, mobility for mobility's sake. I argue with people I still mentor that you must lay out a career path that gives you broad exposure, and I think what folks need to do is to make that a conscious thing and target the kinds of position that are critical to fulfilling an ultimate career objective. And then seek the support system to obtain those experiences or as close to them as possible. That's a bit different than management and leadership saying, "We're going to move you here, here, and here, for your own good." I always say, then, "To what purpose?"

And I think that sometimes places geographic mobility above career experience mobility, particularly at Wright-Patterson. One can be

exposed broadly to research, development, acquisition, not test as much as when we had a test operation, but that's a pretty broad career, as well as elements of a broad variety of headquarters functions, program functions, laboratories and the like. I believe that anyone aspiring to the Senior Executive Service should, ultimately, have multiple geographic experiences as well, but they need to be thought through. I'm aware of one recent experience where a woman who was the logical choice for a Senior Executive position was denied that position because she had not been geographically mobile, so she said, "Where do I need to go?" And they said, and she went. Two weeks later, she was offered an SES position by the Navy, and she accepted it. So the Air Force, because of its hard stance on mobility, which is well-intended, lost a very good person because they were inflexible. What would have been wrong since she was the obvious selectee, and documented as the most capable person, been promoted and indicated in two years, now, we want you to go to the Pentagon, or wherever, I think that would have been entirely satisfactory. So, I am concerned about that, that the system that we now attempt to foster our senior leaders has many good aspects, has many tremendous opportunities, but we get stuck in some rules that we over-apply.

And the other is the sheer capability in the acquisition side of technical depth, not only in engineering but in financial, logistics, and I don't know, but perhaps, contracting. The classical functions which were very deep at Wright-Patterson, supported by strong mentors and home offices where those functional disciplines were cultivated and people were moved in and out of program offices. A lot of that education, training, support system has been eliminated, and we have deployed most of the people, undoubtedly necessitated by force reductions and so forth. So I think we have to begin to return to how do we now begin to capture in some updated process, the new talent. And I think some progress is being made in the laboratories, because they seem to have more ability to hire young people, and, but overall we still, I think, are struggling with the workforce shaping, new talent generation, and leadership development components, and I'm confident that senior leaders that hopefully I was a part of bringing online will work all that out, because it's important.

00:31:55 Brown: This concludes our interview with Mr. Jim Mattice. Mr. Mattice, thank you so much for spending the time with us today.

00:32:02 Mattice: Very good. Enjoyed it.

End of Video Tape Two

End of Interview