*INCIDENTAL PAPER*

**Seminar on Intelligence, Command, and Control**

**Survivability and Space-Based Missile Warning Capabilities**
**Richard L. Layman**

**Guest Presentations, Spring 1994**
Thomas P. Quinn; Lewis S. Wallace, Jr.; John E. Rothrock; John A. Leide; Keith R. Hall; James D. Davis; Albert Edmonds; Richard L. Layman; William R. Clontz; Richard T. Reynolds

**January 1995**

# *Program on Information Resources Policy*

***Center for Information Policy Research***

***Harvard University***

The Program on Information Resources Policy is jointly sponsored by Harvard University and the Center for Information Policy Research.

*Chairman*
Anthony G. Oettinger

*Managing Director*
John C. B. LeGates



E-mail: pirp@deas.harvard.edu URL: http://www.pirp.harvard.edu
ISBN 1-879716-23-2 **I-95-3**

## Survivability and Space-Based Missile Warning Capabilities

**Richard L. Layman**

*Colonel Richard L. Layman is commander of the 2nd Space Warning Squadron, Buckley Air National Guard Base, Colorado. In this capacity, he serves as the senior officer responsible for the only fixed continental U.S. ground station for the Defense Support Program (DSP), a space-based system that provides immediate global and theater missile warning to North American Aerospace Defense Command, U.S. Space Command, the Joint Chiefs of Staff, the National Command Authorities, and theater forces. Colonel Layman enlisted in the Air Force in 1969, and served as flight line maintenance officer on tanker, bomber, and fighter aircraft. He commanded the 520th Aircraft Generation Squadron, 20th Fighter Wing, USAFE. He also completed a tour of duty as a Minuteman Missile Combat Crew Commander, and has served on the staffs of the President's Commission on Strategic Forces and the President's Blue Ribbon Task Group on Nuclear Weapons Program Management. Among his awards and decorations are the Defense Meritorious Service Medal with one oak leaf cluster, the Meritorious Service Medal with two oak leaf clusters, and the Joint Service Commendation Medal.*

**Jenkins:** Dr. Oettinger mentioned that he wanted me to introduce our speaker today, since he and I crossed paths for the first time in 1983. I filled his chair, once removed, on the Air Staff when we were both sparkies together as captains. Since then, Colonel Layman has gone on to do some good things for the Air Force and the country. He was the military's principal negotiator for the Geneva START talks. He was a protégé of General Brent Scowcroft when he was the National Security Advisor, and he was a member of President Reagan's ICBM modernization team. Most recently, he's moved over into Space Command, where he's currently a commander, and he took some time out to spend two years at Oxford as a strategic studies fellow.

**Oettinger:** Too late to meet Bill Clinton, I gather.

**Layman:** Absolutely.

**Oettinger:** Shucks.

**Jenkins:** Before he gets too far into it, he'll start telling you about his Air Staff days and what it's like to be in the Air Force, and he'll give you an idea of what he was trying to contribute to national security. I'd just add that when I came in he had made a list along the lines of "this is how you get into the job as an ASTRA (Air Staff Training officer) in the Air Staff," and I was being briefed by the person who replaced him. Basically, as captains in the Pentagon at that time, we were in charge of the photocopies. So with that, I give you Colonel Layman.

**Layman:** Thanks, Will. That's a marvelous introduction. I really appreciate the invitation to come up here today, but I'm somewhat ... not uncomfortable, but apprehensive about what your expectations are of me.

**Oettinger:** They're vicious.

**Layman:** Are they? Well, that's okay. I can take it. I've bled before the best. I don't want to insult you or embarrass myself by presuming to deploy a lecture here. So what I'd like to do is just give a quick overview of the types of things that I think you might be interested in that I have had some opportunity to touch on, and ask you to interrupt and question as much as you will and thus let you steer the conversation or the presentation to where you want it to go. If you get me outside my experience envelope, then I'll just so state and try to get

back into something that I did have something to do with.

I presume that my invitation to come today is based on my association with General Scowcroft to begin with, and the transition from the Reagan Administration-type considerations in dealing with U.S. nuclear policy and command and control, which I think is your primary interest here, to what it has become today: that is to say, the elimination of a monolithic, single, readily identifiable adversary, which used to be the Soviet Union, and now is no one. Further, I assume that you are interested in the considerations that we undertook to build our nuclear forces and our command and control network to control that have changed.

**Oettinger:** You might also say something about disarmament, since that's the other side of that coin.

**Layman:** I'll get from the point where we are today, where there is no single identifiable adversary, since the weapons and the command and control capability of the former Soviet Union have been virtually demolished, or at least fragmented, to the proliferation of nuclear weapons and the increasing need for capabilities such as those I can now command: the global missile warning capability and the command and control network that supports it. As you said, I was the military negotiator for the Joint Compliance and Inspection Commission, which was the follow-on entity to the START negotiating team. Once the treaty was signed, it reverted to a different status. I'll also mention the START II Treaty, and President Bush's nuclear initiatives of 1991 and 1992, and again get back to the space warning business.

So, with that, let me reacquaint you with where we started, and that's in the early 1980s under the Reagan Administration, when the focus of all the efforts with which I was concerned had to do with our single purpose—the purpose for which the Air Force became a separate service, which was control of nuclear weapons and providing the backdrop against which all U.S. national interests and national undertakings were actually carried out. Again, we had a readily identifiable, very capable adversary that virtually from time immemorial has had a stronger, better conventional capability than we had. They chose to spend more on national defense than did we. We focused our efforts on the nuclear capability and the ability to control those weapons.

By the time of the Reagan Administration, we had become convinced through several different sources that the Soviet Union possessed unredressed capabilities in several nuclear areas. Not the least of our concerns was that while we had assured connectivity and survivability for our ICBM leg, we did not enjoy that for either our fleet ballistic submarine force, nor did we have assured connectivity with our bombers. So part of the Reagan Administration program was to bolster connectivity. Our warning network was rudimentary at best.

**Oettinger:** In fairness, I think it would be accurate to say that a lot of that got started under the Carter Administration. It took its form and realization under Reagan.

**Layman:** I wouldn't disagree with that at all. But the reason that I'm characterizing this the way that I am is that you will recall under the Carter Administration we had canceled the MX for the first time; we had canceled the B-1 for the first time; and we were looking at, or had looked at and disregarded, several connectivity measures. The space warning system, for example, the Defense Support Program (the satellites), part of which now falls under my command, had been severely cut back. We had a satellite failure in about 1978, I think, when a satellite went up and was only on station for two days, and it brought the continued viability of the program into question. Here we are now, nearly 20 years later, ready to launch satellite number 17 to continue the function that was all but dead under the Carter Administration. So, yes, some of it had been started, but not much.

Then at this time there was also a question of increased hardness and capability for our ICBM force, which is one of the justifications for the MX. The MX was probably the biggest hobbyhorse that the Reagan Administration had to serve as the

linchpin of its strategic modernization program.

**Student:** Where are we going with this whole hardness issue now, in terms of the targeting and what we're doing?

**Layman:** The primary threat against the MX had always been the SS-18. The SS-18 was capable of delivering ten warheads to very close CEPs (circular error probabilities) at high yields, and therefore, with the 308 SS-18s that the Soviets had, they could have done a two-for-one, three-for-one laydown on our hardest ICBM facilities and basically emasculated us in a first strike scenario. So the concern was that we had to harden these things, make them more survivable. Under the START II Treaty, there are no more MIRVed ICBMs. There are no more SS-18s, period, some of which go away under the START treaty, by the way. But by START II there won't be any. We've basically accepted what was proposed under the first Scowcroft Commission report, which was an arms control environment that was conducive to moderate numbers of small, single-warhead ICBMs in a somewhat survivable basing mode and considered full-spectrum capability versus system-on-system capability. So hardness has largely become a non-consideration nowadays.

**Student:** That's not entirely true. You still want hardness against a multiple kill effect.

**Layman:** Yes, indeed. But, for example, the Russians, because of START II, included a preference to convert some of their SS-19 silos to accept SS-25s. We, the United States, have abandoned our super-hardening efforts for our ICBMs.

**Student:** Yes, but there's more to hardening than just pouring concrete. You have communication EMP (electromagnetic pulse) hardening, you have HD (high density) hardening. Those things are full blown.

**Layman:** I wouldn't disagree. In fact, we're going to laser crosslink capabilities on our satellites, when you're talking command and control. We have added jam-resistant downlink capabilities to the satellites that we operate. We're putting up new communications satellites, all of which are intended to be more resilient in a scintillated environment. So there are certainly still hardness and survivability concerns out there, but what I was referring to, and what I think Will was referring to, was the super-hardening efforts. There was a monumental effort to try and allow ICBM silos to take a near-direct hit and survive and be able to launch out, and that effort has been terminated.

**Oettinger:** Let me just, if I may, interject a clarifying statement that I hope will keep this intelligible for everybody. In some of the earlier seminars there were discussions of use of civilian facilities for communications and so on versus specialized military capabilities. The little by-play of the last couple of minutes of question and answer dealt with that residual of military capabilities for which there is no particular civilian demand. So when you're talking low-intensity conflict, et cetera, the kind of thing you heard here a moment ago is to some extent irrelevant. But anything that might escalate toward even a small number of nuclear explosions of appropriate kind brings these considerations into play. The disappearance of the Cold War does not remove the agonies of balancing this question of how much, for the sake of economy, do you do with ordinary run-of-the-mill everyday civilian stuff, and how much do you require by way of hardening, in this extended sense, which is something that the civilians don't necessarily want to finance for ordinary commercial purposes?

**Student:** It seems to me that this whole issue of strategic modernization and hardness and everything else, in the context of what we are talking about—command and control—is really focusing on international peacekeeping efforts. We look at Bosnia, Somalia, and these things. We talk about coalition warfare. We lose sight of the fact that the preeminent *raison d'être*, if you will, of the United States military, is to preserve the national sovereignty. Underlying

all of these previous discussions is the fact that we still have to protect the strategic interests of the United States. Hence, there are a lot of issues that are ongoing here that aren't getting the headlines, but that are vital to national command and control.

**Student:** Tony, you've nicely dealt with the second half of my question: to what degree should—could and should—standard civilian communications channels be used in this kind of area? But what you've said so far prompts me to ask, "What are your perceptions of the threat?" Do you actually need the anti-missile capability that you've got, or indeed the offensive ICBM capacity?

**Layman:** What anti-missile capability?

**Student:** All right, the defensive missile capability. Do you still need it? And for what purpose?

**Layman:** Part of what I'm trying to get to is the changing environment, from when there was a clearly identifiable need, at least in the minds of the military planners, in a target-based consideration. In the early 1980s we based our strategic forces on the number and the characterization of those targets that we felt we needed to be able to eliminate if we were to have a general nuclear exchange. These days, a lot of those considerations have gone by the board, or they've gone to subordinate status.

Right now the big concern in the force sizing scenarios for the 1990s, developed by the Joint Staff in the 1990–1991 time frame, deals hardly at all with nuclear considerations, but more with mobility and responsiveness-type concerns—the need for fast sea lift; the ability for assured communications with forward elements; the deployability of forces; lightness of forces—because the focus has changed. That's exactly the thrust that I'm trying to get to. Where once the nuclear forces were the be-all and the end-all, we now take them largely for granted and, in fact, we're stepping away from a lot of the capabilities that we once felt that we absolutely needed. We fought long and hard, and a lot of Air Force officers were bled dry, to get the MX, which is now known as the Peacekeeper, deployed. We only ever deployed 50 and now under START II we've negotiated those away.

Lest I be misunderstood, let me explain that I believe that we're all tainted with the brush we're painted with. I happen to be a hero worshipper of General Brent Scowcroft and the Scowcroft Commission. One of the key proposals coming out of the Scowcroft Commission's first report was: deploy a moderate number of MX missiles to encourage the Soviets (now the Russians) to negotiate the eventual end or the elimination or severe reduction of MIRVed ICBMs. Under START II that aim was accomplished quite nicely. Now, granted, START II is not in force (nor is START I) and it may never be, but the willingness to accept such an environment has certainly been demonstrated, at least on the part of the United States and Russia.

**Student:** I'd be the last person to advocate the removal of nuclear weapons, but I do think you have to think carefully about differences in nuclear weapons. On the British side of the Atlantic, anyway, this is an acutely sensitive issue because of the percentage of the total defense budget that Trident is taking up. So far the government has stuck extremely hard to retaining Trident, and I happen to think that's right for a whole host of reasons: not only what you might actually do with it, but simply because having it helps. But is there any change in thinking about the sort of nuclear capability you're going to need, too?

**Layman:** It depends on what you used as your threshold, but again, prior to the 1983 Scowcroft Commission report, and after ... I assume that you all know what the Scowcroft Commission was. Do you not?

**Oettinger:** I think it's better to say a couple of words about it.

**Layman:** Okay. There was a recognition that the MX was doomed to failure, that it would never come on-line, and that there was a key element of President Reagan's proposed strategic modernization plan ...

**Student:** You mean congressional funding for the MX?

**Layman:** Congressional funding, yes. The program had been canceled, revitalized, canceled, revitalized in a variety of basing modes, some of which were ludicrous, some of which required a Philadelphia lawyer to interpret, some of which were totally technically based and had no military utility, but it turns out that it didn't matter because Congress didn't buy any of the proposals.

President Reagan undertook to investigate it, once and for all, by a bipartisan high-level commission. In December of 1982 he established the President's Commission on Strategic Forces, which was chaired by General Scowcroft. It was an 11-member panel and had 13 senior advisors, almost all of whom were former Secretaries of Defense, Secretaries of State, or Directors of Central Intelligence. Another member was Admiral Levering Smith, who was a key figure in the deployment of the British Polaris, one of the progenitors of your total strategic submarine program and missile program. They were impaneled for a period of 45 days to consider whether there was actually a need for MX and to evaluate the entire Reagan strategic modernization program. They didn't make their 45-day time line, were extended by an additional 30 days, submitted their initial report, and then were prolonged for the balance of a year. They were disbanded, finally, on January 4, 1984, and rendered their final report on March 21 of that year.

The extension was to look at arms control efforts. Our START efforts had begun. You will recall that Ken Adelman, at that time, had just been named to be Director of the Arms Control and Disarmament Agency, and it was an uphill battle to get him confirmed. There were questions throughout the Washington arena—in fact, I think there was no small amount of opinion stated from this quarter—about whether the United States was serious about pursuing strategic arms reduction talks in any fashion, let alone in the fashion envisioned by at least the detractors of the Reagan proposal.

So the basic outgrowth of the Scowcroft Commission report was that we would deploy something like 100 MX ICBMs, which would demonstrate resolve to the Soviets, and let them know that we were serious about strategic modernization and that they could not, basically, spend us into backing off the program. By deploying these missiles we would have created two things: an environment that demanded that the Soviets come to the table and negotiate in earnest for actual reductions in strategic weaponry, and a resulting force that would be congenial and acceptable so that both sides could deploy moderate numbers of smaller, single-warhead ICBMs in a survivable basing mode. It would mean that we would back away from the force-on-force, offense-on-offense capability, to look more at forces that were not destabilizing in a crisis—that is to say, that did not invite preemption. You had sufficient faith and trust in the survivability of your forces so that you wouldn't feel the need to launch out under a perceived attack, and therefore in a crisis situation you would not be as uncomfortable or as light on the trigger finger.

**Student:** Colonel, before you get too far on the Scowcroft Commission, I think this has a valuable lesson in terms of civilian-military relations. It seemed to me in that period when I was in Washington that that whole commission (obviously, you have first-hand observation, because I know you were there) was an exercise in damage limitation: the perfect example of what happens when the military is trying to second-guess what the civilians want in terms of trying to determine what our force structure and mission requirements are. For example, the magic number for the MXs was that we need 100, but there were no force structure requirements. We couldn't tie in a mission requirement that dictated 100, and yet we went forth to the Congress asking for 100 MX missiles.

**Layman:** Actually, the computed force structure requirement was for 200. In fact, that got us into trouble.

**Student:** Exactly, but we went forth to the Congress, and one of the things that got

us into trouble is that we went forth with an artificial requirement. If we needed 200 we should have asked for 200. We determined that was not logical, and therefore we just went through with the magic number of 100. It also seems to me that in the early 1980s, late 1970s, we spent a large amount of DOD manpower and money trying to determine basing modes for the whole strategic forces. We talked about railroad cars: putting them on the Southern Pacific and going from Atlanta to Denver or something, and we spent a lot of time working the Hill explaining to Congress why this was such a good idea. Then we came back and Congress used those old arguments against us when we determined that we didn't want to do that.

**Layman:** In fact, I'll tell you that in our first request for MX ICBMs we absolutely proved, beyond a shadow of a doubt, to the U.S. Congress that we needed 200 MXs. That was the absolute minimum level. When they told us that there was no way we were going to get 200, we proved that the need was actually 100. Not very smart. We did the same thing with basing modes. The rail basing mode for MX missiles was finally curtailed as a result of President Bush's second nuclear initiative, which was articulated in the State of the Union speech in 1992.

**Student:** Did you use some of the same things with the B-2, and that's how we got in trouble with the B-2?

**Layman:** Yes, indeed. This is what you were saying earlier, Dr. Oettinger, about when we let the engineers run the program for so long it finally gets us into trouble, and then you need a salesman to go in and clean up the mess. Then you let the salesman run it for too long and then you need an analyst to go in and clean up the mess. Then you come back, and it's a full circle process. One of the essential considerations in the management of large institutions is to understand, when you get close to running onto the rocks, not to say, "Oh gracious, what did I just hit?" We hit the rocks many times, in the B-1 program, the B-2 program, and the MX program, and we came very close to doing it in the small ICBM program.

After I had left Washington, D.C., I went to Headquarters, Strategic Air Command, and my job out there was to manage the funds for the MX and also to be the force structure analyst who determined SAC's needs for small ICBMs. How many warheads do we really need? The computed number—what we figured we needed based on the considerations that had been acceptable: target-based analysis, certain probabilities of kill against certain categories of targets, with a certain amount of responsiveness under certain types of assured connectivity—was something on the order of 1,700. I was dispatched to Washington to brief the Defense Science Board, under the chairmanship of John Deutch, who was Provost of MIT at the time, and the pitch that I gave Dr. Deutch was proof that we needed 450. That 450 was not, by our calculations at Strategic Air Command, militarily sufficient, but 1,760 certainly did not pass the giggle test. So, you're right. It's somewhat of a Kabuki dance, particularly in a politically threatening environment.

**Oettinger:** I've got an interjection. Since so much faith is put in analytic approaches to addressing such problems, what we're hearing is of some importance. I would urge you, once again, for the final session, to read very seriously, in that bundle on "cow and bull,"* the paper from *Science* on

* Anthony G. Oettinger, "A Bull's Eye View of Management and Engineering Information Systems." *Proceedings of the 19th National Association for Computing Machinery (ACM) Conference*, ACM Publication P64, New York, 1964. Reprinted in *Information Technology in a Democracy*, A.F. Westin, Ed., Cambridge, MA: Harvard University Press, 1971, pp. 250 ff.; Naomi Oreskes, Kristin Shrader-Frechette, and Kenneth Belitz, "Verification, Validation and Confirmation of Numerical Models in the Earth Sciences." *Science*, vol. 263, 4 February 1994, pp. 641-646; William G. Perry, *Examsmanship in the Liberal Arts: A Study in Educational Epistemology*, Cambridge, MA: Harvard College, 1963. Reprinted in *Persuasive Writing: A College Reader*, Karl Zeender and Linda Morris, Eds., New York: Harcourt Brace Jovanovich, 1981.

the matter of verification and what would constitute a good proof if there were one, so that when you're faced with proofs presented, you can judge how close to some ideal or far from it they might be. We're often going to have a much more reasonable conversation when both sides say, "We can't prove it. Now let's negotiate it." Then figure out what the hell reasonable people might infer from the somewhat murky evidence at hand, and go from there.

**Layman:** Something else that you have to consider, and this is another *faux pas* made by those who were heavy proponents of the MX, was that once the resolution was made to accept the Scowcroft Commission findings and proceed along the paths suggested by the Scowcroft Commission, the Air Force had a grand scheme of presentation to Capitol Hill. They would present briefings every hour on the hour; I remember that was the watchword. Every hour on the hour we will present a briefing in one of the conference rooms on the Senate side of the Hill and on the House side of the Hill to convince these people that we actually do have a program worthy of their consideration and support. But then in the execution of it we fell a little bit short. That is, if a Senator was willing to hear it, we felt compelled to send a technically competent and qualified briefer to brief him one-on-one. If a member of the House was willing to listen to our presentation, we also felt compelled to send a technically competent and articulate briefer to speak to him one-on-one. What we found out very quickly was our "every hour on the hour" basically had anybody who could spell MX giving the pitch and presentation, because all the technically qualified people were off addressing the people who were actually voting, and they couldn't be expected to come down to the auditorium or what have you. So it was a grand plan gone awry, and it didn't do us very much good in a public relations sense. But it was intended totally as a public relations, or a congressional relations, undertaking. It fell on hard times because it was improperly executed.

We did the same thing, by the way, with the B-1. The B-1 we brought into Andrews, on its way back from the Farnborough Air Show in England, had tours set up to take the congressional principals out to see the airplane. We scheduled buses and so forth, and found out that the only people who were using the buses were the 17-year old pages and administrative assistants who had nothing better to do and thought they'd go out and enjoy a day in the sunshine at Andrews Air Force Base. There were those who argued that this demonstration could yield no good.

I don't know if anybody in here recalls it, but I certainly do because I was intimately involved in it. The airplane had been under some considerable congressional and public scrutiny, and, as I say, had been canceled under the Carter Administration. But when it came time to wrap that operation up, Mrs. Reagan was due to leave that afternoon for China, and the airfield always closes during presidential or VIP travel. So they decided to take the bomber off at the last possible minute before the airfield closed, and therefore they could get national TV coverage. They took the airplane off, got about ten miles south of Andrews Air Force Base, over Woodbridge, Virginia, and a hatch blew off the airplane. So rather than divert to another field, and they didn't have very many options (I doubt if they had any options at that point), they came back over Andrews Air Force Base, and here's the national TV coverage again. They came down low and fast and here was this gaping hole on the top of the airplane where the hatch had blown off. Well, that's adverse publicity. Everything was fine up until that last moment. Where we had a really good plan, again it went on the rocks at the last minute, and there was really nothing to be gained because we already had the support we needed. We threw away a lot of support based on that incident.

I don't know how I got off on that tangent.

**Oettinger:** It was interesting.

**Layman:** Good plans gone bad is basically the approach here.

**Student:** We do a lot of tangents here.

**Layman:** I'm a master at tangents.

**Student:** During lunch we were talking about some of the jointness and a little bit about service rivalry. Without raising too much Air Force ire here, I wanted to know what your perspective was on some of the nuclear strategic triad issues being issues of parochialism and searching for a mission. You talked about connectivity problems with the bombers and the SSBNs, but survivability issues are a lot of the reason, as I understood it, that maybe the MX wasn't getting approved—hardening for the ICBMs, et cetera, whereas we had one leg that was entirely survivable.

**Layman:** Yes, the battle was warm!

**Student:** Was the search for a mission for each of the services a big part of it: not to let one service have the big portion of the strategic package?

**Layman:** Basically there was an obvious ploy by both the Air Force and the Navy to have everything. The MX was claimed to be the answer to a maiden's prayer. Those who were involved in the program, if they evaluated it maturely, understood that it could not be. In this environment, or the environment that existed as early as 1980, with the accuracies that the SS-18 had demonstrated, with the yields that it was capable of, there was no way that any fixed-based ICBM was going to maintain survivability. It just was not possible. And it's not possible today.

The thing that put the MX on the rocks more rapidly than anything else was continued Air Force proof that it was survivable: the fraternization arguments, and the dense-packed basing. I escorted briefers to Capitol Hill on several occasions and I heard proven solutions that varied by orders of magnitude. One briefer would offer proof that two warheads had to hit within 17/100s of a second to have any effect. The next fellow would come up, and he would say it was 17/1,000s of a second. The next guy would come up and say 42 pico-gigaseconds or whatever it was. They always had the right answer and it was always very emphatic and it was always proved, but it was always wrong.

And again, the Air Force was not guiltless of shooting itself in the foot here, because the MX, as you must understand, was an adversary of the Minuteman. We have an MX office and a Minuteman office and there were people who supported the Minuteman who undertook severely to shoot down the MX. And, by the way, there was a C-5 controversy going on at the time, the argument between the C-5 and the Boeing 747. There were advocates of airlift who undertook to gain their funding by shooting down MX because there's a big pool of money, $16 billion, in the MX pot that they thought could be used otherwise.

**Oettinger:** Could you bring that back perhaps to the earlier question regarding where we are going? Because since the days of those stories the threat, as you put it early on, has changed a lot. So what remains, and what's the character of nuclear threat that one might perceive today? Where will the next round of these shenanigans be played?

**Layman:** I personally believe that the shenanigans are over with. Maybe I'm optimistic, but we can't justify any longer a 20-ship Trident fleet; we can't justify any longer having the Peacekeeper, if, indeed, we undertake the cuts that are agreed to under the START Treaty. So, where does our problem lie? Our problem lies not, as we have suspected for years and years and years, with the residual Soviet capability (with the possible exception of Ukraine and their intransigence), but with the emerging nations.

I think survivability is going to play an even bigger role than it has in the past and that there will be enhanced emphasis on missile warning capabilities, which fall within my hat at the moment. The emerging nations are the ones that are going to be a problem for us, but they won't be drivers for force sizing for a long time because we already have a significant force in being, and even with the START II cuts we will be able to handle responsiveness to a moderate attack.

The next question is, "What are you going to do with it now that you've got it?"

It's not a force capability problem. It's a policy problem.

**Student:** For two years I worked at SAMSO (Space and Missile Systems Office) on nuclear hardness and survivability issues as a nuclear physicist, and I was also an airlifter. I got to see both sides of the world. But I think I you're right in your assessment of the force structure that the military proposed. Where the shenanigans will occur is among the producers, because right now, every day, you're going to see the Boeings, McDonnell-Douglases, and Lockheeds go at each other, always giving unsolicited proposals for things, and making assumptions on whether things are civilian-based or have unique technical specifications. That's my only comment. It's a shrinking industry out there. They're really going to go at each other's throats.

**Layman:** Since we are in a Kabuki dance, let me wholeheartedly agree with you. I don't think the military is going to be party to, or at least the source of, continued shenanigans. But you're exactly right. Even in the missile warning business, in the last two weeks, I've visited three different concerned contractors, and all three of them presented me with the answer to a maiden's prayer within my current area of application: space-based missile warning. They've all got a grand idea. They've all got a brilliant idea. And they all realize that there aren't very many dollars out there and each of them wants all those dollars.

So, there's always going to be that type of approach from that sector. But basically, the program concerns from the service level and the infighting between Air Force and Navy, for example, on which is better deterrence—small ICBM or MX or boats—should decrease. The answer is: it doesn't matter. We've got them all. We've now come to a more mature realization that we've accepted, whereas up until the mid-1980s, probably, I would say that nine out of ten concerned officers who had ever thought about the mechanisms and the mechanics of deterrence would have suggested that deterrence was almost entirely based on your ability to discipline the adversary if he undertook an attack.

From the mid-1980s on we became more and more and more accepting of the element of denial. Part of the concern is the ability to deny said adversary his objectives, and a mature consideration of deterrence would include both elements. I think we're at that point today.

**Student:** I'm as usual confused. But I'm not sure I see that greater, more advanced survivability is necessarily a prerequisite to dealing with emerging nuclear weapons states. The major problem these guys have always had has been delivery systems. You can get your two hemispheres of uranium or plutonium or whatever, and it's not too difficult to figure out how you stick them together to go bang. But getting them into the right place has always been the kind of major hurdle that none of them, thank goodness, so far has succeeded in jumping really satisfactorily.

Now, that seems to me to require two things: one, basic survivability, of the sort I'm sure that the United States has had for many years; but perhaps a second, kind of new look at unconventional delivery systems, like Frederick Forsyth's van in a multistory car park in Washington, D.C. But that doesn't necessarily seem to me to imply greater high-tech survivability. It just seems to me to predicate a rather different approach.

**Layman:** We're not in a discrete environment. We still have the U.S.-Russian residual capability, even if it's at considerably lower thresholds than it used to be. That used to be the only driver. We didn't even seriously consider anyone else as having nuclear weapons in a threatening position. Our concern now, from a survivability perspective, is not force-on-force survivability. It's U.S. survivability; U.S. warning; an ability to respond, if we felt the need to respond, from a policy perspective, and to stay away from a knee-jerk response, which demands robust warning. For example, if the threat were a missile delivery system, can you detect a missile? If it is a bread truck in a car park in Boston or Pyongyang, can you detect that and have a decision-making mechanism in place that can respond to the information that you're

given? We do have that capability. I'm not sure that we know how to treat the answer that we would get from a policy perspective.

**Student:** It's not the survivability of the United States at all. I can't imagine that the United States, or the President, can afford even the threat of Indian submarines cruising past San Francisco, or defecting Russian submarines that are now under North Korean control threatening the state of Washington, even though those are only a few cities with a few million U.S. citizens. So it's not a question of bombing India or North Korea back into the stone age. It's already enough that they can threaten the United States or a small part of it. It's not a question of their surviving an all-out U.S. attack, but maybe those dictators in North Korea don't care about that.

**Layman:** You'll recall that in March of 1983, about the same time as the Scowcroft Commission report came out, which was April of that year, the President delivered his SDI speech. As was pointed out here a moment ago, there is an overwhelming technical capability out there, plus the desire of any contractor that can join two pieces of metal to prove to us that they can provide this leakproof umbrella. But this is part of what gives me the comfort level to say that I think the shenanigans are over from a strategic offensive perspective for the military, because it's shifted to the survivability aspects. We've shifted to "Let's hinge our national survivability on an ability to duck an attack or to detect and still survive," from the leakproof shield, which is nowhere near being capable of being demonstrated, let alone employed. But the efforts are certainly there, and there are people out there who want the U.S. government to spend money on that capability.

**Student:** Is the distribution of Russian equipment, like selling the Atlantis nuclear-powered submarine to India a few years ago, still going on? Maybe the Indians still have the submarine, and what with the desperate officers of the Pacific Fleet, maybe some would defect to Russia, and things are screwed up in Moscow. So the threat is still there, I would say.

**Layman:** The hypothetical threats are endless, and you can't afford to build against all the hypothetical threats. You can build against the most stressing or the most likely or a combination thereof, but you can't afford to consider every conceivable threat, like the rogue submarine captain ...

**Student:** They had been patrolling in the Mediterranean for a few years, and they were friends with the Libyans. So maybe some would defect if things completely screw up there in Moscow, and then the Libyans would have a nuclear capability.

**Layman:** Wouldn't that scare you to death?

**Student:** So it's good for the United States to keep at least a few intercontinental missiles.

**Layman:** Again, would you expect to respond to a single blast coming from an unspecified source with a general nuclear exchange? What if it's a truck or a van? I don't know. Is it worth spending billions of dollars to be able to respond to something like that? You're basically shooting into the fog. There is no return on your investment to be able to counter that type of threat. So the question is, how long do you pull that thread before you give up? When do you let go of the rope?

**Oettinger:** Having injected the word "shenanigans" into these proceedings, let me just say a little bit about it, because I didn't mean to imply this negative flavor. I take you back to Dr. Quinn's comments earlier in this semester and his little graph about technology and deployability and so forth, and he ended up saying "no" when he talked about selling acetate: the guy with the most acetate wins.* That's kind of under the heading of shenanigans: when you can't prove something via bogus proofs you sell acetate.

---

* See Dr. Quinn's presentation earlier in this volume.

But consider the other extreme, which leads to the accusation that the military is always fighting the last war. If you don't have your acetates, then it means that you are only improving what you had piecemeal, which would mean staying with the deterrent nuclear force against the former Soviet threat. So again, I commend to you, in my usual moderate fanaticism about balances and so on, the notion that you've got a serious problem there, because if you don't buy enough acetate, you're fighting the last war. Of course, if you fight the last war, you will be totally unprepared for the next one. Then you add what triggered my train of thought here, which was our guest's last remark, that in the universe where at the moment there are so many hypothetical threats, the problem of even constructing acetates is a non-trivial one, let alone trying to figure out who the hell or what the hell you bet on.

**Student:** I just want to say that we've gotten on a very interesting topic here, and if anyone's really interested in it, there's a book, *New Nuclear Nations*,* which discusses almost exactly what we've been talking about for the last 15 minutes. It happens to be written by my advisor, so I'm not plugging it, but ...

**Oettinger:** Who is who?

**Student:** Carnesale and Blackwell. It talks about a lot of these issues: what to do about North Korea, or even if a friend of ours were to get these weapons, what do you do then?

**Layman:** Since you brought it up, I'm not in the book-selling business, but there's a marvelous book called *Hawks, Doves, and Owls*.** Dr. Carnesale is also a co-editor of that, which is wonderful in the current environment.

But I'd like to take a jump here if I can. You brought up the subject of fighting the last war, and being prepared for what we just did. I want to put a plug in for the President's nuclear initiatives, because I think it showed a lot of courage on President Bush's part, and the part of his administration, with no assurance of reciprocity on the part of the Soviets, to undertake to stand down major elements of U.S. nuclear forces. Since your seminar's interested in command and control, there was a degree of reliance on our ability to communicate and expect response from our overarching nuclear capability such that the President could stand down all the bombers that were on alert in September of 1991, when it was almost a certainty that the Soviet Union was going to collapse. With the assurances and the comfort level that we had as a result of our START negotiations and having just signed the treaty, he decided to undertake to eliminate, to take down from alert, those Minuteman IIs, which were slated for eventual elimination under START. He decided to take the warheads off those missiles and take them back to central storage, so that there actually is no capability to respond with those missiles today. He decided to take the bombers down from alert; they're no longer on a few-minute recall capability; they're not even loaded with bombs; they're not parked in a secure alert area; they haven't had their systems checked and so forth and so on. He decided to remove sea-launched cruise missiles from ships at sea, to remove ground-launched tactical weapons and atomic-armed artillery projectiles from overseas, and return them back to central storage. He did it to demonstrate to the Soviets, who were at that time economically wounded, societally demolished, and perhaps even scared to death of the consequences, that we could be trusted and that we were willing to help see them across their troubled times, if by nothing else than by standing down the threat that they had considered to be targeted against them.

Then, of course, there was the second iteration of the nuclear initiatives, which was articulated in the State of the Union

---

* Robert D. Blackwell and Albert Carnesale, Eds., *New Nuclear Nations: Consequences for U.S. Policy*. New York: Council on Foreign Relations Press, 1993.

** Graham T. Allison, Albert Carnesale, and Joseph S. Nye, Jr., Eds., *Hawks, Doves, and Owls—An Agenda for Avoiding Nuclear War*. New York and London: W. W. Norton & Company, 1985.

speech in 1992, that curtailed the advanced cruise missile procurement, curtailed the rail-mobile basing mode for the MX missile, and therefore eliminated any capability that we would have for deploying our second 50 missiles, and eliminated the small ICBM program. All of this, I think, indeed led up to the START II Treaty, which, as I said before, was the culmination of the program articulated by the Scowcroft Commission. It called for total elimination of MIRVed ICBMs and movement toward a force structure, on both sides of the equation, that was and is more stabilizing, or less destabilizing, in a crisis because of the threat levels, the warhead levels, and the survivability of the individual force elements, not to mention the entirety of the forces.

**Student:** With the projected collapse of the Soviet Union, one could argue that the volatility of that situation might indicate that we should not have done what we did. In fact, when that happened, one of the first things that seemed to come out in the media was, "Who is in control of the strategic rocket forces, and what's the outlook for the security of the United States?" That certainly appeared to be a concern of the American people at the time the event took place. So, what was that decision based on from your perspective? Was that based on national intelligence estimates? Why were we comfortable politically with pursuing that route?

**Layman:** I would say that we're not yet sleeping with both eyes closed today. Part of it was based on assurances; part of it was based on faith and trust; and part of it was based on knowledge that we had a residual capability that would suffice to see us across any difficult times. There was an almost immediate Russian response; I think Yeltsin responded to the initiatives on October 5 with a few substantive measures of his own and a few nonsubstantive throwaways.

But up to the day I left the Joint Staff, there was still some concern about the SS-24s in Ukraine. There is to this day. They're in session in Geneva right now. The Ukrainian national position is that the SS-24s are not captured by START; that they are not required to eliminate those systems; that if the United States wants those to come down, the United States must pay for them. They know that they signed the Lisbon Protocol that said that they were a successor of the treaty. They know that they accepted the responsibility for the limits imposed across the Soviet Union, but when the Rada ratified it, they basically walked away from the substantive elements of the Lisbon Protocol. However, we have Russian assurances about what it would take for them to use that. We have intelligence estimates about the state of maintainability of both the bombers and the ICBMs. So we aren't scared to death, but nor are we completely comfortable that there will not be a resurgence of capability. It's certainly a risk, but I don't think it's an outlandish risk.

**Jenkins:** Information technology is the new thing. Space-based information now seems to be the wave of the future. What do you perceive that translates to in terms of the future of the strategic triad, versus a lot of people who argue for a dyad, and where are we in that process? When we're basing our force structure on a declining threat, the high-value asset of the United States is space-based information, knowledge or information technology. There's a trade-off. Will we put force structure against space-based systems, or will we put force structure against maintaining existing systems?

**Layman:** The answer is both. Our problem in space right now is not an inability to get information. Our problem is our ability to process and use information in a timely fashion. On all the satellite systems we've got, almost without exception—and this includes the new ones that are up—our problem is ground processing capability, and even with some of those that have onboard processing, we lack an ability to disseminate and appropriately use the data. We've got enough interest out there, or enough capability. For example, you saw it when you watched the newscasts of the Gulf War. We detected missile launches in a matter of seconds, and basically activated

a communications network. It would probably scare you to death to see what that communications network looks like—how many links and how many points there are for failure in that communications network. So money has to go against that to eliminate some of those dangerous nodes, which can contribute to direct link failure.

**Oettinger:** This is a point you've heard now in several different ways. I can recall from various speakers in this semester that the connectivity down to the foxhole is a serious problem ... "foxhole" being used metaphorically.

**Layman:** We don't consider it metaphorically.

**Student:** The Navy does.

**Oettinger:** Yes, that's what I meant.

**Layman:** But you can dig a "foxhole" in the water, or in the bottom of your boat. Certainly you need to maintain the ability of your strategic offensive systems to respond. But even in the military, we are becoming a society of "Grab the new toy; grab the more capable system and exploit it and see what you can do with it." We haven't yet learned to determine whether we really need to do something. We know what we can do, and we do things because we can. We don't always ask, to the degree that we need to ask, "Should we do this?"

We have a demonstrated capability right now to detect missiles worldwide. We are enhancing that capability. The Navy's got a system—actually, the Navy and Army jointly have a system. The Air Force has got a system. The contractors are trying to sell us new systems every single day. Is there a right answer? Well, the Navy's bought theirs. We're buying ours. Why are we paying for the same thing twice? Because we can; because they like the bells and whistles on their system, and we like the bells and whistles on our system. We think the system we've got suits our purposes, and we couldn't incorporate what the Navy wanted. The same thing is true from the other angle.

But the splitter for where the funds go is way upstream, so by the time you get down to what you're going to spend your money on, the decision has already been made that you have *this* money to spend on *this* type of system. One of the things that I think the American public loses sight of, particularly when you get to some of the more vitriolic newscasts, is that if you don't spend the money on System X, and the money is earmarked for System X, it doesn't go back into the big pot. It's not usable elsewhere. You hear all these folks walking around door-to-door and banging on the door and saying, "Hey, do you realize that for the cost of one B-2 bomber, you could feed *x* number of people ?" Well, that's not the way life works. That's not the way funding works. That's not the way the congressional process works.

It's a question of viability. Do you wish to continue to have your offensive forces viable? Sure you do. So you will spend whatever is required. Do you want to have your detection capabilities viable, or enhanced? Sure you do. So you will spend what you get, and I daresay that at whatever level the decision is made, and at whatever level you are funded, you will pursue your capabilities to the maximum extent with the dollars that you get. But you can't trade one off against the other. It just doesn't make sense.

**Oettinger:** In your point about the Air Force having theirs and the Army and Navy combination having theirs, I think I detected a little note of "Why do we need two systems?" No? Let me make a point, going back to the birth of the nuclear business. It's sort of interesting, because the Congress made a very deliberate decision at that time that you bloody well needed two in an environment where there were naturally three or four services. So, early on in the nuclear business, the Los Alamos Laboratories and the Lawrence Livermore Laboratories were deliberately created to provide two competing approaches to the same problem. I didn't know whether you meant it pejoratively or were in support of it. The number "one" is a very dangerous number in anything.

**Layman:** That's exactly right. The number "one" makes for a single poor failure. I wholeheartedly support both of those programs that are out there, having seen what their capabilities are. For example, the Navy-Army system, which we call JTAGS (Joint Tactical Ground Station), is capable of being picked up and moved. If we were to go back to the Persian Gulf-type situation, and the affected commander felt the requirement to have the missile warning capability right in his back door, he could do that with the Navy-Army system. He cannot do that with the Air Force system. The Air Force system relies on a much larger processor and much more mechanical cooling, and it's got different redundant systems. It relies on different processing software, and you can see different things. So the question is, how do you apply what you've got? Just like the points you brought up a few minutes ago, the folly will come, and the sins will come, in trying to be all things to all people. The Army-Navy system is a marvelous system for what it does. The Air Force system is a marvelous system for what it does. If you try to make either system suit the other purpose, it will not work, and therein will lie the folly.

**Student:** But by the same token, is there really the need for interoperability between those types of systems? Last week we had General Edmonds talking about fusing a lot of systems together, and my question to you is, do we need interoperability between the Air Force, Army, and Navy on this type of a system?

**Layman:** Let's say if it costs us no more to have it, and if there are advantages. This will lead us right into what Dr. Oettinger wanted to talk about a while ago, which is joint operations at the low level, at the foxhole level. I've got a situation myself, and I don't want just to bounce around here, particularly since we're running low on time, but these days we're doing a much better job of operating with our sister services, and operating with our allies.

Again, let's go back to the Gulf War. The missile warning capability that we had and the distribution network that we employed included that the missiles were initially detected at my squadron. We transmitted early warning messages across a communications net, and one of the first recipients and the first verification node was in Turkey. So before you ever saw it on CNN, it was detected in Colorado, verified in Turkey, and passed to the commander in the field. I don't know how far it is from Riyadh to Denver, but I know that if I were the commander, I would feel a lot more comfortable if all I had to do was turn to my right and there is a fellow sitting there with a computer screen in front of him, and he knows the answer, and I don't have to rely on communications with Turkey, and I don't have to rely on communications with Denver, and I don't have to rely on a non-scintillated atmosphere in between. Who cares what color uniform the guy's wearing who's sitting on the scope?

I had this discussion yesterday with a captain from Naval Space Command. The training that sailors undergo is predominantly for their job as fleet support, and at my level in my operation, those sailors could just as readily be sergeants, privates, or airmen. It would make no difference to the data that goes out over the wire. But how you use that information and the kind of things you tend to look for depends on where your mindset is, and when you cross-link those, you get a pretty good product.

Now, as a squadron commander, I don't particularly care for the fact that I've got an operational entity that works for me that is not under my command. That's not a comfortable feeling. But there is some value in their being there; technically, a lot of value. I just wish the command relationship were different. Those sailors actually work for Naval Space Command, but they operate the assets with which I'm charged, and report through my mission channels. So basically I have a bunch of 25 independent operators within my squadron who don't answer to me, and that's what I don't like. I do like the fact that they're there, that they're capable, that they broaden the spectrum of the capabilities of our guys because of their different capabilities and the things that they're interested in.

**Oettinger:** I'm sorry, spell that out a little bit better for me. How do you guys coexist? I mean, they can tell you to go to hell. They probably don't, but ...

**Layman:** No. There is a 25-man naval detachment that is part of the 2nd Warning Squadron at Denver. On a day-to-day basis, when those sailors are on duty, they work for a satellite operations crew commander who works for me. If they misbehave, get out of line .... If the Navy wants to transfer them, they can transfer them. If the Navy wants to send six of those folks to Stuttgart this afternoon to stand up JTAGS, then the Navy can do that, and they will have disrupted my operation. They don't have to ask me to do anything. They can just reach right in and take them.

**Oettinger:** Isn't that true of any CINC?

**Layman:** No, that's not true of any CINC.

**Oettinger:** So when a unit is under a CINC, under the operational management, the service cannot rotate people without the CINC's permission?

**Layman:** No. The CINC's concern is the unit. The CINC doesn't worry about the individuals. The service worries about the individuals.

**Oettinger:** Well, that's my point. The Army could disrupt a CINC's operation by rotating or taking all the company people in some theater.

**Student:** No, they can rotate, but they can't just arbitrarily pull them and leave a vacancy.

**Layman:** They can do that, but it's transparent to the CINC at the application level. This is not transparent to me because I've got duty schedules, crew schedules, training schedules, and so forth.

Let me make it a little more clear. If you stand down from sitting in your duty position for 60 days, you must go through requalification training. I'm only allowed two trainers. So if Naval Space Command takes these six people and sends them to Stuttgart for 90 days, first of all, I've lost the use of those people for 90 days; secondly, you've disrupted my training schedule; thirdly, when I get them back, I either have six paperweights that I can't use at all, or I have to divert my training assets to bring those people back on line. What you're referring to is that Will Jenkins could be detached from here without your approval, but he would be replaced by another individual maybe as competent, maybe more competent, within a realm of consideration. So it would be transparent to you from an applications perspective.

**Student:** Unfortunately, it's not that pure between the services. The CINC has etched-in-stone billets and, as he said, he can't just take them. However, what the services will do is take Will away ...

**Oettinger:** ... and send some jerk.

**Student:** No. They'll say that I'm taking Will's place, and that I have to go to school for three months, so we'll gap the position. The biggest thing that I see that the services will do to the CINC is gap positions.

**Layman:** I have that problem as well. I'll get a sailor in, and he'll go against my manning, but he won't be pipelined through the training process at the Combat Crew Training Squadron for, say, nine months. So now the Air Force, because the Air Force has a vested interest in this, will flow this out rather smoothly. There might be a two-month gap or a three-month gap, but there certainly won't be anything like that.

**Student:** I keep thinking of how this whole thing unfolded in Desert Storm. I don't want to use Desert Storm as any kind of concrete example, but it suggests to me that there is a different perception among the services in the daily operations that you have now as opposed to what we saw in a major regional contingency. In fact, the opposite was true of General Schwarzkopf, and the Air Force—General Horner—actually controlled the number of assets coming in theater. That was the result of

two things. Everybody wanted to get their ticket punched and get to the desert; and the services were very supportive in terms of getting their people over there. But in terms of the legislative requirement, I was there working personnel, and I can tell you there's no doubt that General Schwarzkopf and General Horner had veto to any level that they wanted. Through their staffs at Riyadh they did, in fact, micromanage to the extent that they felt it was necessary and the services had to comply. That's opposed to what you're talking about, Bob, which is, in a real sense, the fundamental problem of day-to-day operations. The services can appear to be supportive and then they say, "Okay, we've got a guy inbound but he's not going to be here for four months." So you've got a four-month gap and two months' worth of training, so you're in effect without this person for half a year, and they are being used in the service pipeline during that period of time.

**Layman:** Let me point out to you the invalidity of your argument. You're exactly right for illustrative purposes, but the major difference is that in Desert Storm-Desert Shield operations, there was intense national scrutiny of what was going on. If I could get a captain in Air Force Headquarters interested in my problem, I'd be ecstatic. Certainly the President is not interested in my problem, and none of the four-stars are interested in my problem. I don't expect that they would be. It's just my problem, and I'll live with the answer. But it's considerably different when you have high-level scrutiny than when you have what's just basically day-to-day operations, because I'm not hurting by any stretch of the imagination. I just would feel more comfortable if I had the latitude, in the areas for which I'm responsible, to be able to be the master of my own destiny, and in regard to the sailors attached, I'm not the master of my own destiny. Part of being a squadron commander is that you should have a reasonable expectation that you will be.

**Student:** Can I derail you for just a second? One of our former speakers in the course here a few weeks ago, John Rothrock, who is with the Stanford Research Institute, had done a lot of work on space systems. I think that he, among others, would argue that's being prepared to fight the former war. We've categorized Desert Storm as the former war, and you're talking about the capability of the DSP in terms of forecasting close missile launches. That might all be very well, but I can suggest to you, as somebody who was sitting in the tents 72 miles from Riyadh, that by the time that system got to us, I had about 30 seconds to get my chemical gear on. So there are people in the field who weren't as comfortable with that as probably the people at Space Command.

**Layman:** I would imagine so.

**Student:** ... which, in fact, was talking about what a great job they were doing.

**Layman:** But again, the goal post is moving from both sides. You had 30 seconds to get your chemical gear on. How much would you have had if you had received no warning from DSP?

**Student:** That's not the argument. The question is, where are we going to go from here?

**Layman:** Let's look at the evolving systems. If you have only a 30-second time-of-flight missile, the best you're going to get is 30 seconds. But how much do you need? This is a perpetual argument: how much warning is enough? You need enough warning to be able to get your head down. You'd like more than that, but that's part of our architecture. Our architecture is such that we have to see the missile three times before we can say it's a missile. But our arrangement with the field commanders in Desert Storm was that if we see it one time, we're going to call you and say, "Something's coming, get your head down!" Now, do you want us to wait and then tell you, "Something's coming, get your head down!", or do you want to know what it is? I think you want to be told that something's coming and you'd rather duck twice unnecessarily than not duck once when you need to.

**Student:** It seems to me that changed in Desert Storm about January 23rd, about five days into the war, because initially ...

**Layman:** Initially, they used the day-to-day procedure, which is what we do today: I've got to see the same missile three times before I can confirm that it's a missile.

**Student:** It was getting there before we were.

**Layman:** Yes, and as you say, you had 30 seconds' warning. If you're looking at an air-to-ground launched missile, for example, and it's got a time of flight of 18 seconds, I can't see it and tell you fast enough with the connectivity links that we've got right now. In fact, I may not be able to see it at all, and even if I can, I probably can't see it fast enough to do the guy in the foxhole any good. Or I'll tell him, "Oh, by the way, you just got hit."

**Student:** Let me paraphrase it, then. You're saying that while we admit that, as the national military policy of the United States, we need to be prepared for the small tactical contingencies, we're pursuing technology that will have no value in that theater. Is that right?

**Layman:** I didn't say it won't have any value. It may have limited value depending upon the threat. Right now, we're building against the full spectrum of threats, and we're trying to tighten up our capabilities.

**Student:** Doesn't that go back to what we were talking about earlier—that we're building against a threat that no longer exists?

**Layman:** No, because they're inclusive threats. The system that we use, DSP, is an infrared sensor, and it detects heat thresholds, so you define your sensor as the lowest level to which you can see. For example, the unit of measurement (and it doesn't matter what it really means) is called a kilowatt per steradian. If you can detect two kilowatts per steradian, then you need one devil of a processor to be able to sort out the false positives. Otherwise, you're going to have your head down all the time. If, on the other hand, your predominant threat is at 54 kilowatts per steradian, and you set your processing threshold at 50, then you don't see anything that's below that. Are you willing to accept not being able to see what's below that? If the area that you're looking at is the Soviet Union and the threat is the SS-18, which is, let's say, 200 kilowatts per steradian, 54 is going to be just fine. If, on the other hand, you're looking at Nicaragua, and the threat is 15 kilowatts per steradian, you aren't going to see anything. So you have to tailor your capability. But an all-inclusive capability would permit an operator-imposed threshold, such that he knows what's most likely to come out of this area. He's willing to task his processor because he needs to see down to this level. He's willing to accept the false positives, and, by the way, so is the guy in the foxhole.

**Student:** Is there a downlink inside the system, let's say for an MX or the like, or let's say for a Hawkeye that is directly guiding fighter or ground attack aircraft, to warn them of anti-aircraft missiles?

**Layman:** If the question is whether the satellite is capable of that, yes, it is. The processing required is outlandish. It's too much to be considered useful on an aircraft. You would have to have a flying computer.

**Student:** But your computer could downlink via satellite to flying assets?

**Layman:** Oh, sure. But what good does it do them? Why would I want to warn an F-15, for example, about an ICBM launch?

**Student:** Can you also detect the launch of a long-range ground-to-air missile?

**Layman:** Certainly, if it burns hot enough. But the question is, what do I do with the information? I can't tell where it's going. I can tell where it came from. I can tell the theater commander and he can direct a counterstrike if he wants to, but he's still got to be able to get there, locate the thing, and put a bomb on it in what's called the intelligence force employment cycle time to

do him any good. That depends on whether he's got an airplane up in the air, whether it's armed with the proper munitions, whether the environment is permissive enough to allow the pilot, or the radar, or whatever mechanism he's going to use, to find the target, and then to be able to lay out a bomb run and deliver the target. There are a lot of considerations. It is not a trivial process to be able to do that.

**Student:** It wouldn't be much good to the guy in that aircraft, but maybe for the aircraft that goes up 30 minutes later to find the location. Maybe he only got that information on the ground: that it's not a ballistic missile.

**Jenkins:** Final thoughts?

**Layman:** *Moi*? I really don't know. I've spent about 19 years in the Air Force, starting out with strategic offensive forces, and now I'm in a strategic defensive arena. Every day I see new things that make me revise my position, so it would be presumptuous of me to say, "Here's where we're going." I can say where we've been, at least insofar as I've seen it.

But if I can say anything that's overarching, that I think is going to be of any enduring value to us, it's to go back to the issue of doing something because we can or doing something because we need to, and an ability to discern which path to take. I think that the propensity these days is to pursue any capability that is out there, perhaps too prematurely in some cases. I also think that the opposite side of that coin is that the unattainable "good" is probably oftentimes the enemy of the attainable "good enough." Pursuit of the processor that will discriminate at two kilowatts per steradian, for example. You could see a match head at two kilowatts per steradian. What good does it do you? So why spend money defining and redefining and redefining your ability to do something that you'll never use?

Laser crosslink is another example. Our new satellites that are going up have a laser crosslink capability so that they can talk to each other and then downlink, so that one ground station can process the whole world situation. We can do that already, and we didn't have to expend 300 pounds on the satellite and about $5 million to do that. So why add 300 pounds to the weight of the satellite and $5 million to the cost basically to duplicate something that you've already got? Maybe you need to do that and maybe you don't. But if the decision is undertaken from a mature, responsible perspective, then whatever answer you get is in the "good enough" range. But if it's, "Hey, we can do this, let's go ahead," then it's probably not a mature, responsible, contributive answer.

**Student:** Do you see the military getting co-opted by the contractors as we downsize our staffs?

**Layman:** Yes, I really do, to a much greater degree, I think, than is going to prove to be acceptable. I think we're going to have to stand up to some really deep scrutiny in the not-too-distant future. As I say, I went out to visit three unnamed contractors over the course of the last two weeks, and they all had a brilliant idea. "Here's what we can do with your system. And for the paltry sum of another $7.2 billion, here's what we can do for you, Colonel." I keep telling them, "My job is to take what I've got and operate it. You go talk to someone else."

**Student:** The unfortunate thing is that what they're going to do is co-opt someone on the Hill.

**Layman:** Well, yes. They will do exactly that. They will talk to someone else, and someone else will invoke a parochial interest. Look at the A-10. How many A-10s do we have beyond what our legitimately developed and concerned force structure requirements were? That's right along with what you were saying. The contractor convinced the officials in the government who had the decision-making capability, and now we've got these things.

**Student:** That's why we got the KC-10s during the MX crisis, and the C-130s.

**Layman:** Yes. Unfortunately, I think you're right on the nailhead.

**Jenkins:** With that, Colonel Layman's got to catch a plane.

**Layman:** Thanks for your questions. I've appreciated the opportunity to have been here.

**Jenkins:** On behalf of Dr. Oettinger and the folks here at Harvard, I'd like to give you this small token of our appreciation for weathering the airplane and coming out here.

**Layman:** Grand! Thank you.

INCSEMINARS1994

ISBN-1-879716-23-2