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The Challenge of Leverage in the Post Cold Era
John E. Rothrotck

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The Challenge of Leverage in the Post-Cold War Era

John E. Rothrock

Colonel John Rothrock (Retired), a specialist in strategy and intelligence matters, is Director of the Center for Global Security Planning at SRI International, a position he has held since he retired from the U.S. Air Force in 1990. During his Air Force career, Colonel Rothrock had responsibility for force development, technology management, planning for military uses of space, and collection and analysis of intelligence. He developed the concept that led to the USAF's current electronic combat program, and also conceived and initiated the Air Force's Rapid Application of Airpower Program (RAAP), which now constitutes the targeting element in the Theater Air Forces' advanced combat planning system. From 1984 to 1987, Colonel Rothrock served as the Chief of Intelligence Planning for the Air Force. Subsequently he was selected as a Senior Fellow of the Atlantic Council of the United States (1987–1988) and a Senior Fellow of the National Defense University (1988–1990). In the latter capacity, he was chosen to join the Institute for National Strategic Studies, a concept development and study center supporting the Secretary of Defense, the Joint Chiefs of Staff, the Department of State, and the National Security Council staff. Colonel Rothrock holds both a master's degree in international relations and area specialist certification in European political and military affairs from the University of Notre Dame. He is also a graduate of the Armed Forces Staff college, the National War College, and the Defense Intelligence College.

Oettinger: It is a real pleasure—well, no, that sounds unfair to the other speakers, past and future—but it is a great pleasure to introduce John Rothrock, with whom I've enjoyed several years of very pleasant association during his stay in the Command and Control Research Program and the Institute for National Strategic Studies at the National Defense University (NDU). I'm pleased to still count him among our friends and delighted that he could come up and share with us views that he has formed, partly during his military experience, including a stint trying to introduce the teaching of command and control at the National Defense University, and now, more recently, in the civilian sector. He has deep experience in all aspects of intelligence and command and control. So, without further ado, it's his. He said that he was interruptible with questions, so fire away as soon as something strikes you as worth questioning. All yours, John.

Student: I'm sorry, John, but if you could, would you give us a little background on your military career prior to going on to NDU?

Rothrock: Yes, okay. I was an ROTC graduate in 1964, and very quickly got into the intelligence business. I was a current intelligence Warsaw Pact-area specialist for much of my career, to include being the principal U.S. Air Force in Europe intelligence analyst during the Czech invasion. I also worked the Arab-Israeli war in USAFE. I had a lot of European time. During the Southeast Asian war I ran an interrogation team and very quickly found myself attached to a U.S. Army infantry brigade with my team. So I got to see a somewhat different side of warfare than most Air Force officers, certainly nonrated Air Force officers.

Later, having gone to the University of Notre Dame for 24 months getting the usual master's degree and an area specialist's certificate in European military and political affairs, I went to the Armed Forces Staff College, the National War College, and in the early 1980s I was deputy for National Security Council Affairs in what now can

be called the National Reconnaissance Office ...

Oettinger: My gosh, you are the first speaker to utter the magic words since it became permissible!

Rothrock: Yes. I was one of the people who advocated early on that it become permissible. Later in my career, I was Chief of Intelligence Planning for the Air Force, having run what probably now would still be a fairly sensitive intelligence operation in Europe in the early 1980s. Then I became a senior fellow of the Atlantic Council for a year and then finished up my career at National Defense University as a senior fellow in strategy. My duties included running the Command and Control Research Program for a stint, which, as Tony mentioned, brought us together. I've been with the Stanford Research Institute (SRI International) now since I retired in October of 1990.

I've thanked Tony personally, but I'd like to thank him publicly for indulging me in this opportunity to come and talk to you. I'm a big fan of this program because during all of my time in the military my chief frustration in thinking about intelligence and command and control issues was the extent to which our institution refused to acknowledge command and control and intelligence to be essentially intellectual propositions rather than propositions of technology, systems, procedures, and resources. The principal value added that I see this program bringing, to the extent that I understand what you do and who you are, is that you do insist on treating command and control as an intellectual proposition first and foremost. It *happens* to have dimensions in terms of technology, resources, procedures, et cetera, but these surround, rather than constitute, its core.

What I'd like to do today is first to discuss conceptual changes that I think must be accepted to have a good working understanding of the post-Cold War context within which command and control, I'm convinced, will have to operate in the future. In this initial part of the talk I get into issues of strategy, force structure, leverage (if you will), and vulnerabilities. Then, hopefully, there will yet be time left in the time allocated to my remarks for me to address some more specific command and control concerns that I have relative to the ability of large hierarchical institutions to accommodate information technology and some other associated issues.

The fact is that the context for military employment is very, very different now than it was even four or five years ago. As I was mentioning earlier, here I was, a career specialist in intelligence, and specifically in the Warsaw Pact and the Soviet Union, neither one of which exist anymore. So, at 51 I'm a walking antique. In October of 1990 I retired and in November of 1990 a guy with my background, having carried all my clearances, was living in Weimar, in what had been Eastern Germany until a month before, working in the town of Jena with the Carl Zeiss optics combine, helping them develop a transition strategy and working with people who had designed some of the Soviet overhead optics that had been my bête noire when I was in the National Reconnaissance Office. So, the world has really changed and we have to understand how it has changed, particularly in terms of the *leverages* that apply to the new global context, which are very, very different than the leverages that we as military planners and national security specialists are used to dealing with.

Oettinger: John, you should know that last week, in preparation for your coming, we distributed two sets of the *Global Reach, Global Power*, vintage 1990 and vintage 1992. Whether they have read them or not I can't tell, but it's by way of something to play against.

Rothrock: Okay, thanks. Just really quickly I'm going to go over some background and then talk about what I call "high leverage conflict" (figure 1). I'll talk about some factors that we need to consider in employing military forces, in particular, leverage, as leverage allows you to treat ambiguity and credibility. I'll talk about force structure and employment considerations, and for employment read command and control as well.

- **Background**
- **The environment of "high-leverage conflict"**
- **Credibility, ambiguity, and leverage**
- **Force structure and employment considerations**
- **The special importance of space**
- **Further implications**
- **Conclusion**

Figure 1
Overview

I think that *space* is an important consideration. There are lots of wrong ways to go in regarding space. Like anything else, there are more wrong ways you can go than right ways you can go. You have to make sure you are making the right choices for the right reasons. I'll talk about some other implications ...

Oettinger: In saying "space" here, you're being literal? I mean, this is the stuff out beyond the atmosphere: it's not battle space?

Rothrock: It's not battle space. I'll talk about battle space later on, but I mean outer space.

First, I think that we need to understand that the world that we're used to dealing with has changed very much back to what I call "history as usual" (figure 2). We have to understand that we have lived a historical anomaly. The Cold War period was historically anomalous in terms of the essentially frozen state of global relationships that existed from soon after World War II until, certainly, when Gorbachev came in and then the collapse of the Soviet Union and the Warsaw Pact.

One of the things we have to recognize is that things are moving much faster than we are used to having them move. They are not necessarily moving faster than they

- **The post-Cold War epoch**
  – "History as usual"
- **Desert Shield/Desert Storm**
  – Last of the old wars and first of the new ones
- **Concerns about military relevance**
- **"High-leverage conflict"**

Figure 2
Background

used to move before World War II. We are used to a much more gradual pace than in fact history has allowed previously. We have got to get used to that. It is back to history as usual.

Desert Shield/Desert Storm is a tremendous watershed for us, intellectually, both in good and bad terms. We have to understand that it was both the last of the old wars *and* the first of the new wars. It is the first of the new wars primarily in terms of the technologies that were used, and the way they were used, and the effect to which they were used. It is probably the last of the old wars, first by virtue of the length of time that the situation's buildup gave us to react and decide what to do, and second, because of the clarity of geopolitical circumstance in which we were employing the forces. It allowed for development of a political consensus, fairly well subscribed to, not only within this country, but also within a very broad and varied coalition. You won't necessarily have either the clarity of circumstance and certainly not the time of development of the situation to prepare in the future.

I'm afraid that if we make the wrong calls on history and on Desert Shield/Desert Storm, we're going to develop a military institution that is less and less relevant to the global situation as well as to the society that it is supposed to defend and represent. This brings me to this discussion of high-leverage conflict.

Student: Just one brief comment on Desert Shield/Desert Storm. The time of

buildup was carefully politically manufactured. We didn't have to have it, but we created it. The length of the buildup was carefully orchestrated to give us enough time. It could have gone either way.

McLaughlin: Saddam Hussein could have continued into Saudi Arabia in the second week.

Student: And the political strategy leading up to the beginning of Desert Storm was carefully calibrated in time to meet the military requirements. So, I agree with you when you say that we had sufficient time to build up, but that was a conscious decision taken. The political strategy, the diplomatic maneuverings leading up to the beginning of the air war, were pretty carefully calibrated to coincide with the military.

Rothrock: But I might also say, from a military perspective, that we needed all the time we could get.

Student: I said from a diplomatic perspective, because I was involved. We tried to give it to you.

Rothrock: Well, yes. My point is, as a military planner, diplomacy probably won't provide us the same luxury of time in the future.

I don't want to belabor this slide too much (figure 3), but I think that there are probably three perspectives that are important in understanding high-leverage conflict, i.e., the extent to which the United States as a great power—the sole remaining superpower—can nonetheless be jerked around very, very significantly geopolitically (to include our domestic political circumstances) by third- and even fourth-rate powers, as a result of this proliferation of high, absolute levels of lethality around the world. First, there is the difference between efficiency and effectiveness. This is something that information technology often clouds for us, because the information technology allows you to be supremely efficient. You might be efficient doing ineffective things, however, and the technology will not necessarily tell you whether you are being effective or not. It will just tell you if you are being efficient or not.

- **Three defining distinctions**
  - Efficiency vs. effectiveness
  - Arithmetic vs. geometric perspectives
  - Strength vs. power
- **Multilateral vs. bilateral competition**
- **Proliferating motivations and capabilities for global violance**
- **Continued relevance of deterrence-based strategy?**
  - New offensive-defensive relationships?
- **Some key leverage issues**
  - The "Colonel Colt effect"
  - Casualty-based strategies
  - "Mass" vs. "density"
  - New importance of strategy's domestic component
- **A crisis of military relevance?**
  - The options the military presents Presidents: solutions or tests?

Figure 3

The Environment of High-Leverage Conflict

There is a higher level of human *understanding*, as opposed to knowledge, which is the distinction we were making at lunch between the cow and the bull.* You need the bull to understand whether or not you are effective. The cow allows you to be efficient.

* These concepts are discussed in 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: ACM, 1964. Also reprinted in *Information Technology in a Democracy*, A. F. Westin, Ed., Cambridge, MA: Harvard University Press, 1971, pp. 250ff.

Oettinger: For folks who weren't here over lunch, I will issue some further background on this. To clarify his comment, we were talking about the technical definitions of "bull," not in the quasi-obscene fashion as you normally know it, but as context or frames of reference without data. There is a complementary notion of "cow," which is not as widely used, but should be, which is data without context or frames of reference. So what John is referring to is the notion that knowledge is born, in a way, of the union of cow and bull.

Also I might add that, to my mind, this has a very profound implication in terms of what you said a little bit earlier about the fast-moving historical context. In the tension between too much bull or too much cow, neither of which in isolation is worth a damn, when you have a very rapidly moving historical situation, or any other situation, it suggests that more bull is preferable to more cow because the cow becomes meaningless very rapidly when the context or the frame of reference changes.

Rothrock: And it's very necessary you have both the *right* cow *and* bull.

Oettinger: Yes. It is on the whole better to understand the context or frame of reference even if you have very little data, than to have lots of data, but an obsolete and irrelevant context or frame of reference. So more about cow and bull later, but I just didn't want a cryptic remark to go by.

Student: But, remember, you heard it here first.

Rothrock: So we've talked about efficiency versus effectiveness, i.e., the need to make sure that you are doing the right thing well rather than doing the wrong thing well.

The next thing I think is important is something I borrowed from our former Marxist-Leninist adversaries, who, we might acknowledge, had some very interesting, intellectually useful paradigms. One of them is the difference between *arithmetic solutions*, on the one hand, erroneously applied, against what are, on the other hand, in fact *geometric problems*. I personally think that the proliferation of ballistic missile and cruise missile technologies is presenting us with a geometric problem, and ground-based defenses, even those that provide you a 0.9 or a 0.99 probability of kill, constitute an arithmetic address of what is a geometric problem.

Geopolitically, in the ambiguous circumstances that I've mentioned earlier, when Presidents are probably going to have to apply military force in the future, you cannot afford even a few catastrophic events that can be inflicted against you and your force structure by these proliferating systems. You have to have a geometric address of what is a geometric problem. I know that's a politically controversial issue, but I'm prepared to discuss it.

Student: I didn't understand what you mean by arithmetic and geometric.

Rothrock: What I'm talking about is that, for example, you have a capability that relies on hitting a certain number of missiles, when in fact you have to eliminate that threat as a class of threat. You cannot simply rely upon an imperfect performance against it.

Student: Does that mean, for example, if India or China buys Russian cruise missiles or submarines, then it's not that one or two submarines that constitute the threat, but that the submarine can be close to the U.S. and nobody knows where it is? It's not the few missiles that can hit a target.

Rothrock: Exactly. The important thing is not the numbers, but the type of threat. The point that I make often is that arithmetic thinking is essentially efficiency thinking. Geometric thinking is effectiveness, and effectiveness constitutes shaping circumstances, rather than simply arithmetically responding to circumstances. The idea of shaping is a very important command and control concept: shaping the conflict, making sure that you are fighting the right battle under the right circumstances, for the right reasons, and that the enemy is being forced to fight, from his point of view, the wrong battle for the wrong reasons.

Oettinger: Note again that what he's saying has some Clausewitzian, Marine Corps doctrine manual kinds of overtones. These conceptual frameworks are critical because, again, all the cow in the world ain't going to do it for you if you're at the wrong view of what it's all about.

Rothrock: The next thing in this chart (figure 3) is strength versus power. I believe that the force that will extend from the bottom-up review is simply a continuation of what we have been doing. We're spending billions ...

Oettinger: What is the bottom-up review?

Rothrock: The bottom-up review, the BUR, is the review that Defense Secretary Aspin commissioned in 1993. It came out with its report as to the force structure recommended for the out years of the current defense plan. It essentially is a continuation, with tinkering on the margins, of the kind of force that we have had since World War II. That means: two major regional contingencies, et cetera; big concerns about whether or not you have enough firepower and this and that. These are all valid concerns within the old paradigm, but not necessarily valid concerns, at least not the way we're considering them, within the post-Cold War paradigm that I'm trying to build here. So we're talking about *strength*, which does not translate necessarily into *power*. You can waste an enormous amount of money developing strength that is unusable in the circumstances that are most likely to afflict the President in the future. Again, keep in mind the word "relevance." You can be *strong* but not *relevant*, just as you can be strong but not powerful. It goes hand-in-hand.

Also there's a *multilateral* competition now for geopolitical power and position, whereas before it was essentially a bilateral competition. To another audience for another purpose I'd belabor that, but I'm not going to talk about it right now.

There are proliferating motivations and capabilities for global violence—tremendous proliferation of absolute levels of lethality. If all the world gets 1970s' level of lethality, it is a very, very dangerous place. The fact that we have 21st century lethality is an interesting but irrelevant point, as a former North Vietnamese general told a U.S. military officer not long ago. The U.S. officer said, "But we beat you in every battle," and the North Vietnamese said, "An interesting but irrelevant point." Our technology, also the size of our force, can become very, very irrelevant relative to this proliferation of absolute levels of technology that can inflict catastrophic geopolitical events upon a future President.

Oettinger: I think it's worth underscoring something, and let me see if you agree with this. One of the features of U.S. or industrialized world society that makes this particularly true is the continuing concentration of population and of everything else, which makes it especially vulnerable to a relatively small number of destructive acts.

Rothrock: Exactly right. Also, post-industrial societies in particular, for a lot of different reasons, are so sensitized to attrition that we're now even concerned about the other guy's attrition, especially in ambiguous circumstances where you don't have a Pearl Harbor or "Remember the Maine" domestic political context to work from. If you'll recall, Colin Powell acknowledged the influence that the so-called "Iraqi convoy of death" held for him and President Bush as they were considering under what circumstances and when to cease hostilities in the Gulf War. Now, some would argue that they yelled before the dog bit them. But nonetheless, these are concerns that even 10 years ago we (at least military planners) did not think of. The information age has an awful lot to do with it, the CNN syndrome and all that, but there are other reasons as well that are sociocultural.

One thing that I will point out to you: the most modest projection is two billion, and the farthest out projection is three billion. What am I talking about? Males 15 to 23 years old in around the year 2010. The overwhelming majority, 90 percent or more, are going to be born into circumstances of "extreme deprivation-cum-hope-

lessness." The two billion is with good demographics, and the three billion is with bad demographics. With this situation being leavened by bad economics, disastrous demographics, and proliferating lethality, we're talking about a global version of Watts or Southeast Washington D.C.—not a nice thing to contemplate, but nonetheless it's likely.

Student: If you're going to talk about males being predisposed to violence, then what about the other half of the population, which probably would be females, and their influence on conciliation and all of that? I mean, you can make that argument either way.

Rothrock: I'll accept that. But so far, if history is a guide, the females haven't done very well in remedying this situation—or maybe we'd be a lot worse off had they not been around. But nonetheless, the fact is that when you take a look at the roles that females are having within these ghetto-ized, marginalized societies, they are not exerting much of an ameliorating factor.

Student: Just a comment: in Northern Ireland, females are more involved in violence than males are.

Rothrock: Interesting you mention Northern Ireland. For another reason, I did get some figures from both the city of Detroit as well as from the U.K. Embassy, because I wanted to take a look at the past 25 years of violence in Northern Ireland, the "new time of troubles," so to speak, versus the same experience during the same period in the city of Detroit, not to include Wayne County. According to the U.K. Embassy, total fatalities associated with Northern Ireland violence, up through 1993, were about 3,490—3,500 or a bit less. In Detroit, 14,500 people have been murdered during the same period of time. The population bases are almost identical; that's why I chose Detroit and Northern Ireland.* What gets the headlines? Not Detroit, but Northern Ireland.

Oettinger: Want to swap?

Rothrock: No, but it would be very interesting to consider why we would not want to make that trade—even though the killing rate is nearly five times worse in our case in point than in theirs.

Student: The U.K. would require prior notice of that.

Rothrock: After the seminar, we might want to talk about the role of the offense versus the defense, but that's a doctrinal issue that I don't necessarily want to get into right here. But I do want to talk about what I call the "Colonel Colt effect." This proliferation of 1970s'-level lethality throughout the world is having the effect on the world that Colonel Colt's fabled six-shooter had on the West as the frontier expanded. Whether you were four feet eleven or seven feet tall in the Old West, the essential proposition was that you were both armed. Everything else was on the margin—how many guns you had, how well you used them, et cetera. The fact was that you were both armed. In fact, the bigger guy was in some ways more vulnerable unless he was very fast.

The same thing is happening now where you have proliferation of "Colt-45" kinds of technology. Our side has all kinds of very advanced weaponry, lots of it, but nonetheless, we are vulnerable to catastrophic single geopolitical events that can really do in a President. The military, as an institution, is flirting with irrelevance if it can't be effective against that new geometry, where numbers of things don't necessarily count the way they used to. Even levels of technology don't count if they are simply incrementally better.

I had a discussion about two months ago with a strong advocate of the Global Positioning System (GPS). For those of you who don't know, GPS is the space-based system that allows you to position down to incredible accuracies on the ground. I said, "For our side, it's a great system, but what about when the United

* That is, they were identical in 1968-69. Detroit has since lost a large percentage of population, thus making its murder statistics progressively worse on a homicide-rate basis.

States is up against an enemy force that has access to this?" And he said, "Oh, well, that's really not a problem because our version of it is going to be so much better than what they will have access to." And I said, "You don't understand. This is not a technology equivalent of a body-building pose-off. This stuff will actually be used. It isn't good enough to be technically better; good enough, on the enemy side, can kill you." It's a very, very different force, which will have that kind of capability, as opposed to a Saddam Hussein, who didn't.

Oettinger: Then again, let me point out that downtown Manhattan is sufficiently wide in area that even the accuracy of the degraded GPS is more than enough.

McLaughlin: For political purposes it doesn't matter if you get Long Island or North Jersey instead.

Rothrock: Exactly! Now the other thing is that basically the bottom-up review force presumes still that we are going to out-attrit the enemy, and we most certainly will. There's no enemy up there who is conceivably going to go against us over whom we cannot have an enormously advantageous kill ratio. I would go back, however, to the words of the North Vietnamese general, "interesting but irrelevant"—especially in a society such as ours that is increasingly casualty sensitive, when most of the conceivable enemies that we're confronting are less sensitive to casualties than we are. So we kill a lot of them, they kill a few of us, but geopolitically, we're more damaged in our cause by our few casualties than they are in their greater number of casualties. That's a tremendously important point in considering not only force structure but also command and control and employment concepts.

Student: Hasn't MIT also done quite a bit of work that concludes that the American's willingness to accept casualties is not only relevant to American casualties, but also to casualties in general?

Rothrock: Yes. I was talking earlier about the Gulf War "convoy of death," which is a great example of the effect that concerns about casualties—even the enemy's—had on us. Another important point, from a military point of view, is the vulnerability that mass and density constitute in this current environment. With the bottom-up review force, we are in the process of developing a force that still requires you to have tremendous density of presence, and that you present it as a *target* within the swath of lethality that the enemy can levy against you. This is very important because we are talking leverage here.

Oettinger: The Marine barracks in Lebanon is an example.

Rothrock: Exactly right. In the ambiguous circumstances that we have to anticipate in the future, a President who is told that, "Well, you might lose one Aegis cruiser or you might lose this or this, this, and this," will say, "You've got to be kidding me. In these circumstances, if I lose 400 kids from Des Moines and the like, I'm out of there. I can't afford that." Again, a military whose force structure cannot present options better than that is flirting with institutional irrelevance within our society.

Now, I'm deliberately talking provocatively here. The tone is strident, and I am doing that for effect, but I think the facts really need to be taken into account.

McLaughlin: John, let me add a footnote, though. Again, we've been through some of these cycles before. By the end of the Victorian era, the British had become very sensitive to overseas casualties, and I could imagine much the same argument going on at this point: "Oh, we can't lose another 1,000 people in India." Faced with war, you moved into World War I, where the sensitivity to casualties became orders of magnitude different. I guess I'm saying that maybe if somebody decided to level Manhattan you might have a nation that would lose some of the qualms about totally eliminating North Korea from the face of the Earth.

Rothrock: Yes, but the point is that you have lost Manhattan. That's an enormous institutional failure by the military in that

they did not protect the United States. Secondly, you have eliminated Korea, but other than a feel-good reason, what have you accomplished? See, that's the problem that we are into, and again, the information age exacerbates these concerns. I just think that it's important to think about this problem of mass and density. Usually we think that the objective of the military has to be to get there "the firstest with the mostest." The fact is that you've still got to get there "firstest" because time is the one invariable in the modern battlefield, but also, you want to get there with the "most effective," not necessarily the "mostest," because density is itself a vulnerability in this proliferating lethality that we are talking about.

I mention the importance of strategy's domestic component, and we've talked about that before. You've got to have a strategy that reflects your strengths and weaknesses as well as your enemy's strengths and weaknesses. You've also got to make sure that you have a military that presents options to a President that are other than tests of his manhood—"his or her 'manhood'."

Oettinger: There is something oxymoronic about what you just said.

Rothrock: My point is that these options are supposed to be solutions; they're not tests of courage and resolve for a President.

McLaughlin: It certainly wasn't contradictory in talking about Margaret Thatcher in the Falklands.

Rothrock: I've discussed ambiguity and leverage, and if you are not able to use leverage to handle ambiguity, you don't have credibility (figure 4). Without credibility you have a tremendous problem in the world because you are going to be "called out"; again, a parallel with the Old West.

Student: Can I just take you back to the options again that aren't a test of presidential manhood or whatever? Do you think that the new situation is going to result in military strategies that should not be ones of offense? I've been reading in other contexts about deterrence and I think that

- **To achieve leverage, future strategy (and forces that support it) must be credible in the face of ambiguous—but lethal—threats.**
  - Requires realistic net assessment of modern American strengths and vulnerabilities
    - Strength: technology
    - Vulnerability: attrition

Figure 4

Credibility, Ambiguity, and Leverage

the way in which the world seems to be going, with more multi-nationalization of military operations and perhaps a different kind of context, you are not always going to go out and hit the other guy physically, but might want to put more pressure on him through military means. Do you think there is a tendency to move away from classic warfighting in the sense of going out and getting someone?

Rothrock: Yes, I do.

Student: Does that have implications for the command and control procedures that you need to put in place?

Rothrock: It very definitely does, because what we are talking about is that, ideally, you want to rob the enemy of his will and ultimately, of the relevance of his own objectives. If his rallying cry is to get the Americans out, wouldn't it be kind of nice if you weren't there to begin with (i.e., you don't need the access that his geography gives), and he didn't have that fulcrum? He still wants to attack your interests, but he doesn't have that fulcrum. That's just one example.

Oettinger: But it's an important one, because it illustrates that the ideas that I think that John is expressing are not as radical as they may seem. I don't know what you are going to say about the importance of space, but one of the elements of its importance is precisely that over the last 20 years it has enabled the removal of bases that otherwise would have been vulnerable.

Rothrock: You're right. You're anticipating me. In fact, I'm doing a study for the Office of Secretary of Defense on that very issue right now.

Oettinger: Let me then either set you up or anticipate, or whatever, and make another statement that I think is relevant here. I hear the implications of what he's saying as going far beyond the matter of use of military force, in that it gives an importance to intelligence and to other actions that I don't know how to characterize.

Rothrock: Understandings, beyond information, beyond knowledge.

Oettinger: The boundary between what is military and civilian, and what is war and what is peace, is made immensely more fuzzy by what you are saying. This is not just a conceptual problem, because when you think about the black and white character of war and peace in legislative and other social structures, the problem of legality, appropriateness, moral power—in any way or shape—for something where defense or offense may in fact take place in "peacetime" presents a whole new range of issues.

Rothrock: Exactly right. Increasingly, I think the old Cold War aphorism of "neither peace nor war" is going to apply again in the post-Cold War period, but in a very, very different way. Just as the military prepared itself during the Cold War essentially to deter more than to fight, I think that we are going to have to prepare ourselves for a tremendous range of non-classic military functions in addition to, when push comes to shove, actually having to duke it out with somebody.

Oettinger: Well, equating military with violence is where the problem may lie.

Rothrock: I talk about information warfare later on here.

I've talked about efficiency versus arithmetic for this geometry (i.e., strength versus power). I repeated them deliberately in this slide (figure 5) because I think that they are important paradigms.

- **Leverage distinctions:**
  - Efficiency vs. effectiveness
  - Arithmetic vs. geometry
  - Strength vs. power
- **Achieve advantages of mass without the vulnerabilities of density**
  - Standoff/precision
  - Limited logistics presence
  - "Fine grain" forces
  - Non-lethal options
  - Space
- **Make enemy's capabilities (perhaps even his objectives) irrelevant**

Figure 5

Some Conceptual Force Structure and Employment Considerations

Any military concept or any program should be forced to meet the tests implied here. What do you want to do with a force that you designed for leverage? You really want to achieve the advantages of mass without the vulnerabilities of density that I just spoke about. So far, I think that at least at the tactical level, we are doing pretty well there. We are making good and very creative use of standoff and precision technology, but what we aren't doing adequately is limiting the logistics presence that we have to present within this swath of lethality that is growing in its range as well as in its capacity.

My friend Earl Rubright has recently briefed Admiral Owens, who is the Vice Chairman of the Joint Chiefs of Staff, on work that Earl has done down at USCENTCOM. Earl is the science and technology advisor to the commander of CENTCOM. He was Schwarzkopf's science and technology advisor during the buildup to and the conduct of the Gulf War. Earl has done some very interesting research into the logistics implications of precision position, surveillance, and

weapons technologies. I could give you all sorts of ratios and what have you, but we're talking about enormously great economies in the tonnage of munitions, equipment and materiel versus achieved objectives that translate into very, very much changed and, importantly, very much reduced logistics requirements in theater, to include your lift requirements to and within the theater. This frees up resources to do an awful lot of other things. So again, if you're thinking geometrically, and in my sense *geometric thinking* means *systems thinking* to a great extent, you've got to think about the implication of this precision, surveillance, and employment capability as it translates all the way back through the entire chain of military activities to include deep into the support base—again, keeping in mind the support base as a vulnerability of density in the face of the enemy lethality.

In another context, I talk about "fine-grain forces": unique forces that present limited geopolitical, catastrophic loss potential on the one hand, but pack a hell of a wallop and can get rid of very specific, finite, but nonetheless potentially catastrophic enemy threats. I'm writing a paper on that right now.

Very important are *nonlethal* options. A President would love it if you could tell him that, "Hey, we can deny this guy his objectives and we don't even have to kill any of his population," because typically, the guys we're going to be up against are going to use our concern for their population against us. They are much more willing to lose their own guys (their soldiers and their people) than we are to kill them.

Student: I don't think that's the issue. It isn't that they're not willing to suffer casualties, or to employ casualties, or even to use our sensitivity to casualties. I agree with what you say in part, but I don't think that represents the full spectrum of conflict.

Rothrock: You see, my point is that they are willing to use casualties against us.

Student: I think that's a sensitivity that we feel, but I don't think that the nonlethal option applies to all of the contingencies.

Rothrock: No, it doesn't apply to all of them, but it applies to some important ones. Again, the objective has to be to present a President with options.

Oettinger: Although it's interesting, this is going back to the point made a little earlier, that there are gender-related issues in all of this. I've heard it said around a similar table within a planning context that "real men don't use nonlethal weapons," and so the extent to which that kind of blind spot influences the debate on that issue ...

Rothrock: It's tremendously controversial.

Oettinger: So then one should be aware that there's a cultural component of this kind of debate when you are changing paradigms or questioning paradigms. It cannot be overemphasized. It's real.

McLaughlin: It mixes with other preconceptions and prohibitions. I guess it might have been nice to disable Saddam Hussein's army in the desert with massive dysentery, but we don't use biological warfare.

Rothrock: Exactly right. We're at a point now where we have some traditional moral distinctions that technology has really overtaken. In fact, we're making arguments that it's more moral to kill these guys than somehow to disable them temporarily or what have you. Now, you do get into real issues when you're talking about using lasers to blind an entire army and paralyze their command and control rather than kill it. Then you get back into Tamerlane kinds of decisions, which, thank God, our culture is not comfortable with. But we will be up against cultures that are comfortable with those kinds of decisions.

Oettinger: That reminds me of that Jules Verne story, *Michael Strogoff*. There's this guy who is wandering through Siberia on a mission for the Tsar and he gets captured by the Mongols or whoever, and they try to blind him with a glowing sword passed before his eyes. So he's blind and a beautiful young girl leads him, et cetera. Then later

on it turns out that the sight of his mother as he was about to be blinded made him have so many tears in his eyes that they deflected the firebrand and he was not in fact blinded. Jules Verne anticipated all of this a hundred years ago. *Michael Strogoff* is the name of the story if you want to get sort of a foretaste of these moral agonies.

Student: But let's talk about Sun Tzu for just a minute, because according to him the greatest triumph is not to have to actually physically engage your enemy. So you talk about "real men don't fight," but in fact much of the philosophy espoused by modern day strategists in the military field goes back to Sun Tzu's *The Art of War.*

Rothrock: Yes, but it's one thing to espouse a strategy. It's another thing to develop the force structure, and the force structure determines how you fight. Frankly, the force structure is one that looks like it never heard of Sun Tzu. Certainly, the bottom-up review force structure projections never heard of Sun Tzu.

Student: Force structure is defined as manpower specifically as opposed to tools?

Rothrock: No. The kinds of weapons, manpower mixes, et cetera.

Student: I mean, for instance, deception, or using the media. You talk about the U.S. public information system.

Oettinger: But you're talking fringe. He's talking about where all the money and the resources go. You see, that's the difference.

Student: But the balance between them may not be quite right.

Rothrock: The balance is way off. Again, as you'll probably recognize, we're talking about differences in degree that constitute differences in kind.

Oettinger: Let me add to this. You ought to, if you have not done so already, being at the Kennedy School, read Graham Allison's *Essence of Decision.* What he's saying, going back, is that the President or the commander of whatever has to fight with what resources he has. The resources on hand at the time are what he's talking about. The preponderance is not in the deception and those things.

Rothrock: In fact, I would really recommend reading that book, and if you've read it before, reread it in the context that I'm trying to convey here. He has a bureaucratic model, he has a logical model, I forget what he calls that, and then he has a political model of how the decision was arrived at and the considerations that were taken into account. But the bottom line in each one of them was that the force structure that Kennedy had didn't suit bureaucratically, it didn't suit him politically, and it really didn't suit the situation logically.

Oettinger: But that's all he had.

Student: But it's an interesting point, surely, that the so-called fringe strategies actually give you more bang for your buck, if that's not the wrong simile. Some of these things are not expensive.

Rothrock: They aren't. The point that I'm making is that you can achieve enormous economies, again, by a different geometry. Right now, as I said, if you use the Colonel Colt analogy, and I've gone out and bought $1,500 worth of pistols and I have them strapped all over me, and the other guy only has one of them, what I've done is addressed the problem marginally, although at great expense.

Oettinger: But you see, again, the cultural biases cannot be overstated. It's sort of interesting because John is sensitive to this, but he's a maverick in his service, which doesn't usually talk the way he's talking, and likewise for the Army. If Rothrock were a naval officer, I think the odds of his talking about deception, et cetera, would be a lot greater. You run across many more people in the Navy who are attuned to that.

Rothrock: Surely.

McLaughlin: On the other hand, while I enthusiastically endorse the direction John was heading in, I remind you that it cannot be carried to extremes. The best example is the British 8th Army in the western desert, and one of the commanders said at the time it was marvelous to have all this wonderful Enigma intelligence, and they were still kicking the shit out of us because we didn't have equal forces.

Rothrock: You have to make sure that you are not the best informed defeated force in the world. Believe me, as a veteran of the Vietnam War, both in the Pentagon as well as in the field, I can tell you that for years the Air Force wanted to hit the Bac Mai controller because the Bac Mai controller was vectoring North Vietnamese pilots against our aircraft very effectively, and was responsible for the majority of kills against us. We wanted to schlong it and the National Security Agency argued against it all the time because it was a valuable source of intelligence. Well, the intelligence it was providing us was how this guy was killing us.

Oettinger: Let me say in their defense that that's one of those balances. It's so poignant.

Rothrock: I gave you only one side of the story. There is another side. The Air Force guy in me was on one side of the issue; the intelligence guy in me was on the other side.

Oettinger: The greatest manifestation of that is that it was alleged that Winston Churchill permitted the raid against Coventry to go through in order to protect Enigma. I guess the debate has been settled now that he did not do this, and the current thinking is that that's a canard, but it illustrates the sensitivity and the importance of that particular set of balances.

Rothrock: I will talk very quickly about space (figure 6). I think that space is extremely important because space, above all, provides you a geometry that plays very much to American strengths, minimizes our weaknesses, and also plays against the

- **Comfortable separation between rhetoric of aspirations and reality of actions**
- **Space as a medium for geopolitical modulation and posturing**
- **Acceptance of "space-faring" proposition**

Figure 6

Space: Policy and Conceptual Legacies of the Cold War

strengths and to the weaknesses of the rest of the world. We do space better than anybody else, at least so far.

I think that we need to rethink the militarization of space and divorce ourselves from what is really Cold War thinking about space, where space was seen as a bilateral competition between two superpowers and a venue that permitted modulation of the competition. It was a venue in which we sent signals back and forth to each other. We cooperated in space. We had signed agreements, et cetera, et cetera. When we were mad at each other, we canceled joint missions with each other, and the like. It is classic Cold War thinking, although on the soft side of the Cold War. We've got to rethink space and understand that it is going to evolve into a full-up medium for military competition on a multilateral basis.

With regard to ASAT capabilities, and certainly ballistic missile capabilities, these missiles go through space. They are vulnerable to what you can do to them from space. These are all capabilities that we have to take into account in a new context.

Oettinger: May I just interject? I have an undergraduate student who is finishing a thesis, due on April 6th, on precisely that history of the cooperation/competition between the U.S. and the Soviet Union during the Cold War years in space. What's critical is that what John has just said about the tone being set on how to use space is demonstrably an outgrowth of a series of

Cold War political decisions. Given everything that John has said, there's no reason why that set of circumstances has any relevance to what's coming ahead. But the legacy is deeply enshrined, not only in U.S. national practices and law, but also in international practices and law, so that what John is saying is by no means something trivial and superficial. He's making an absolutely vital point, and if he's right (and I think he is) about use of space, this requires fundamental revamping of the current regime in which we think about space. If anybody is interested in pursuing that further, I'll be happy after April 6th to get you a copy.

Rothrock: I am.

Oettinger: You are already on my list.

Rothrock: In fact, I should have hired this young fellow to do what Andy Marshall* has told me he wants me to do, and that is to take a look at space as a Cold War experience thus far for the United States.

Oettinger: I will send him to you. You will get a phone call from Matt Bencke. He's looking for a job. You can make use of him.

Rothrock: Now, one good thing that did come out of our understanding or, better stated, perceptions of space developed during the Cold War, is the idea of space as a maritime equivalent, an idea of a "space-faring" proposition (figure 7). I think that that is very important, and I think it's important to take a look at the maritime analogy. I'm not looking at it uncritically. For reasons of time, I won't criticize the analogy because it does have some pitfalls in being applied.

Importance of sea lines of communication evolved during the age of exploration and age of manufacturing, i.e., the sea allowed you to move things back and forth, and these were important to national economic well-being and national power writ large. So there very quickly developed a military competition regarding use of the sea, a naval competition, if you will. The information age is elevating the importance of space lines of communication, although I might say there is competition that the space community is not willing to take into account, particularly from the enormous capacities of fiber optic communication. But nonetheless, I think that this generally holds true, at least I'm examining it, and I still believe it holds true.

But if this is the case, does the sea equate to space in terms of similar patterns of competition evolving? Regarding space specifically in its post-Cold War context, I'm afraid that in space and its militarization, we're in a situation very similar to the U.S. position in the years between World War I and World War II, when we opposed rhetorically, as well as in public policy, unrestricted antisubmarine warfare, to include even the preparation for it. Now fortunately for us, the institution that many of you are

- **Maritime Analogy**
  - Importance of sea lines of communication evolved during age of exploration and age of manufacture
  - "Information age" is elevating importance of "space lines of communication"
  - Historically similar patterns of competition/ threat?
    - The unrestricted sub-warfare analogy
- **Proliferating dual-use technologies**
- **Space as an evolving military fulcrum**
- **New importance of defense as factor of national power**
- **The spectre of peer competitors**

Figure 7
The Evolving Competition in and for Space

* Andrew W. Marshall, Director, Net Assessment, Office of the Principal Deputy Under Secretary for Policy, DOD.

part of, the U.S. Navy, true to form, didn't pay any attention to U.S. policy and, thank God, as it turned out, developed, within the wherewithal that was provided it, an understanding of unrestricted submarine warfare and knew pretty well how to do it once they got the materials and the technology to pursue it. I don't think that there is any institution today that is thinking the same way about space and its militarization as the Navy was thinking about undersea warfare counter to U.S. policy rhetoric in the interwar period. And I want to explore that a little bit, and see if that analogy holds up.

Oettinger: You know why it's believable. I think this space business still has kind of an egghead, intellectual technology kind of thing rather than an operational side to it.

Rothrock: You're right, Tony. I've talked with General McPeak* about this.

Oettinger: What made the Navy effective in this way between the wars is that they had all this operational capability sitting on its duff and instead of just sitting, they started thinking in Newport and so on. They thought operationally as well as intellectually and then technically, which makes all the difference, in space-based operations as well.

Rothrock: At the risk of sounding parochial, I can tell you the Air Force wants to make it joint. The Air Force back in September stood up, as we say, i.e., initiated, an organization called the Space Warfare Center out in Colorado Springs, and it is deliberately manned by people in addition to and other than career space types, who are typically, as we say, "wireheads": research and technology sorts of people. But the new Space Warfare Center includes a broad spectrum of Air Force specialties. They are going to get other services in there and hopefully it will become subordinate eventually to the Joint Space Command as opposed to just the Air Force Space Command. When I presented this briefing to Lt. General Tom Moorman, who is the vice commander of Air Force Space Command, he said that he hopes that Space Command performs that equivalent of the Navy's thinking about unrestricted submarine warfare.

Oettinger: You ought to get Frank Snyder* up there because Frank would be a fantastic model for operationally oriented but intellectually unblemished sorts of thinking.

Rothrock: I won't go into it here, but there's an awful lot about "the *inner* space" that we could convey to *outer* space in terms of paradigms of understanding. I think space is an evolving military fulcrum.

I've talked about the importance of defense as a factor of national power. After this seminar, I could into that further, but it's along the lines of what you were talking about earlier.

Then I think we do have to take into account that most of what I've been talking about has been the tin-hat, third- and fourth-rate power being able to jerk around a future American President, maybe even the current American President. I think, however, we have to take a look at the potential of peer competitors in space, because space provides you a geometry where the traditional measures of national power are less and less applicable. You don't need a lot of land mass. You don't need a large population. You do need wealth, and you certainly need tremendous intellectual capital. Lots of folks have those capabilities, and in fact are not encumbered by the geopolitical constraints that are involved in coping with large territory and large population.

Student: Certainly that goes beyond nation states too.

Rothrock: Exactly, right. That's another thing I would mention. Nation states are really being put upon as institutions

* Gen. Merrill A. McPeak, USAF Chief of Staff.

* Frank Snyder is the author of *Command and Control: The Literature and Commentaries.* Washington, DC: National Defense University Press, 1993.

individually and collectively by these evolving transnational trends, ranging from drugs to the fungibility, as they say, of labor as a commodity, essentially non-national loci of capital that can destabilize governments. All of these concerns, such as environmental concerns, have tremendous domestic impact on nation states' governments, but they are concerns that nation states individually or even in concert seem to have very great difficulty in handling. The potential of that disconnect between transnational dynamics on the one hand and domestic politics on the other hand can, I think, be very destabilizing.

Oettinger: Some of that is still sort of out there in the future. If anybody wants to pursue that question in greater depth with the current historical example, then I think that what has happened in the last couple of decades and continues to happen to the world's financial institutions provides the best foreshadowing of what he's talking about. A lot of this question of who's got the muscle and the means and so forth, as between the private this or that versus the nation state, has played itself out now for a couple of decades. It's ahead of other areas in the financial services.

McLaughlin: The other side of that is whether the nation state is too big for some purposes or too small for others, so that you have something like the European situation.

Rothrock: They also might be the wrong shape, the wrong geometry.

McLaughlin: Yes, but you have the European Union occurring at the same time as you have the U.K. devolving powers to Scotland and Wales, and Spain devolving powers to Catalonia, and the like.

Oettinger: The best articulation of what McLaughlin has just said about the size of geopolitical nation states and so on has been in some articles by Daniel Bell. I cannot remember exactly which ones, but if you need a citation and somebody's interested, I'll help you locate it.

Rothrock: One of the things that I distill out of what Bell has written, and I don't think I've read everything, is that you really have two dynamics at play in the post-Cold War world. You have economic imperatives for integration in tension with political imperatives for atomization. Right now there are 3,000 groups in the world that ascribe to themselves the term "nation" and are probably willing to kill somebody in pursuit of having someone accept that ascription. When you combine that with the demographics, economics, and lethality that I've been speaking of in this presentation, it makes for a very scary scenario.

Oettinger: Well, it might be fun to ask Dan to join us in one of the later sessions because it hadn't occurred to me that his thinking was as relevant as now is obvious. Let's talk about that.

Student: You raised the economic issue and I think that's important, particularly when you're talking about space. For instance, I think there's a tremendous overlap between the economic demands and military demands that could be placed on assets in space, and who is going to provide those resources—the launch capability or the technological capability—and who controls them. Is it Tonga that had a satellite space available because of the manner of allocation? And they were able to sell that space?

Rothrock: Yes, as I recall, Tonga made money off the space age.

Oettinger: Yes, but Tonga's a joke. What's not a joke is the French.

Rothrock: ... or the Japanese.

Oettinger: My favorite scenario is the French selling satellites to everybody, becoming the Switzerland of satellites.

Rothrock: As importantly, even making available in a timely fashion the information and knowledge product from these satellites. Later on I can tell you about some observations that some colleagues and I made up at Global '93 at Newport this year. We were playing the Straits of Hormuz

scenario. You get into very interesting problems when you're up against, say, an Iran that has mined the Straits of Hormuz and has access to GPS and to an advanced Spot kind of surveillance product.

Oettinger: Global '93 is the Navy's war game at Newport each year, and Spot is a French satellite.

Student: Increasingly, multinationals control those commercial assets that have a military significance. So if you wanted to shut down GPS to deny that to Iran or something like that, you'd have less opportunity now to make a strictly military case if you're not working in a coalition or something like that.

Rothrock: You're right, and the way the military is approaching that is essentially to have a range of GPS quality available that we can dial for ourselves as well as allocate to others.

Student: Yes, but didn't they approve the sale of the receivers?

Rothrock: Again, it's a confusion of arithmetic solutions against geometric problems.

Oettinger: It's all good enough now for downtown Manhattan.

Rothrock: Yes. Good enough can kill you. That's what I told the GPS advocate: good enough can kill you.

Student: I just hope, though, that nobody would make the mistake of thinking that the nation state is totally down and out despite all these problems.

Rothrock: Well, what's the alternative? That's how I would argue against myself. But the fact is the nation state is currently functioning, but isn't doing a very good job.

Oettinger: No, but that's precisely where I refer you to the financial services area, because you can see where the strengths and weaknesses lie and the scandals that have hit all the people give a good example of the interplay of the private interests and the nation's.

Student: I entirely agree, but it's just a common fallacy (not in this part of this campus, I know, but in other areas) to think that the nation state has had its day.

Rothrock: Again, I've heard that. I've heard people get enthused about what I say to a point that makes me uncomfortable, and I come back to them from the other side and I say, "Well, what is the alternative?" Don't point to supragovernmental organizations because then you're forced to explain the United Nations.

Oettinger: As long as there's territory, there will be nation states. To quote our late and highly lamented Cambridge representative, Tip O'Neill, "All politics is ultimately local"—a saying that, by the way, he ascribed to his father.

Rothrock: One important consideration, and in fact I've just written a paper on this, is that I'm afraid that our current analytical methodologies and measures of merit are going to condemn us to developing a military force that is more and more representative only of what we can measure as opposed to what we actually need (figure 8). The analytical methods that we have seem to be less and less applicable to the environment that I've described, particularly as those analytical methods, when you run the string back to their intellectual origins, still ultimately turn essentially on relative attrition measures, and attrition might be a geometry that you don't want to pursue as a President.

Oettinger: There's a marvelous article in this week's *Science* magazine,* which I will bring to you. It uses environmental concerns as an example, pointing out the enormous weakness of what passes these

* 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.

- **We need to think beyond current paradigms**
  - Current measurements/analytical methods are constraints
- **"Information warfare" is an important strategic test for American military thinking**
- **Military forces must reflect—not oppose or challenge—the society and value systems that they are to protect**

Figure 8
Further Implications

days for models used in policy making and so on. Then again, for all of those of you at the Kennedy School who get sort of bullshit by the belief of this school in models and analytical techniques, et cetera, it is one of the best debunking pieces that I've seen. Keep this bullet in mind, and I will, by next time, have for you the *Science* article. It is a little hard reading but it's quite comprehensible and I think it will arm you for life.

Rothrock: Can I have a copy as well?

Oettinger: You want a copy too? It is a beautiful article and it is very well researched, very well articulated.

Rothrock: Have you been hearing a lot here about information warfare? I know the military guys have been hearing a lot about information warfare. I'm very ambivalent about information warfare as a concept. Information warfare, for those of you who are not aware of it, is very much the buzzword within the Pentagon now, and it's the idea that the information age requires new sorts of preparation for new sorts of conflict, and understanding that information and the medium that constitutes information is a new sort of battle space, et cetera. You have to understand, essentially, how to compete and conduct warfare within information, within cyberspace, and all this. It gets very, very fuzzy very, very quickly.

In fact, it gets so fuzzy so quickly that what I'm afraid of—and we have to be very careful about this—is that information warfare, as I said to Tony on the phone a couple of days ago, is becoming essentially the "We don't know what to do in the post-Cold War" file for the American military. All the tough issues—doctrinal issues, organizational issues, technological issues, procedural issues—could be migrating their way into information warfare, giving them, first, a respectability that they didn't have on their own, and second, an insulation from politically uncomfortable address. When you get two people, let alone two institutions, together, and they start talking information warfare, within five minutes they are talking totally past each other conceptually.

Oettinger: I share John's ambivalence on that. I was surprised, myself, about the peak in trend surfing: all the trend surfers in the military are currently surfing on this beach of information warfare. It puzzles me because I agree with you on this also: they are not saying anything, and they don't know what the hell they are doing, and this is a concern. On the other hand, it is a very serious topic, and one that has its roots way before the current surf and will be around and will be important after the current waves have died.

Rothrock: It's a serious and difficult topic. A boss I used to have (he was my toughest boss, but also the one I learned the most from in my 26-year career) said, "Just because a job is hard doesn't mean it can't be badly done." I think that we might be on the verge of that here.

Oettinger: By the way, for those of you to whom this is all Greek, there is on the reading list a book by a Frenchman called Thierry Breton, titled *Softwar.** It's "Software" with an "e" cut off. It's about 10 years old, but it's well worth reading.

* Thierry Breton and Denis Beneich, *Softwar* [*La Guerre Douce*]. Paris: Laffont, 1984.

Rothrock: I really don't know if the Tofflers' new book* is a help or a hindrance in the understanding of this, but certainly there is no self-conceived defense intellectual today who has not read that book, at least within the Beltway.

Oettinger: Paul Strassmann's been almost selling it.

Rothrock: They have a lot of good to say, but I think their value is in the articulation, not necessarily in the thought.

I think it's very important to take into account this domestic component (figure 8) and make sure that the forces that we construct reflect the values of the society in the ways that their structure demands they be employed, rather than being at odds with the society. I think that this is a very important issue because it's a strategic disconnect that our opponents will readily use against us.

Oettinger: Yes, but let me go back to the comment that John McLaughlin made a little bit earlier and to the comment you made still earlier about "Remember the Maine" and Pearl Harbor. How many World Trade Centers or beyond would it require to take this strategic opposition to bloodshed, et cetera, et cetera, and turn it into a cry for blood? "Remember the Maine" was engineered by William Randolph Hearst!

Rothrock: The problem here is that you have the information age working against your ability to manufacture these sentiments and to define out the ambiguity politically.

Oettinger: I disagree, because the information age also permits—for example, through the Internet—the sharing of direct experience. I'll bet you that there are more people aware of what it was like to come down from the hundredth floor of the World Trade Center through direct phone or Internet communication with real people who were there than read about it in the press.

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* Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century*. Boston: Little, Brown and Company, 1993.

Rothrock: What I'm getting at is that for all of the circumstances of comfortable clarity of threat to our interests that the World Trade Center and what have you provide, a President is going to be confronted a lot more times by very ambiguous circumstances. If we don't have a force structure that can be relevant to those ambiguous circumstances, I'm afraid that this is what is going to happen (figure 9). In fact, there would be some who would argue that we're already on this slippery slope.

Our strategic options could become so narrow that we could find ourselves continually rationalizing our global interests to be fewer and fewer and our values to be less and less important—rather than defending and advancing them.

Figure 9

A Grim Prospect Should We Fail to Meet the 21st Century High-Leverage Challenge

McLaughlin: This is the world affairs version now of Moynihan defining down deviancy.

Rothrock: Exactly, right, yes.

Student: Is the military driving the politician to believe that information warfare is a nice thing—clean and without casualties—and that's the train we jump on, or is it the society driving the politician to drive the military to go that way—reduce manpower and so on?

Rothrock: There are a lot of motivations for it. Everything that you have said is a motivation for information warfare, and right now, at least, information warfare seems much stronger on motivation than it does on content.

Student: There are some guys who have their handsets and no communication with a superior and they march on. Then my nice communication warfare is nothing.

Oettinger: All true, but I think that one of the reasons for its popularity is that, after all, the President and the Vice President of the United States are both e-mail addicts today and neither of them has had their finger on a trigger.

Student: Maybe it's a dream that can't be fulfilled.

Oettinger: The problem is that there is some reality to it. The difficulty in dealing with information warfare (and he and I are on exactly the same wavelength) is that we both deplore the current trend surfing aspect of this, which means it's becoming a trash can for all sorts of things. The danger is that in dumping the trash can, you also dump out real, core, important things because of all of the things he said about lethal force and so on.

Rothrock: What I'm afraid of is that bureaucracy, for political reasons, is doing a tremendous disservice to what is a very good and important macro idea. But the micro treatment and the micro understanding of it are, I'm afraid, going to rob it of its credibility before it's out of the gate.

Student: Is the military the right place? Is it maybe that they're trying to conform virtual war or cyberspace or something to their traditional paradigms as opposed to new ones?

Oettinger: You're getting here into an area that has been totally unexplored in this seminar. Let me give you an example of where that's leading us. There is a bill—the National Security something or other bill, which was originally HR-145 under either the Bush or Reagan Administration. It was sponsored by Congressman Jack Brooks (D-TX) and it was HR-145 because he was responding to National Security Directive Number 145. It deals with a long history of arguments between the civilian side of the government and the military side of the government, which would be the National Security Agency and others, over the safeguarding of critical information. That's right on this matter of information warfare, because the National Security Act deals with stuff that is of military importance and that is subject to classification of Secret, Top Secret, et cetera, and all that kind of stuff.

Now 20 years ago, when Nelson Rockefeller was Vice President, he wrote an eloquent report calling attention to Soviet intercepts of U.S. communications in what are in today's lingo called "sensitive but unclassified" information—financial information and other things.

Rothrock: The Internet problem of today.

Oettinger: Ever since then, there has been a struggle within the U.S. government over whether this was a military or a civilian matter. Speaking of information security and protection of computers and telecommunications and so on, the current state of affairs is that the responsibilities are yoked together uneasily between the National Institute of Standards and Technology, which is a piece of the Department of Commerce, and the National Security Agency as executive agent for the National Security Act, but through the Defense Department, and that's a precursor for this whole set of issues.

Rothrock: The "Clipper Chip" is where all of this is going to come to a head.

Oettinger: Yes. It's a major manifestation of this.

Rothrock: But it's just the current manifestation of the issue. I think that it really goes far beyond a military purview. The question is, how do you, in the post-Cold War world, define what is military and what is not military when you are talking about national power, in all of its manifestations, being exercised? The military is only one part of it.

Oettinger: You will find in the proceedings of previous seminars talks by Jim

Hearn, Harry Daniels* —several information security types out of NSA. I don't have somebody from the National Institute of Standards and Technology because it was hard to find one who could talk (that's some prejudice, but that's the way it is). But it is a serious civilian-military problem. You'll find some history of it in the seminar proceedings. The other place to look is Randy Fort's piece on economic intelligence from 1993.** We just got the word that there's stuff back from the authors, so if somebody wanted to read it, it's now approved and readable. Again, he addresses the tremendous difficulty of dealing with what's civilian and what is military. I can also make available to you a piece of Fort's that's published by the Strategic Studies Center in Washington that deals with the economic stuff.

So between these two, with the information stuff coming out of HR-145 or whatever the law is now called, those are two areas where you can get a foreshadowing of the really serious issues of where the hell does that buck stop. That's in the process of being invented very painfully.

Student: But it's national security, and who's responsible for it? If you start broadening the definition beyond a specific force, physical, military ...

Rothrock: Let me give you an example right now, and I can't get into the details of this, because this has recently and very belatedly been classified. But I can tell you that at SRI, when you have 3,500 of what are essentially technologists, they sit around and they work nights and weekends and fool around and do this and that. I won't go into the details, but some of these guys came up with a way to use pretty mundane technologies in a very sophisticated way to do terrible things to computers without actually entering the network. Unfortunately the "geek literature," as they call it, is starting to creep up on the same kind of understanding.

We went around for a year and a half within government, and there was no one who saw it to be within their charter to address this, although every one of them, as a citizen, was appalled at the implications. Right now it has been classified and taken on, but for very, very narrow concerns, by one group that considers itself to be immediately and very specifically threatened by this.

What constitutes national security? If somebody can drive around and screw up a key power grid switch, our national security is very much affected, but who is responsible for such things?

Oettinger: Be careful again on the use of language here. National Security, with a capital "N" and a capital "S," is a term of ours that refers to the Act of 1947 as amended and so forth, and essentially it refers only to things that have a kind of military or CIA-esque defense against nation states sort of character that under current law would be under the purview of CIA rather than FBI.

Student: I'm talking little "n" and little "s."

Oettinger: But I think it is essential, you see, to do that crazy kind of thing because we ought to find a better pair of words than "national security," lower case "n" and lower case "s," to deal with this, and one attempt has made it sensitive but not classified. But even the words necessary to deal in a meaningful fashion with this set of issues are missing. Anyhow, if you talk about current eloquent statements and concerns, you go back 20 years to Nelson

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* James J. Hearn, "Information System Security," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1992*. Program on Information Resources Policy, Harvard University, Cambridge, MA, August 1994; Harold Daniels, "The Role of the National Security Agency in Command, Control and Communications," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1986*. Program on Information Resources Policy, Harvard University, Cambridge, MA, February 1987.

** Randall M. Fort, "The Role of Intelligence in Economic and Other Crises," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1993* Program on Information Resources Policy, Harvard University, Cambridge, MA, August 1994.

Rockefeller and find the same kinds of concerns and the buck doesn't stop anyplace. In that respect, that 's what makes it so poignant.

Rothrock: If you take the Federal Reserve computers and all of a sudden you have somebody unknown to the computer and unknown to the people who are dependent upon the computer doing something so that the computer is now adding one and one and getting three out of it, you've got a problem. The problem is going to be of incredible proportions before you know what happened, and before you recognize it.

Student: Can I just endorse, Tony, what you've said about that? I think especially—and being a Brit, I can talk about national security unbridled by the National Security Act of 1947 ...

Rothrock: ... but in the U.K. you have the Official Secrets Act.

Student: Yes, but that gets much, much wider than any national security act passed in this country. Until 1986 in the United Kingdom, you could be prosecuted for taking a photograph of a fire extinguisher in a labor exchange under the Official Secrets Act. That's now changed. I do think that the terminology here is desperately confusing, but it is terribly important and there is, I think, a controversy going on about unclassified but sensitive in the context of the U.K. It seems to me that you must draw a distinction here between traditional security techniques, in quotation marks, and system integrity techniques. The two are not necessarily the same, though they can overlap. But if you make the mistake of thinking they're the same, you find yourself veering in the other direction toward overkill. That, I think, is something that you have to guard against.

Rothrock: You do, because you can wind up with that last line that I said (figure 9) where our values would become less and less important. You can wind up having that apply domestically, and to say the least, we'd be a very different country with our values changed in that sense.

What I'd like to do is to just take about five more minutes and mention a couple of issues and then talk about my experience at NDU.

Oettinger: Yes, we just have about 20 more minutes left.

Rothrock: I probably won't take all that time.

What does all that mean within a command and control context, specifically? I think that it's important to think about the issues that I raised there within the command and control business. Especially when you're talking about large hierarchical organizations—and we talked about this earlier—you have to talk about how advancing information technology plays to hierarchy and how hierarchy plays to the technology.

I don't quite understand if Tony agrees or disagrees with me, but I believe there is a natural tendency in the application of the technology, if you think about the unfettered potentials of the technology, to have the technology flatten and decentralize decision-making structures and processes. Now that runs counter to organizations that have a lot of imperatives, if you will, for hierarchy that don't allow them (or at least they understand themselves not to be allowed) to use the technology to its full potential of flattening and decentralizing decision making.

The typical military guy will tell you that you have to have hierarchy because ultimately you have to tell the guy to take the hill when his computer has told him that he's going to get killed in doing it. That's probably overdrawn, but nonetheless there is this tension here between the absolutely logical application of the technology and other than logical or different logical imperatives for hierarchy. That is especially true within the military and, to some degree, probably within law enforcement and other organizations as well. You have to be very careful how you manage this, because two bad things can happen to you. You can wind up using the technology in ways that simply ossify the hierarchy—absolutely just paralyze the hierarchy in information about itself.

Then secondly, and associated with that, you can make the organization so transparent from the top to the bottom that it knows more about itself than it has ever wanted to know. There's an interesting example, and in fact I proposed this as a notional case study and no one was ever interested in allowing me to do it. I'd like to go back and take a look at the preparations for Normandy and presume that we had a time machine and could take modern information technology and imbue Ike's command and control structure for those preparations with our current technology. I personally think that we'd still be preparing to invade Europe, because I believe that what would have happened is that the structure would have become so transparent that real show-stopper issues that came up at lower levels would have immediately been bouncing up to very, very high levels of decision making—you know, Mulberries were wrongly designed, this and that didn't fit together, this outfit hadn't been made aware what that outfit was doing. All of these could have been legitimate show-stoppers, and in good conscience an Ike might probably say, "Hey, since I know that, I can't say for it to go ahead." I think we really have to understand the role of information, not just the role of technology, in very complex organizations in order to use this technology in some service of necessary hierarchy as opposed to just fouling it up further than it is.

McLaughlin: I want to comment on that, because we literally had that debate in this room six or eight years ago about Normandy. The other part is you have to assume the good effects of the technology: the fact that you would have had nine more divisions of troops because you wouldn't have had all those people typing the orders that were talked about earlier.

Rothrock: A good point, yes.

McLaughlin: You wouldn't have taken 10 percent of U.S. casualties in the air campaign against Germany if you had had their damage assessment.

Rothrock: Yes, we wouldn't have gone back hitting the same target and all that.

McLaughlin: So it's something that you have to be careful about.

Oettinger: I agree with you in terms of the concerns you raise, John, but I guess it's the words you used in part of it that trouble me: "the technology causes ..." and so forth. We won't have time to debate that here, but I just want to put it on record for the class.

Rothrock: The technology doesn't cause anything. It's the people's use of the technology that causes it.

Oettinger: But information technology is peculiar in that way because its main effect is to liberate and make a much wider range of options available. People are enormously uncomfortable thinking about it.

Rothrock: Exactly right, and that's my next point.

Student: Sorry, John, can I pick you up on this? I do think it's terribly important to try to get this straight. You implied earlier, and forgive me if I've got this wrong, which is why I'm asking the question, that information technology logically led to broadening and flattening.

Oettinger: That's where I disagree with him.

Rothrock: I personally believe that if you step back and you think about this technology—how it's best used—it will lead you to the conclusion that you can empower people more broadly and at lower and lower levels to make informed decisions that will give value added to an organization. On the other hand, you can use the technology to make the top of the pyramid increasingly knowledgeable about everything that is going on in the organization and put it into further focus. It's the organization's and the culture's choice. All I'm saying is that you've got to make sure as you're making that choice that you under-

stand the benefits and the vulnerabilities associated with each one of the changes.

Oettinger: Amen, amen. We're in complete agreement.

McLaughlin: For further clarification, John didn't say "logically," because what you witness in competitive environments is that flattening has been proceeding. In non-competitive environments you can get along forever with centralized hierarchies.

Rothrock: Yes.

Oettinger: But that flattening is responding to any number of demands. Nobody denies that as an empirical fact. The causes for it are the issue. The fact that it coincides with information technology, computers or anything, is no proof of causality. That's what we're arguing about.

Student: No, there are other factors at work.

Rothrock: Culture, for instance. What it amounts to is that this technology constitutes in many ways a catalyst that makes the cultural predispositions of the different organizations and societies important, both in positive and in negative ways.

Oettinger: The counterrevolution is already evident. You pointed this out earlier in conversation, because given flattenings, et cetera, and a tendency, therefore, to communicate too damn much, various folks are already taking measures to protect themselves against that, and I think one of them would be filters and increasing hierarchy. That was the whole point.

Rothrock: Yes, that's right. You can have a reaction where actually you wind up with a hierarchy within a hierarchy, and the internal hierarchy is to control this technology and its organizational implications.

The other point I wanted to make is that there's a principle that I've always advocated and I've always insisted that people who work for me pursue, and that is, simply, have machines do what they do best and have humans do only what they can do. Increasingly, I'm afraid that without a systems concept, without a geometric concept for the interplay of machines and humans, we're putting humans into a competition with machines that the humans cannot win. We are forcing humans to apply their intellect to keep up with the clerical counting and collating capabilities of these machines. You absolutely don't want to do that. You want to use machines in ways that they can develop information—now even knowledge, at least as lowly defined—thereby freeing up the human to do what only the human can do, and that is to bring a judgmental level of inference that renders understanding.

Oettinger: Machines are good at cow; people are good at bull.

Rothrock: That's exactly right. You have to understand the intersection, and it requires a system and a geometric appreciation for the relationship between the human and the machine. The thing that really complicates this is that with the pace of technology, this relationship between what machines can do in terms of level of inference and what only people can do in terms of level of inference is continually changing, and so you continually have to reassess where you stand.

I mentioned a new analysis that I think is required. The last thing I will take into account is that I think each one of the services needs to step back and think about the extent to which it's an *inductive* service as opposed to a *deductive* service in its regard for an understanding of information. I believe that the Air Force is the most inductive of all services in its regard for information. I believe that the Army is the most deductive, believe it or not, in its regard for information. The Navy is somewhere in the middle and probably all over the lot. The air guys are very inductive. I think that the surface and subsurface guys (I don't know much about the subsurface community) are less inductive and have more of a mix. Where you can tell whether a service is inductive or deductive is how seriously they take their doctrine operationally: how much of a guide to specific operational employ-

ment their doctrine is as opposed to simply an advocacy for their roles and missions.

Now, roles and missions. Everything I've said today I think has a special relevance. I don't know if you are aware of it, but there is a Roles and Missions Commission that is to be appointed, either by Friday or by next Friday, I forget if it's the eleventh or the eighteenth ...

Student: The chairman is Tom White over in the Kennedy School and one of the members is going to be Mick Trainor.*

Rothrock: Oh, really? Super. I've heard Trainor. The point is that they have a charter—and it's going to be interesting to see if they can deliver on it—to revisit all of the decisions that were made within the Department of Defense in 1946 and 1947 that evolved from and contributed to the National Security Act of 1947 and the Key West agreement that divided up the services' roles and missions. The thing that makes this really complicated right now is that the roles and missions have traditionally been divided by battle space responsibility. The Army does certain things on the ground; the Navy does things on the water and associated with water; the Air Force does things that are in the air but primarily focused on controlling circumstances on land. The Navy has its own water-associated air arm, et cetera.

The technologies of precision surveillance, advanced information technology, and precise weapons, coupled with improved conventional, non-nuclear munitions, are obviating all of these traditional distinctions that are predicated upon division of the battle space as a paradigm for dividing responsibility. For example, now, if you wanted to, there is no reason why you can't take multiple launch rocket system or equivalent rocket capabilities, put them on a ship, and make the ship a very effective anti-armor capability, et cetera. That's a tremendous challenge as to what, other than battle space, to predicate roles and missions on. Frankly, I think that if they did their job (which I don't think they will be able to) they would really severely redefine the services in their identities. But there are also a lot of reasons you can argue politically as well as culturally why that might be ruinous at this point. Institutions can only take so much change concentrated in so little time. But nonetheless, it's going to be very interesting to see how that turns out.

Oettinger: Given that we still have armored cavalry ...

Rothrock: There are several books I'd suggest that you might want to look at. Many of them you've probably seen already, but I definitely would look at I. B. Holley's *Ideas and Weapons*.* Professor Holley wrote this here at Harvard, in its original version, back in the early 1950s.

Oettinger: Professor Holley's at Duke University; he's a great guy.

Rothrock: The other is Richard Simpkin, *Race to the Swift*.** Simpkin wrote in the early and mid-1980s in a Cold War context, but still an awful lot of what he has to say about organizations' information understanding is very applicable to the kind of command and control context issues that I've talked about today.

Casting the net more broadly, and just flexing your mind so that we are thinking in nontraditional, more supple terms (supple is a word that I like to use a lot), there's George Gilder's *Microcosm*.*** He talks about the need for organizations that are founded upon principles that derive from Newtonian physics of things and mass as the ultimate objects of control, taking into account quantum theory that understands

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* Lt. Gen. Bernard E. Trainor (USMC, Ret.), Director, National Security Program, John F. Kennedy School of Government, Harvard University.

* I. B. Holley, Jr., *Ideas and Weapons*, 1983 (reprint of 1953 edition). Write for information to the Office of Air Force History, Bolling AFB, Building 5681, Washington, DC 20332.

** Richard E. Simpkin, *Race to the Swift: Thoughts on Twenty-First Century Warfare*. McLean, VA: Maxwell Macmillan Co., 1985.

*** George Gilder, *Microcosm*. New York: S&S Trade, 1990.

that it's really relationships that define what needs to be done and controlled.

Oettinger: The first two I like. I must confess, always, to having a little ambiguity about Gilder. He's a Harvard man, by the way.

Rothrock: You might not like everything he says, but he raises issues that in day-to-day, Monday through Friday office work, you don't think about.

McLaughlin: But he provides some answers that are flat out wrong and he's already recanted in two years or whatever.

Oettinger: If you use him for provoking your thought, fine. But beware of the implications.

Rothrock: I might say, don't presume what I've said here today to be at all instructive. I didn't come up here to instruct anybody. I think Gilder raises interesting issues. What I have come up here to do is to raise issues.

Oettinger: You've done an excellent job.

Rothrock: Another book, just to give you an idea of how other folks are thinking about the kind of context I've drawn here, is Howard Rheingold, who has written a book titled *Virtual Reality*.* I don't know if you've seen it. It's very interesting. The entire book focuses on how this virtual community is evolving, where you have an electronic version of day-to-day human interaction. But importantly, when you go through his index, the word "serendipity" never appears. I think this is something very important for us to think about as we presume, willy-nilly, that these computer interactions are going to suffice for all human interaction. Serendipity is enormously important in combat. I can tell you that for a fact. There are a lot of people who are alive today because someone said a lucky thing to another guy and it registered. There are a lot of guys who aren't alive today because somebody didn't pick up on something that was said or understood by someone else.

The other area where serendipity is extremely important is in the progress of scientific knowledge, where things result from circumstances that were never conceived when the activity began. I'm wondering if we aren't squeezing some of that out in these electronically determined relationships.

Oettinger: This is again misuse of the technology and I would completely agree. I would put it this way: never underestimate the value of a good book.

Rothrock: Yes. You've got to make sure that the technology does not squeeze the concept or the bull out of the society's intellectual interactions.

The other thing I'd just throw out to you is that *Forbes* had a special supplement called, I think, "Follies Along the Information Highway." It's either the last quarterly supplement or the one before that.

Oettinger: Your timing, among other things, is absolutely unbelievable, and your talk and your discussion here have been superb. I am very, very grateful to you. We do have a small token of our appreciation.

Rothrock: Okay. Well, thank you very much.

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* Howard Rheingold, *Virtual Reality: The Revolutionary Technology of Computer-Generated Artificial Worlds—and How It Promises to Transform Society*. New York: Touchstone Books (S&S Trade), 1992.

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