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## Ensuring Interoperability in Military Communications Systems: The J-6 Campaign Plan
**Douglas D. Bucholz**

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# Ensuring Interoperability in Military Communications Systems: The J-6 Campaign Plan

**Douglas D. Buchholz**

*Lt. Gen. Douglas Buchholz, USA, has been Director for Command, Control, Communications and Computer Systems (J-6) on the Joint Staff since 1996. He joined the Army in 1968, and later served in Germany and in Vietnam. His many assignments include serving as executive officer, Office of the Program Manager, M1 Tank Systems, U.S. Army Tank Automotive Command; and Commander of the 9th Signal Battalion, 9th Infantry Division. In 1986, he was named as Chief of the Communications, Interoperability, and Maneuver Division, $C^3I$ Directorate, U.S. Army Combined Arms Center. Later, as Commander, 3rd Signal Brigade, III Corps, he was the first to field a Corps-level Mobile Subscriber Equipment tactical communications system to the Army. His first assignment in the Office of the J-6 was as Military Secretary for the Military Communications-Electronics Board; in 1991, he became Deputy Director, Unified and Specified Command Support. He was named Deputy Commanding General, U.S. Army Signal Center and Fort Gordon in 1993, and in 1994 assumed command of the Signal Center and Fort Gordon, simultaneously becoming the Army Chief of Signal. His many decorations include the Defense Superior Service Medal, the Legion of Merit, the Bronze Star with oak leaf cluster, the Meritorious Service Medal with four oak leaf clusters, and the Army Commendation Medal with oak leaf cluster. LTG Buchholz holds a B.S. from the University of Oregon, and an M.S. in Procurement and Contract Management from the Florida Institute of Technology.*

**Oettinger:** I need not give you much detail about our guest, General Buchholz. You've seen his biography. Before turning it over to him, I just want to say two things. One is that he's expressed a willingness to be interruptible with questions as he goes along. The second is that we are especially pleased by his willingness to honor us with his presence today. He's the ninth in an illustrious line of folks in his job, each of whom has seen fit to come and talk with us, so we get a sense of continuity and change as seen from the vantage point of the J-6. I give you General Buchholz.

**Buchholz:** Thank you, sir. Do any of you have a clue what a J-6 does? Because if you do, I'd like to know. I'm the first Army J-6—meaning joint, that all services are eligible for it—since 1985. That's for varying reasons that have to with service balance on the Joint Staff.

My boss is the Chairman of the Joint Chiefs of Staff, and I'm basically his communications and automation officer. Where I fit in the military hierarchy is, basically, that I'm the senior communicator. That doesn't mean that I can beat up the services, but that does certainly mean that I can have a little say over what they should or should not do, probably more what they should not do. Each and every day I report to the Pentagon, which is obviously blamed for everything that goes wrong. It's an animate object. It's not inanimate. It actually breathes, and it does things wrong all the time. By the way, it was designed in one weekend, and built in 18 months—on a swamp, which probably explains a lot of things. If you're interested in that, I'll tell you about it in response to your questions.

But anyway, be that as it may, the point is that every day I work with about 130 great Americans—mostly military, some civilians—and our job in life, basically, is to ensure that systems being developed (I'm in the communications and automation business) are developed in some kind of coherent way so that never again does somebody have to use a credit card to call up artillery. I think you probably all read about that in the Grenada affair. It was simply that a ship couldn't talk to the ground, therefore they couldn't call up artillery fire. Native American cunning worked again, and a guy got his credit card, called back to Fort Bragg, which used a tactical satellite system downlink and called up the artillery very successfully. Only Americans could do these things. I apologize, but I'm very proud of our country, because I watch what we do every day, essentially. So anyway, my job is to make sure those kinds of things don't happen, but in fact they do.

There are billions and billions of dollars spent in this country, every day, in my field. Now, those billions of dollars are spent in the commercial world, not in the military world. A very significant thing that has happened now, which makes my job a little more complex (although it does solve some things, too), is that we are moving increasingly, as much as we can, to using commercial solutions to our command, control, computer and communications requirements.

The good news is that there are industries out there creating answers to my problems very rapidly. The hard part is that I have to decide which industry I want to believe. That's not to say that they're telling me things wrong, but I have to make sure that they comply with a technical architecture. That means that whatever we buy—I don't care what it looks like—will work together. That is just a tad harder than you think it is.

Then you have to remember that although we do have some purchasing power capabilities, we follow industry now. We no longer drive industry. The Defense Department in this country for many years did drive industry in many areas because of its purchasing power.

**Oettinger:** In the past, what you just described was viewed with alarm. You're saying it very matter of factly, but there were predictions that we would be going to hell in a hand basket, that nothing would work or be ruggedized, et cetera. Would you comment a little bit on this? You're calm about it. Is this resignation, or ...?

**Buchholz:** No, not at all. I'm very used to it. In fact, I was one of the early warriors in this war. There were those who said that a simple laptop would not work in a desert environment. One little grain of dust would crash your hard disk and that's that. Not so. There were others who said, "When it's 25 degrees below zero, your computer won't work," and I said, "Well, neither will I."

Many things that we have developed in this country over the years, through the type of mindsets we had, were really developed to fight in about one half of one percent of the world's surface, and that's the ultimate. So what we have done is what you call risk management. You do it in industry: that is, develop something to take care of the 80 percent, and then worry about the 20 percent on the peripheries as it occurs.

So we have adapted commercial computers. We carry them around in some big cases. We may put a Saran Wrap-type of cover over them to keep the basic dust out of them. But, to answer your question, I've now used them in tactical environments since 1983 (and think how far the computer has come since 1983), and they work quite well.

Basically, you, the taxpayers, have a choice. I can spend $70,000 for a militarized computer, or I can buy a commercial computer that does everything I need to do for $5,000. If it breaks, I virtually throw it away, but you still just got a good deal. So that's what we do. We try not to break it, though, because you still have to get resupplied, so to speak. Our experience is quite good. Yes, they do break, but we have enough. Part of the sustainability of commercial things is that you put a lot of stuff out there because it doesn't cost much. Everybody has one. As things start going down, there are the haves and have-nots even in the military, and so you go and rip off the loggie. If you're the operations officer, your stuff's always going to work and the logistics guy will do without. But you have a lot of backups simply by the sheer mass of things, such as computers.

We have adapted to that quite well. What we're not adapting to is the ability to get it out there quickly. When you recognize the technology, you're still caught in the Iron Age (excuse me, I have some passionate moments), or the Industrial Age way of buying things. We are still buying tanks and developing them from scratch, and I'm saying, "No. No. There it is right there. Go buy 10,000 of them." But I'll take that on at a separate time.

The point is that the commercial world is answering many of my needs very satisfactorily. You don't read much about it, but it's saved phenomenal amounts of taxpayer money, and given us tremendous payback just in efficiency and productivity.

Do not ever be lulled, as you go out into the world. Don't think that automation *saves* people. It actually *takes* more people. I don't know if you read it anywhere or not, but many times, in the early days, we said we have to go buy all these things because it's going to save people, and, actually, it took people away. Then we soon learned we had to put them back, and it's another battle. It's a very popular idea. You tell your boss that so he'll allow you to buy technology. Then, if your boss is very smart, he'll check if you ever let somebody go because of it. But your productivity, because of automation and effective communications, is multiplied many times, and that's a fact.

My point, though, is that my job is to make sure that all these different things work. Now, I don't serve the armed services directly. I work for the commanders in chief, CINCs. There are nine of those around the world, and they are joint commanders, which means that they command forces of all services. Schwarzkopf, remember him? You all watched CNN, I hope, back during the Gulf War. Schwarzkopf was a CINC, and he moved forward from Tampa to Riyadh, and that's basically where he ran the war. Of course, he had the support of the commanders of all the services.

So, my customers, whom I need to satisfy every day and basically keep from irately calling the Chairman of the Joint Chiefs, are the CINCs. So I obviously travel and go to see them. I have to understand their command and control needs, and their communications needs. That's kind of my main job in life.

What's hard about it is that the number of acronyms that describe all these different systems across all the services is beyond any intelligent person's ability to remember. So you mumble a lot. It's very, very difficult, but I say, "Tell me more about it," and then I can remember what their acronym means and what their system is. There's a tremendous amount of similarity among them. I don't care what the system is. I care that they work together. That's really my major effectiveness. I was the deputy J-6 for two years, 1991 to 1993, so coming back as the J-6, it's been a lot easier because I have a lot of training. At least the acronyms haven't changed too much.

So my job is to serve the Chairman and to ensure that the commanders in chief around the world have the communications and automation systems so they can do their intelligence work; so they can do their logistics work; so they can fight America's battles wherever we're told to go do something. "Fight" isn't always a violent term. "Fight" means steaming with a carrier battle group, and parking it 12 miles and one foot off somebody's land. That's called projecting power. You cannot deny that there is a threat when there is an aircraft carrier and its associated ships parked just outside your 12-mile limit. That is American power. We do these things when told to do so.

We have, at any one time, over 70,000 soldiers, sailors, airmen, and marines deployed somewhere in this world doing stuff. Don't think these guys all have face grease on and they're sneaking around in black Ninja outfits. Many of them are down in South American countries building schools, or running medical facilities for folks. It's basically going down and showing that Americans are good folks, too. Your Special Forces, which you don't hear much about, are out doing a tremendous number of good things, what you consider peaceful things, versus teaching somebody to be violent. I'm not going tell you that those soldiers, sailors, airmen, and marines are out there to be Peace Corps people. They're not. They're out there to extend American presence, and they're out there to do whatever the country says they want us to do.

I'm couching that very carefully for those of you who have watched the evolution of this. Have any of you read anything about the Vietnam War, other than what was public? Have you any sense of what our country did during that period of time? When I say "what the American people want us to do," if you watched during the Gulf War, you know about Colin Powell and his counsel not to commit these forces without a reassuring and overwhelming support of the American people. Colin Powell, myself, and a bunch of others—Barry McCaffrey, the new drug czar—all of us came up in about the same era, and we learned one thing from Vietnam. We are all graduates of that place. That is: Never again commit your forces without the American people behind you. They need to be there. And so, what you now have is much smaller forces out doing what is perceived to be the American public's desire.

I want to bring you back to the digital world where I live, but you have to kind of understand the military mindset, the milieu that I work in every day. The American military today is extremely high optempoed. In other words, they are very, very busy. The force is 40 percent smaller than it used be, and our overseas deployments are seven, eight, or nine times, depending on how you want to assess these things, higher than they used to be, so the average soldier is now spending 140 to 160 days a year away from home. The average soldier is married. (I'm using "soldier" as a generic term; I'm a little predisposed toward the Army, but I'm representing all services here.) Sixty-five percent of our soldiers, sailors, airmen, and marines are married. So it's a different breed today. This volunteer thing that we have has turned into a really good deal, but it has certain drag-alongs, and one is that they're normal Americans. They have normal desires like everybody else.

We certainly don't overpay them. We have not ever attempted to overpay one soldier sailor, airman, or marine. The Chairman of the Joint Chiefs makes a little over $110,000 dollars a year, so I don't think we're overpaying the very top military man around. Many of you will be making that within a few years of leaving here. But this is a very dedicated military that feels very good about what it does.

We have a relatively well modernized military. I say that to you because that's slipping. In the world I'm in, my battle now, today, is to keep the modernization going in the information business so that whatever force we have, wherever we deploy it, will then be able to use its tools and be able to do rapid decision making, and, in fact, be ahead of CNN News. Isn't that a hell of a challenge?

A quick vignette. During the Gulf War, I was on the *Eisenhower*, which is an aircraft carrier. We were all affixed to CNN, watching the missiles come in, watching the Iraqis fill the air with lead trying to hit an Air Force jet that wasn't there, and so on. I asked, as we were visiting on the *Eisenhower*, "Where is your CNN News?" I wanted to see what the score was. "We don't have that." Have you ever seen an aircraft carrier? You cannot believe it's as big as it is. There are antennas all over, and there's this huge area that jets take off and land on and everything. I said, "Why don't you have CNN News?" They said, "Because we don't have the space for an antenna." But when you look around, you realize they have unique problems on aircraft carriers. The boat turns and you have to keep your antennas locked on to a particular satellite. The good news is, folks, is that they all have CNN now. We learned one thing, and that is that you'd better know what's going on in the news as you fight your war. We've become attuned to that, too.

The point is that we have a new digital world. My job, my passion, for the next 19 months until I retire, will be to ensure that we can plug in and get whatever information we want from wherever we want.

I'm not an intelligence person, but I will carry you along with this. "C$^4$ISR" simply means command, control, communications, computers—that's "C$^4$"; "I" is intelligence; "SR" is surveillance and reconnaissance. Just think of big eyes looking at things and moving the information around. America is still quite well served in the intelligence and the reconnaissance and the surveillance. It has used technology extremely well there.

The communications part, which I am arguing now, is kind of like some of you may have read: "It's the network, stupid." The decision makers in the military fixate on end items: computers and things that they can see. That's only recent, remember. These guys didn't trust computers for a long time. Only in the last five or six or seven years have they learned to trust their command and control systems to a computer. But they fixate on the computer. I'm the networks guy. I'm the guy who comes out the back end of the computer, which is a little harder to explain to somebody. It's a little harder to get the resources for all the pieces that create networks and get people get excited about them.

**Oettinger:** I have a question. You happen to be in office at a time when both the Vice President of the United States and the Speaker of the House are techie nerds or (the Vice President particularly) network freaks, yet it sounds as if that example has had zero rub-off on the military folks you're talking about.

**Buchholz:** That's true, but you have to put it in the context that the decision makers are all warfighters, not techies like me. I have hit the high point. I cannot have any more stars. There's no future higher job than mine. So I understand this role, and how to employ it, relatively well. The people who make decisions in the services, or in the Joint Staff, are all warfighters. They have flown jets, sailed, fought tank battles, and so they look 30 or 35 years behind them. The Al Gores, the Newt Gingriches, and, maybe a little bit, the Doug Buchholzes, know about information and the power it brings to bear. Just watch what we do in America with information every day.

Think of it this way. If I say the word "tank," you all have some mental picture of something that has a barrel at the end. If you've seen what an M1 tank looks like, you know it has flat sides, not rounded sides. Anyway, you've all seen pictures of tanks. Click. You know and understand it. If I say to you "network," what's a network? You get five words. Give me five words to describe a network.

**Student:** An infrastructure connecting ...

**Buchholz:** ... wires. Yes. Some switch that's got blinking lights on it. Puke, right? I haven't excited anybody there. Now, you're a warfighter—you're a guy who's grown up, got four stars here, four stars there. This man has been through hell several times and understands this very well, and knows that a tank is pretty important. I have been in combat. I have been shot at. I know what it sounds like to have bullets going past my head, and I will tell you that metal things feel better in combat than networks. Are you with me? So, sales are a little harder in my game, and that is what I'm saying to you. But, be that as it may, no matter how much they beat me down, I just pop back up like that little thing we all had when we were little, which you punch and it comes back up. Why? Because you can't deny me.

Everything you read in trade magazines, on airplanes, someplace, is about what information does. Everything tells you that if you think that's fast today, it's going to be twice that tomorrow, or 20 times that tomorrow. Every day you pick up the paper and you see where somebody's made another breakthrough on mass storage. That's just it. Between one of my closest allies here and me, we own the world when it comes to microns. It's amazing, and we've just started! See, I can get passionate about this. Believe me, guys, this is not a techie down here. I'm an anomaly. But I understand how this stuff is employed, and I've been able to get it to work quite well in my career.

My job, now, you see, is to capture these people, the warlords, and get them to understand the value of all this. Understand, five years from now this won't be a fight. You don't need Doug Buchholz five years from now. You need me now, because, you see, if I win today, five years from now you start getting those types of networks I'm describing. It takes a lot to do all this.

**Student:** A few moments ago, you mentioned that the U.S. technological edge was sort of slipping. I can see that when you compare the U.S. military communications technology to commercial communications technology, there definitely is a trend toward more advanced technology in the commercial sector. But compared to other foreign militaries—when you pit, for example, the U.S. military against some other foreign military—would you say that there are any foreign militaries in the world that are embracing this sort of technological revolution as much as the U.S. military?

**Buchholz:** Not as much as we are, which gets at the crux of an argument that's used against more money for military every day. That is, "Where's your threat, bubba?" During lunch here, some of us were discussing that it was much easier when we had a Soviet threat, with the bear and the hammer and sickle and the red flag and all that. It was much easier then for Americans to understand that there was a place where freedom ends and communism begins. There was the Berlin Wall. I used to take my soldiers and make them go along the Wall, take one of the bus tours, so they could see it. I could tell you stories about the Wall that would just astound you.

But it was easy to see. Threats today are all over the place. For instance, there's a Twinky-eater living in Frankfurt who really dislikes the U.S. military, and he attacks us. How does he do it? He never leaves his apartment.

**Student:** Via the network. *The Cuckoo's Egg*[1] is a book about ...

**Buchholz:** That little son of a gun attacked us three weeks ago. Now, the Twinky-eater in Frankfurt (this is my story, my vignette) is a student at York University who set off his virus with a hand-held phone using the university as a host. I called Bill Robins,[2] my counterpart in the United Kingdom, and said, "Bill, we'll crush that guy." He was attacking our Air Force bases. Now, it was a very unsophisticated attack. We detected it and stopped it very quickly, but we knew where it was coming from. Bill said, "Doug, this bastard's been doing this to me for a month. I haven't caught him yet." Scotland Yard and everything was looking for him. He's a student, one of you guys.

So, back to my point. What's the threat to my world? It doesn't have to be another country. In fact, we take it very, very seriously. Stop and think. Those who started the Iraqi war said: "Hmmm. Look at this. These guys, in six months' time, moved a phenomenal amount of steel and machinery over; moved all these aircraft over; refueled them day after day; surged up to 3,000 sorties on some days. Look at the power generation they did. What was the common thing that made it work?" Come on, guys, you know. You're in the position to make decisions. It was information.

What did we do to the Iraqis as soon as we struck them?

**Student:** Take out their army's computers.

**Buchholz:** We blinded them. We knew what they were doing. The Iraqis had a tremendous amount of fiber optics in their country. We knew where it ran. Where do you think some of the first bombs went? Where do you think our Special Forces struck?

So, we blinded them, and we had our information working for us. Now, if you were a guy who really had it in for the United States (it doesn't have to be a country; this doesn't have to be country sponsored), what would you use to ruin our day and never leave your apartment in Frankfurt, as an example? You know: networks.

Now, stop and think. I'm the bubba who has to make sure that the Chairman of the Joint Chiefs of Staff and all the CINCs can communicate worldwide. I'm not talking about picking up a phone; I'm talking about digitally. CINCs have big staffs, so

[1] Clifford Stoll, *The Cuckoo's Egg: Inside the World of Computer Espionage*. New York: Doubleday, 1989.

[2] Major General W. J. P. (Bill) Robins, British Army, currently serving as Assistant Chief of Defense Staff for $C^4I$ Systems.

this isn't about nine men. This is about staffs who have very specific functionality, and they have to be able to exchange information: order parts, something as mundane as that; order people, replacements; get people fixed, as in hospitals. They have to conduct business every day. There are hackers out there. There are people out there who really want to have fun with that and they, in fact, bang on us every day. A lot of this is done, folks, on something that's equivalent of the Internet.

**Oettinger:** This may sound trivial, but his question had to do with the military itself. Now, it seems to me worth underscoring, if I heard you correctly, that because, as you said earlier, the U.S. military gets some of their stuff from the commercial sector ...

**Buchholz:** They get a lot of it.

**Oettinger:** ... that's also available to all these guys he's describing. So the very fact that the commercial sector is up there means that the kinds of people he's talking about have access to much the same technology as the military. Is that a reasonable summary of what you implied?

**Buchholz:** That's true. Let me answer you very directly. The British and the French are the next two relatively advanced militaries when it comes to information, although on a very limited scale because their budgets are much smaller. Those are probably the two that come the closest.

I guess what I'm saying to you is that it is a natural inclination of the American public to say: "But why do you need all this if you don't have a peer?" I say, "A peer comes in many shapes, and it's more than one." Then I go from there. It works with Congress simply because they go, "Okay, I hadn't thought about that."

What really worries me more than nation states is that there are terrorists out there who don't blow up bombs; they simply feed you viruses. They're smart enough to recognize that feeding a virus to a computer is one thing. They can only laugh about what things are probably happening as your files get scrambled before your eyes. It's when they put the virus in your switches and your routers that it becomes devastating.

We're not dumb. We have techniques for stopping this. But you can't stop everything everywhere.

**Student:** Are you willing to follow this up for just a minute beyond what I understand is your immediate focus, the use of these technologies within the military structure itself? I'm aware, as most of us must be, that there's an increasing concern about so-called electronic warfare, not necessarily as a military-to-military action involving nation states, but increasingly as non-national actors attacking other networks that a nation relies on. In other words, they're not attacking the military structure directly, but attacking networks that support aviation, financial institutions, telecommunications, things of this sort. So I would think that beyond the already complex problem that you've outlined is a further problem of how a national security force protects information in this way.

**Buchholz:** I work it all the time. It is fascinating. Why do you fight the United States? You fight the United States to make the country hurt, to make it hurt economically, whatever. How can you make the United States hurt more? Just by going in and messing with the FAA; by going into the power stations that are turned on and off and adjusted by computers. If you really want to take on the United States, what incentive is there to take on its armed forces? We are still the best military force in the world. There's just no doubt about it. Why take on that force directly? There's every incentive not to.

Does anyone know who Sun Tzu was?

**Student:** Sure.

**Buchholz:** I would say, no matter what you do, read Sun Tzu, because there are truisms in there that can apply today.[3] It's

[3] Sun Tzu, *The Art of War*. New York: Delacorte Press, 1983.

the same thing if you've ever been in martial arts: you never take on the power of your opponent, you take on the weakness. This is exactly where those who study us—who study, for example, the Iraqi War—will take us on: in our weakness. Our weakness is information, and our desire, our need, our total dependence upon it. I'm using "us" in a general sense.

And so, we will have challenges. We will have events that will really make information warfare have an impact on this country. So far, those events have been quite insignificant, but when they finally do crack Chase Manhattan, and we get up in the morning and recognize that all of the money is missing, or when we can't figure out what happened yesterday because all stock transactions on the New York Stock Exchange are gone, that will be an attention getter.

You probably suspect this, but people attempt to crack our banks every day. Do you believe that? You should. It's a truism. Do you think that they've been successful?

**Student:** Yes.

**Buchholz:** Somebody's been reading! Do you think the banks want to admit this?

**Student:** No:

**Buchholz:** Why?

**Student:** Customer perception.

**Buchholz:** You're damn right. What keeps money in the bank?

**Student:** Trust.

**Buchholz:** Who's taken a finance course? How much money that you put in the bank is actually kept there? Very little, right? Ten, 15 percent. Why is that? Because people have trust that when it comes time, they will be able to withdraw their money, right? Now, if you think your bank is about to be raided, or has been, or the rumor is out, what do you think happens? You're going to go down to the bank and withdraw your money. And then at about the 300th person, guess what?

**Student:** There's no money.

**Buchholz:** There you go. You're out of money. So, this is going on, folks. In fact, it's strange that you mention it. I have to go over and testify before Congress on the 20th [of March] on information superiority/information warfare. I don't know how I can testify. That's hours and hours and hours of talking. I say one thing; you perceive another. That happens in Congress, too, and I end up eating it.

Information warfare is a real thing. It's against our country; it's against our confidence. I deal with this every day, and I told you we are in the commercial world very big time. Ninety percent of the information we send throughout the Department of Defense is on commercial systems.

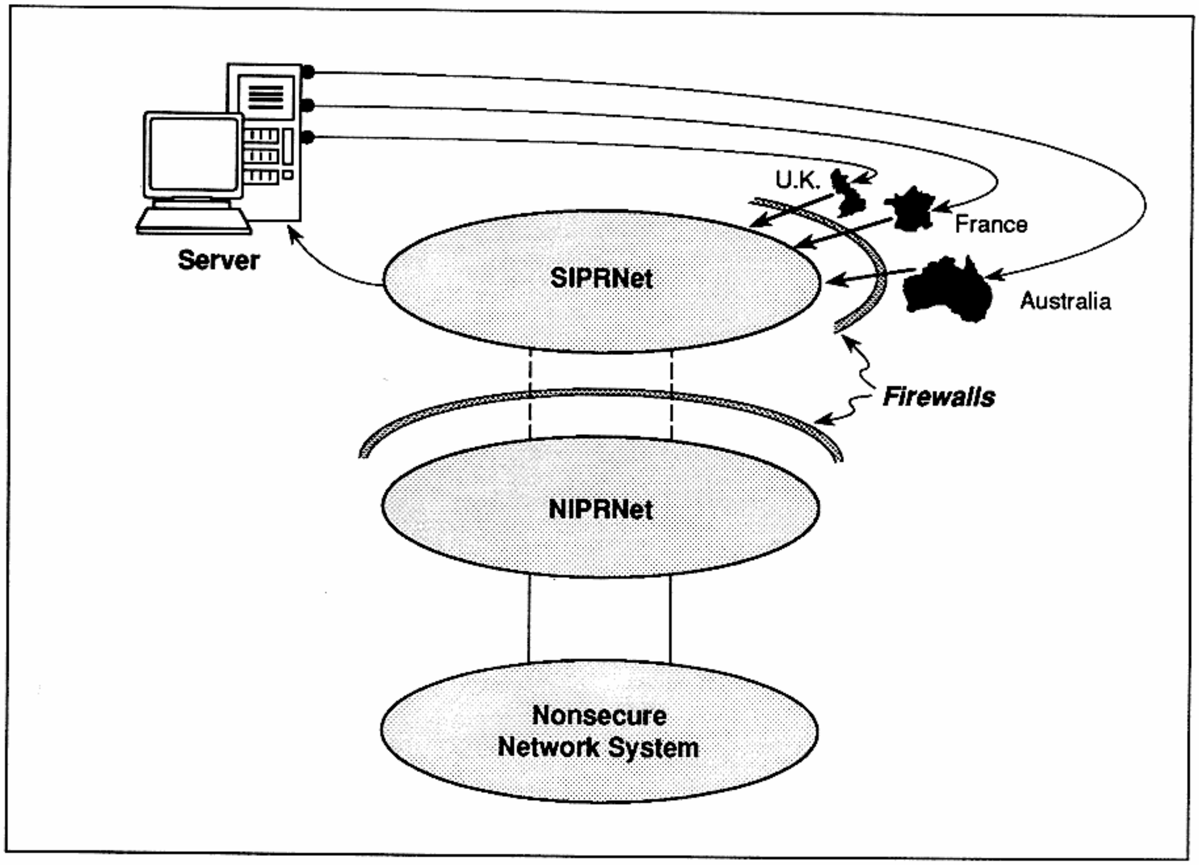
**Oettinger:** Let me interject something here, because your talking about Chase brings back memories. Lest there be any confusion, this is about more than networks and electronics and so on. The problem of bank security has many, many facets, and no chain is stronger than its weakest link. What I'm leading up to is an example back from the early days of automation at Chase, which I participated in as a consultant. The management at the time was worrying about the access to its computer room and installed magnificent double locks, interlock things, so if you could get inside the first door you got gassed before you got through the second door. You'll get a sense of the vintage of this in a moment. I remember we were saying, "Well, is this good enough, and what's the point anyway?" This was an era in which all of the day's punched cards were put outside in trash cans for the garbage man to collect. Is that good security? No. So it's more than networks.

**Buchholz:** Sir, I used to program, and when I dropped that tray of cards, I could never get them back in the right order, so I wasn't a bit worried about putting them outside. No one was ever going to sort them right anyway.

**Student:** Could I take you back to the international realm? We were talking about the fact that even our closest allies aren't really keeping up with the work we're doing to integrate these networks into our military forces. I just came from the international $C^4$ world, and we've had a lot of frank and open discussions with the British and French and Germans. They're deathly afraid that they're not going to be able to trade necessary information with us. I can understand that it's sort of a tough balance. You don't want to hold yourself back because they don't want to devote that R&D money, but on the other hand, if you can't talk to them it makes the battlefield a more dangerous place for our soldiers. Where do you see that going in the long term?

**Buchholz:** I can tell you how I'm solving that—not to their satisfaction. We've been meandering around, but I'll eventually get through all this here. I'm in no hurry about it. I'm going to be unstructured. I'm basically a student at heart.

I've been talking about hacking, and that's on the nonsecure system. I'm just going to use a simple topology here (figure 1). At the bottom is the nonsecure system; you could say Internet. Then I have a nonclassified net that's called NIPRNet, and that's the military equivalent of the Internet. Then our allies have connections. I've put security systems in here, so if they want to come in, that makes it a little harder. What the gentleman was talking about is something up here that's called SIPRNet. All you need to know is that "S" stands for Secret; a classified net. So, classified information, Secret, is exchanged in here.



SIPR = Secret Internet Protocol Router Network
NIPR = Non-classified Internet Protocol Router Network

**Figure 1**

**Information Sharing with Allies**

Now, you see I didn't put anything between them. I am about to do that. The Chairman of the Joint Chiefs is frowning at that, but I feel confident enough that I know what I'm doing, and the technology is giving me what I want to be able to control the configurations of these things I put out there. So I'm about to do this, in a limited way. Why? Because sharing information worldwide is what it's all about, but not letting a guy into your secrets. If you get into the SIPRNet, that is the equivalent of getting the keys to the palace.

This gentleman was talking about the allies; in this case here, we'll just say the Brits, because they're banging on me all the time about this, and the French, who have decided to join NATO again. (They always were in NATO. Did you know that? All NATO documents have that "NATO" on them. All French documents have this "OTAN" on them. I have a French mother-in-law. I understand this. That's NATO spelled backwards, folks. That meant, simply, that we share this with the French. They were always in NATO, kind of. We always thought that if we really fought that big war, they *probably* would be there. We always thought their nuclear forces most likely would get excited if they thought the Russians were going to make it to France, and they would bring the nuclear forces to bear. That's another era, but you young folks don't have to worry about nukes being targeted on you, although they can retarget in 30 seconds. Think about that. They may not be targeted today, but they can be retargeted in 30 seconds.)

Back to this. The Brits and the French, for example, and the Aussies (I'd like to start right now with the Aussies) want to get into the SIPRNet. They say, "We are allies," and I say, "We love you dearly, but I will not allow you to be in there." If you've read history: allies today, enemies tomorrow, or at least they don't agree with you. There's no country that has a classified network that's going to allow another country to participate in it. Is that true in Japan?

**Student:** Actually, we don't have such networks yet.

**Buchholz:** Let me ask you this. You have your secrets. You don't let an American come in and read your secrets.

**Student:** No way!

**Buchholz:** Okay, but that's called national. You take care of your nation. That's what it's all about. The military is but one way of doing that.

So, what I'm saying to answer your question is that these things are firewalls (figure 1), and that's the technology that I intend to put in here. There are varying types of them.

So, what we're doing to satisfy them, using the example of the Brits (Bill Robins is their J-6) is that I'm going to put a server out here. We're going to pump out to them what they need to have—not what they want to have—and then allow them to pull from this server, so that they have the common operational picture but not necessarily everything. We have an opinion as to what we want to remain on this side of the firewall, and it will stay there. So I have not given them the keys to the palace. That's quite simplistic, but that's basically what we're doing.

**Student:** Can you do that in the State Department?

**Buchholz:** I didn't know they had any communications.

**Student:** They have some pretty large computers and databases.

**Buchholz:** I've not dealt with them, other than that I used to do counterdrug work in South America, and I basically used to provide their communications facilities.

**Student:** If State's Bureau of Intelligence and Research called you up and said, "We'd like your database on a radical group in Bolivia" ...?

**Buchholz:** The State Department has total access to that.

**Student:** Does it have access by keyboarding?

**Buchholz:** Yes, it sure does. It's called ADNET, Antidrug Network. We do that, especially in South and Central America, simply so the ambassadors and the states and, of course, any other operatives we might have down there can access it. In fact, we build them extremely good target packages. "Target package" sounds like a guy in black out shooting people. It's not. A target package is a picture of somebody loading cocaine onto a Piper Cub. We get you a picture. We know what he looks like. There he is loading it on there, with his Piper Cub tail number. We take pictures of it taking off with a digital camera. We beam that to somebody. An F-16 follows him as he's coming up towards America, and if he lands in Mexico, we tell the Mexicans, "He's landing there," and the Mexicans say, "Mañana"—over and over and over. Your State guys have total access to a thing that looks like "Hollywood Squares." It's got all these different little software systems they pull down, and they build these target packages. It's shared with State. Why? Because the State guys go and talk with the Mexican government when they say "Mañana."

**Student:** And you want their data, too.

**Buchholz:** Yes. My experience at State has been that I provide them services because, in my opinion, they have terrible communications and automation. It's in three pieces and it's not done well. I've helped them in the past, simply because they didn't have it, and they have a mission.

Anyway, does that answer the question on what we're doing? The point there being that technology is running fast. Let me give you more good news, though. The joint technical architecture has 63 descriptors. Sixty of them are commercial descriptors, so we're not going to create any military-unique things now, except for three. If our allies want to do what they say, and they stick with the same international standards I have, then at least you have interface.

**Student:** Could I just follow up for a second? Are they willing to meet those international standards? I know the Germans I've talked to are really uncomfortable about having commercial standards in their military systems.

**Buchholz:** Understand, the Germans have the East Germans in their army now. They're adapting, folks. This is a whole different army. The German army used to be (not as much as the Russian army) highly held in its people's eyes. The Russian soldier today is "the cause of all our problems of the last 70 years" and is despised. The German officer used to be something like a local mayor, and today is considered just a problem. That's how much things have flip-flopped. I don't even use the German army as a benchmark any more. I feel sorry for them.

**Student:** I've heard, and it's only rumor, that NSA has encryption algorithms and authentication systems and things that would be of importance to networks that are 10 to 15 years ahead of what's available commercially. If that is indeed the case, and the U.S. military is relying 90 percent on commercial solutions, isn't there a sort of lost potential? You have cheap commercial goods and you have good encryption authentication from the NSA, but by law or for policy reasons, I suppose, they're not talking to each other, so the net result is that the communications systems are less secure than they could be. Do you think that that's a reasonable assertion?

**Buchholz:** It's not the case at all. That's very simplistic, folks. There's LAN after LAN after LAN and WAN after WAN after WAN out there; there are thousands of them. The thing that keeps the NSA devices, security, from being employed on all these things is dollars.

NSA has created something called Fortezza, and it allows you to put encryption right on your computer. It's a card. It not only gives you encryption, it also gives you authentication that a particular person sent it for sure, so you can sign things.

This is much like what the banks do. I can't go into the classified aspect.

The difference between commercial encryption and NSA encryption is huge. Commercial encryption, as you know, is being exported. You obviously can't afford to have NSA encryption exported.

**Oettinger:** If you want more detail on this, Jim Hearn and several of the NSA communications security chiefs (Harold Daniels, Ray Tate) have been to the seminar before your time, and there are more details from past seminars on that question.[4] But the essence of it, as General Buchholz points out, is that in the private sector, the question of who is going to pay for what in relation to what threat is an element, a battle, going back 20 years. Just last August (1996), the President signed Executive Order 13010, creating a commission that is meant to look at this set of issues. So you opened up a very large set of questions here, which would take us far beyond today's presentation. It's a good set of questions, so talk to me some more if you want to pursue those.

**Buchholz:** I'm the DOD guy, and I'm into all this automation and communications and all that. Let me give you some think pieces. The Department of Defense (I'm now referring to my area, nothing else) is a lot like industry, but it's harder. Industry is market driven. We're driven by many other external forces. So let me develop that for you a little bit. These are generalities, I understand, but I'm giving them so that you see the difference and why things are as hard as they are.

Industries have every reason to create stovepipe systems. Can anybody explain that to me? Do you know what a stovepipe system is, unto itself? Why would industry have every reason to do that?

**Student:** It's more efficient to have multiple players creating overhead.

**Buchholz:** Let's go to a higher level. The higher level is that you share as much information as you need to be economically successful, nothing more. Do you agree with that? That's a theory of mine. You share more when it's economically to your benefit. Industry survives by having a niche. Do you agree?

It's just the opposite in the military. We need to share information because we are combined arms teams. We're teams across services. We're teams across infantry, artillery, armor, signals, military intelligence, engineers. All these different types of guys form large teams to do things like Desert Storms. And so, sharing information, teamwork, are paramount in the military.

I tell you that because, obviously, most of my friends have retired now. When they call and say, "Doug, when are you going to hang it up?" I say, "Well, pretty quick, pretty quick." And they say, "Remember one thing. When you retire, you've always been a team player in the military. You always share information." I'm always training my people. I'm always telling the folks in my office what I'm doing so they can anticipate me. If I'm on travel, I empower them to make decisions. Why? Because I share. I talk to them all the time.

When I go into industry, just the opposite should occur. I need to become the most important guy in this niche area and not share information. You guys are going to be out there. That's so obvious it's almost silly. But that's the way industry is. When you have your niche and you are successful, you share as much information as you need in order to remain successful

[4] James J. Hearn, "Information Systems Security," in *Seminar on Intelligence, Command and Control, Guest Presentations, Spring 1992.* Cambridge, MA: Program on Information Resources Policy, Harvard University, February 1993; 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.* Cambridge, MA: Program on Information Resources Policy, Harvard University, February 1987; Raymond Tate, "Worldwide C$^3$I and Telecommunications," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1980.* Cambridge, MA: Program on Information Resources Policy, Harvard University, December 1980.

and stay ahead of your competition, certainly no more. Stovepipe content stays vertical. You'll have a certain amount of horizontal roots to go out to your suppliers, but never enough that your suppliers now can overtake you. How many of you have known of people who worked in industry, and once they got the knack of it, left and set up the competition? You've certainly read cases about that. So you only share as much information as necessary.

When I get in my world, I have to share information, but not allow it to get away from me. I have to share information and make sure that when one of you guys gets really itchy fingers, you can't come in and steal it from me. I have to share information, yet keep somebody from disrupting it.

Back to information warfare. Information warfare has two parts: attack and defend. We have laws to keep us from doing attack. You wouldn't believe what we can't do. When you're in England, bombing me with a virus, I have the capability to make your life miserable, too. I can't do it. The United States has so much law! Is this a bunch of lawyers here?

**Oettinger:** Go back to what you heard from Heymann, though, about the rigidities and responsibilities.[5]

**Buchholz:** So, the point is that I am trying to share information with as many places as possible. Now, there are several intelligence officers (I didn't say *intelligent* officers, I said *intelligence* officers) .... Do you know what the major effectiveness of an intelligence officer is? To gather as much information and share it with as many people as often as he can. To a networks guy, he is an absolute chaos coming at me.

During the Gulf War, we sent out from the Pentagon, every 12 hours, a 100-page intelligence summary. I kept wondering what was wrong with our old messaging system, and we've since changed that. What's wrong with it? A hundred pages of text takes a while to go through. Do you think anybody was reading it in Saudi Arabia? Twelve hours later, you sent it out again. So, after a while, I was getting all these complaints about messages being backed up. "Buchholz, what the hell is wrong?" I said, "Give me those things." I laid one next to the other, and I compared them. How much new information do you think was in "B" versus "A"? They were pretty close.

The intelligence officers just send as much information from as many sources to as many people as often as possible. They are gluttonous. That's their measure of effectiveness, so I can't blame them, but I'm the networks guy. So I've got a problem, right?

Our job is harder because we want to be horizontal. I've told you that talking across varying services and systems—some legacy, some new, and so on—that's hard stuff, guys! Then you compound that by the fact that if I'm told that industry says it's available today, I'm asking whether I buy "A" or I buy "B."

How many folks here know what Betamax is? Two. I bet you even bought one! So I'm confounded with at least a VHS versus Betamax. (By the way, folks, Betamax had much better quality, so I would have bet on Betamax, hands down.) But I was a little smarter than he was. I sat back and watched, and guess what I have in my home? VHS! Then when it breaks, $123 later, I get another one. It's very simple. But it does not have the clarity of Betamax.

So, I'm confounded every day with these decisions. Is it "A," "B," or "C"? Then, folks, the contractors come in and tell you, "Some, but not all." That is a demon that I'm faced with every day, because well-meaning people, who are called marketeers (this is industry), represent their products as they think they will be—not *are*, but *will be*. You see, they've strolled through the research and development department at the company, and have talked to some guys on the benches, and a guy said, "Yes. It's coming along." "Coming along" to an R&D guy means some time in the next five years. Meanwhile, the marketeers are out there, with their glossy sales talk, and then R&D gets stuck with it, and therefore it's not there.

[5] See Professor Heymann's presentation earlier in this volume.

In Bosnia today, we're trying to back out. I think you might have read that Secretary Cohen says, "Yes, there is a date, and we're leaving." How do you back out of Bosnia? You must put a communication infrastructure in place. Do you think there was any communication infrastructure in Bosnia when we got there? You know there wasn't. Do you think there were any build–ings in place? You saw the devastation over there.

So to back out of Bosnia we must get an information infrastructure into place, and this is called commercial. Guess what? The contractors have done it to me again. "We can do that. We got it. When do you need it?" And then they start saying, "You know, the power wasn't what we thought it was going to be. We're going to have to add some filtration systems, and we need some power generation systems, and these can't be more than another $3 million or $4 million dollars." This is your money we're talking about. So here we are, trying to get out of there and this happens every time.

But what choice do I have? My country says, "You have to have your butt out of there." In order to get out of there, if NATO is to stay at all, I must put an information infrastructure in place. As time goes by, if the contractor waits until way down the pike, until I've got no choice, before he says, "I'm sorry, but I've got to put a few filtration systems in there. The power fluctuates. I have to create some power generation," and all these humma, humma, hummas, can I call AT&T at that point? Not without selling the Pentagon, which might be a good idea. I'm not selling the Pentagon at a fire sale.

I deal with these kinds of things every day. So, all I'm trying to say to you is that in the DOD, in spite of what you read, we try very hard, and there's a whole bunch of crap that's done to you. You've all seen the bumper sticker. It happens to you, and so you have to deal with it.

On top of that, we have these archaic laws. I have a master's degree, and I wrote my thesis on the socio-economic effects of government contracting. Seriously. What a stupid thesis to write! When I was a lieutenant, I always wanted to know why a jeep carburetor (you don't know what a carburetor is, you're too young) costs $700. If I knew that, I figured I'd get out of the Army right away and build carburetors. If I could build a $30 thing and sell it for $700, that's a good business. But when you start looking at the system that we have to use in your government to buy things because of the socio-economic laws in your country, and then you put that into the Information Age where everything is turned over very, very rapidly (it could be 6 months, 12 months, 18 months, 24 months), then you can see my problem. How do I keep up to date?

I don't need to stay totally up to date. But I've got to make darn sure that what our allies are complaining about doesn't happen to me. What happens when we go into the next Bosnia? This young man has seen the light. He's in the Army and he's bought a flip phone—excuse me, *Mom* bought him a flip phone. You've got it, and you're out there in this lonely outpost, in this God-awful place, probably scared to death, and you can call Mom long distance because Iridium now has 64 satellites circling the earth in low-earth orbits, all over the place. They're not big bandwidth; it's the little bandwidth that gives you a nice call home for $3 a minute, anywhere in the world. Meanwhile, your commander can't call his next fire support up. It's my fault.

If I'm not moving along, commercial industry is going to make me and my commander look pretty stupid. Then you're back to you calling artillery with a flip phone, through your mom, who's saying, "Send them a little to the left, a little to the right," you know, because the commander can't use the artillery system that we've bought, at your expense, to call artillery. That can happen very easily. So I have to keep up with industry to some extent.

**Oettinger:** By the way, this procurement question is really a very, very serious one. For more detail, read Quinn's account from 1994.[6] He was the one of the procurement

[6] Thomas P. Quinn, "Acquiring $C^3$ Systems for the Department of Defense: Process and Problems," in *Seminar on Intelligence, Command and Control, Guest Presentations, Spring 1994.* Cambridge,

wallahs, and will give you more detail about what General Buchholz is talking about, and how it came into place, and why it is such a drag. For those of you who end up being businessmen, military, Congressmen, it's something that needs looking at really badly. Maybe if you could learn some of the details, it would be well worthwhile. It's boring as hell, but so important.

**Buchholz:** I'll bring you right down to how to fix it, but I have the instrument, and I think you'll buy into it. The answer is: You must empower people to make the damn decisions. Your government does not do that.

**Student:** In fact, I would say from my area of focus that the trend is actually going the other way. I've spent some time researching the World Trade Organization, and amazingly, procurement is one of the easiest topics. It's now being included within the WTO, and the idea is opening up procurement (talking about socio-economic, and, in this case, political-social effects) to international bidders. There's a certain amount of standardization that's occurring and, I would say, what amounts to guaranteed access for international firms and other international interests to the U.S. procurement process and others.

**Buchholz:** As we downsize the military more and more, they're talking about just turning our contracting over to civilians. Now, I love civilians. My mom and dad were civilians. But what is the guarantee that they are going to be contractor neutral? There are extreme consequences for me, as a contracting person for the government (not now, but I have been), being bought out, bribed, gifted by somebody, and therefore giving a contract to somebody who shouldn't get it. When you turn that over to a company, I submit to you, sirs and ladies, that the rules are commercial rules. As you know, in America, the dollar speaks. You can take your ethics classes, but I'm just going to tell you: in the real world dollars speak.

As we downsize, we're talking about turning these socio-economic things over to a contractor, and I'm sure we'll write all kinds of clauses and stuff into it. But look out! You've already taken most of the military—uniform wearers—out of the contracting business altogether. Why is it that bad? We have government civilians doing it, very capable people. But they haven't spent a day in the field. They haven't spent a day with an artillery system, or an information system, to see how it really is working. They just process paper. They just negotiate with industry. It's a game. Negotiation is a game. The whole intent of Congress was to create a corps of extremely competent procurement people. However, they haven't got a clue what they're buying. That's a little bit of an exaggeration. I know I'm being disloyal to say this, but every time somebody thinks they have a better idea, it turns out not to be. We've all seen centralized societies, socialistic societies. What's wrong with them? They're centrally controlled, and the power of America is decentralization.

So, my theory is: if you're going to put stars on my shoulders, if you're going to make a senior civilian DOD person such as Dr. Paul Kaminski the head of acquisitions, then let him make the damn decision! But no, we have all these other screenings you must go through. Why? I told you it's harder because you get a $700 toilet seat every once in a while. You never got the rest of the story. *We* found that, not the auditors. You get the $500 or $300 hammer. *We* found that, not the auditors. We're the ones who called the contractor on it. That was a contractor problem, not a government problem. What did you read about it? "The government's a bunch of idiots, and they're just out spending your money willy nilly." That's self evident. So here you are now trying to deal in a system like this where it doesn't power down.

I'm saying that if you're going to buy technology rapidly, you must divest and allow somebody to make decisions. The second thing you must do is have a budgeting system that's completely different from the one we have. Today, we make

MA: Program on Information Resources Policy, Harvard University, January 1995.

you say, "I need *this much* money," and it goes into a POM (Program Objectives Memorandum; that's a budget line), and you defend it, people raid it, and there are the gives and the takes. It's the stupidest system you ever saw.

The head of Texaco did a study for Ronald Reagan in 1981, and he came and talked to me. I was the exec of the M1 tank program when they were making the first M1 tank. This is the tank that's got the helicopter engines in it and goes 70 miles an hour. It really can do that. It also takes the paint off the front of a Mercedes when it pulls up behind you in traffic, and makes your windshield bend. You've seen it in action. What the Texaco guy was trying to do was explain to Reagan how we could do business better. He came in to look at the M1 tank program, because we were going to spend a lot of billions of dollars and build 7,000 of these high-tech tanks. After talking to us for a while, he said, "This is the most bizarre system ever built," referring to our purchasing system. "Let me tell you what they do at Texaco. The board of directors, whatever they call them, says, 'Okay, if you're pumping this much oil, and making this much gas today, we want this much gas next year and the year after. Do you understand that, executive?' 'Yes, sir, I do.' So I write in the contract that we're going to do these things, and they give me the flow of money I need to do that." End of it. He has a meeting every quarter, or every half year, to show his progress. If he's not making sufficient progress, guess what happens? You have a new president of Texaco. It works that way.

How does the government do it? They give us money one year at a time. Oh, forgive me. Now we have a two-year budget cycle. Do you really think that made a difference? Not much, because we squabble in the in-between years about adjusting the budget. So we haven't backed off at all. We give you money, a little bit at a time. Then the bottom line is that you, the taxpayers, have nobody to hold accountable.

I've done this. I've taken this to Congress. I said, "I will be responsible for this. I will sign the piece of paper saying I made that decision." That's all you, the taxpayers, should want. "Who is the son of a bitch who made that decision?" You can't get it! But they're scared to death. Here's this madman with this much power because I'm out saying, "I can't do this with your current budget system. Put a pool of money there. I'll tell you about how much money should be in the pool and why, and we'll argue about it, and some pool will result, and then I will make the decisions."

The bottom line is: what have I just done? I did away with all the testers, all the procurers, all this bureaucracy. There's an industry out there, folks. But if I choose these things—and I'm talking about those things generally available through commercial industry, not complex new helicopters, not complex new systems, but things generally available from the public—if I buy it, and even if it's only 50 percent as good as I said it would be, it's throughout the force in two years, and you have something. I have many systems that are in the 12th year of development right now. We've sent probably two generations of kids to college—the testers have, the first article guys have, the quality assurance guys have. We have entire bureaucracies to ensure that the taxpayer is going to get a good deal.

Now, which is the better deal? Something I bought that's only 50 percent as good, but costs 10 percent of the thing you're going to get in 12 years? This is not exaggeration. It will cost 10 percent of what you will pay for that system in 12 years, not counting the bureaucracy.

**Student:** A crisis like that occurred when we were first deploying to the Gulf. There was a big problem in all the services that navigation in the desert was very difficult and GPS was not very prevalent in the military at the time. However, they were available off the shelf, at least not terribly sophisticated GPS handout systems. There was MIL-SPEC development going on in GPS systems, but it was probably aiming at being ready around now.

**Buchholz:** Global Positioning System, satellite navigation. Now, do you see what he just said to you? You just took my punch line.

**Student:** I'm sorry.

**Buchholz:** When the shooting starts, we do exactly what I just said we ought to do. When people's lives, and your country's reputation and maybe its worldwide power are at stake, we go ahead and say, "Okay, go buy it." GPS is an example. Now, is there some catch in there? Can any one of you tell me where I'm fatally flawed in my logic? When it really counts, we do it.

This is a true story. During World War II, they took a major who never had seen an ammunition plant in his life and said, "Major, we need an ammunition plant to make this many M1 rounds. We need it a year from now. You'd better find property near a river because you've got to put all this stuff on barges because it's heavy, and you are going to need water as part of the processing. You're going to need some power and stuff. So, Major, go off and give us a phone call when you've got this, tell us how much you want for the land, and we'll okay it over the phone. You shake hands on it. We'll send you some drawings once you tell us how much land you've got, and so on." That's the way we built ammunition plants in World War II.

**Oettinger:** There's a more recent example in the seminar proceedings. Chuck Stiles tells the story of how in 1973 he put in place in the Sinai the tactical early warning system for handling the reconnaissance and so forth that kept the Egyptians and the Israelis apart.[7] It happened, again, for a similar kind of reason, although we had a peace settlement, but we had to do something in a hurry, and it's amazing how things got cut through. So, it can be done, but normally it is not done, and this is a very serious problem.

**Buchholz:** You know how it can be done? It's because you, the future moguls of industry, will shake hands with me and believe I'll pay you later. I'm representing the government now, some faceless bureaucrat out there. Sometimes we do, and sometimes we don't.

The American public are tremendously patriotic when they get behind us, when they approve of what we're doing. Industry, that thing that's always seen as being profit moguls out there who want more money all the time, is extremely patriotic. They will literally ship stuff on a phone call, because now American lives are at stake. So, no matter what you read about how money grubbing they are, they're extremely patriotic people. It brings tears to your eyes. My point is that if we can do it when the shooting is going on, why can't we do it and save a tremendous amount of bureaucracy? Because of socio-economic laws, and because the press and the Congress all tend to be hypercritical. We don't take hypercriticality very well, and we want to have all these mechanisms to deflect blame. (This is not for attribution, right? Both tapes are rolling along here. The name's Fred.)

So that's harder. I've talked to you about stovepipes already. Why does industry use stovepipes? The banking industry does it. The medical industry does it. Did you see the article today about how all your medical information is at risk? It's true.

**Oettinger:** It's the principal article in this morning's [March 6, 1997] *New York Times*.

**Student:** There's a clearinghouse in Massachusetts.

**Oettinger:** The Medical Information Bureau.

**Buchholz:** I've worked in the telemedicine world. I'll tell you right now that all these costs for health that you think are going to continue to go up could actually go down. Telemedicine is the most phenomenal thing this country's ever taken on. We do it in the military. You know what's standing in its way right now? Law is standing in its way. If I'm a doctor licensed in Georgia, and you're in Ohio, I can't treat you via tele-

[7] Charles L. Stiles, "The U.S. Sinai Support Mission," in *Seminar on Intelligence, Command and Control, Guest Presentations, Spring 1991*. Cambridge, MA: Program on Information Resources Policy, Harvard University, February 1993.

medicine because of the law. I'm not licensed to treat in your state. I submit to you again, economics will fix all this—court cases, precedents, and so on.

Telemedicine is being able to take a picture of you, store it, take that little tumor there, and measure it on an x-ray—turn that x-ray around, and it's the equivalent to taking 50 x-rays—make it bigger, make it smaller, and never have you left the doctor's office. We can treat Mrs. Brown downtown with a little thing that she puts her hand or her finger in. We can find out what her blood pressure is. We can tell you what her temperature is. We know what her pulse is. "Mrs. Brown, you don't need to come in today." It's moving information, not the patient. I can go on and on and on about this. We do it; we have it. That will make a huge difference to America in the coming bulge of *us*—I'm 1946; that's the beginning of the baby boom.

**Student:** Just a diversion here for a moment. Speaking of security on computers, some years ago there was a system called TEMPEST, which was installed in various U.S. embassies, and the idea was to prevent the radiation from the computer being detected at a distance of several hundred meters. Apparently that radiation was a very successful way to determine what was on disk, and what other people used to type to the screen. There was some attempt to install some new kind of electronic firewall to prevent radiation from going out. Do you have any comment on the evolution of that?

**Buchholz:** Yes, we basically killed it.

**Student:** So it was not true that ...

**Buchholz:** No. It's true.

**Student:** It is true? It could be detected but there were no sophisticated adversaries who used it?

**Buchholz:** No. Some do use it. TEMPEST is a condition. It's what we call EMCON (emission control), and TEMPEST is to defeat that. TEMPEST simply means not allowing emissions to go outside the walls. We assume this room is secure. Outside the walls they may have a listening bug to pick emissions up. TEMPEST was carried to such a ridiculous level that you basically bankrupted it. Any–thing that gets a life of its own like that, the bureaucrats grow up around it and they send their kids to college.

**Student:** So, is there a current reality to any of this?

**Buchholz:** Yes. There is a certain reality to this. Did you ever hear of AUTOSEVO–COM (automated secure voice communications), the first secure phones? Do you remember "The $64,000 Question"? You went into a booth, you picked up the phone, and you talked, and it was narrowband secure, so it sounded like Donald Duck. We used this from Vietnam back to the States when we used to do Top Secret stuff.

Today, because of who I am, I have in my home a phone that can go Top Secret, so now I can talk Top Secret sitting in my den. I could talk at Secret level on that phone to the Vice Chairman [of the Joint Chiefs of Staff] last week, while he was 37,000 feet up in an airplane over Malaysia. Did I worry about somebody beaming something up against my window to listen to it? No.

What I think changed our minds on all this is that there's so much stuff now, so many emissions going on, that there are certain noise levels to start with. Secondly, as we have found out by our own intelligence, the more they listen to us, the more confused they get anyway.

**Student:** When there's so much information, the question, of course, is what information? ...

**Buchholz:** Who are you? You hit it right on the head! That is a phenomenon. That's the only way I can explain it.

**Oettinger:** I'm so delighted to have you say that on our record, because earlier in this seminar I proposed that during the Cold War days we had the best disinformation system ever invented. People were complaining around the seminar table that we were dealing with this closed society, and the enemy had such an easy time because we wear our hearts on our sleeve about everything, and I said, "No, you've got it wrong. We have an enormously effective disinformation system, because the poor Soviets have so much to listen to, while we have a rather limited number of targets." Post-Cold War, everybody's now got all those targets. I'm delighted to hear you say it, because I was treated as a complete nut when I first said that. This was an enormously effective noise maker. If we had to invent us, we couldn't do better.

**Student:** Who would have thought it!

**Buchholz:** Unintended consequences.

**Student:** I'm curious. What represents a greater threat, a virus or an electromagnetic pulse bomb?

**Buchholz:** It depends on the situation. If you fire off a nuclear weapon at 10,000 feet over Chicago, this country is in huge trouble. If you fire off a virus at Chase Manhattan and are able to get through their firewall, this country is in huge trouble for completely different reasons. Is that good enough?

**Student:** When you mentioned being able to speak securely from your den to a higher authority at the time you mentioned flying over Malaysia ...

**Buchholz:** It's called "The Speckled Trout."[8]

**Student:** I won't forget that.

**Buchholz:** This really ruins all of the mystique of the military, I know, but this was an Air Force plane, so I don't fly in it.

**Student:** As a technical question, is that communication secure because there's some sort of automatic encryption or encoding and decoding that is going on?

**Buchholz:** His aircraft has encryption before the message leaves the aircraft. My phone has encryption at the phone.

**Student:** I suppose then that there's decoding in the receiving end. In other words, your system must recode ...

**Buchholz:** We synch up and share a common key and then talk. This was a Saturday morning. The radioman called me, and said that the Vice Chairman wanted to talk about an issue with me. The radioman called, and said, "Sir, this is Radioman so and so. I'm calling from the Speckled Trout" (I knew the Vice Chairman was over near Australia) "and we need to talk." He said, "I'm going secure," so I put my key in and I watched the screen go through its paces as it shares keys and links up. Now, that is old stuff.

**Oettinger:** This is STU-3?

**Buchholz:** STU-3. In three months I will have a little Motorola phone with a scrambler on it. It makes me feel good to live in the Washington area. Everybody in the world listens to everybody. I mean, if you think that your own phone isn't being listened to, you are absolutely wrong. I will not even call long distance on my mobile phone anymore because they can steal my PIN, so to speak. In fact, today we tried to call, and we found out our services just cut in where you now have to give them a PIN on the phone so that the digital recorders that are out scanning the airwaves recording our PINs won't get it all. Of course, if they just listen they can get 5216 or whatever, and then they've got you again.

**Student:** Pursuing that point, do you have your premises swept?

**Buchholz:** In the Joint Staff, it's all Top Secret air.

[8] "Speckled Trout" is the name of a survivable airborne command post and advanced technology test platform that is also used to transport high-level military officials.

**Student:** But not at home?

**Buchholz:** Not at home. But I don't talk on that phone very often. I have the capability, but I don't use it very often. I am much more security conscious than my flip attitude suggests.

**Student:** Going back to sort of the network aspect of it, you mentioned being able to put commanders in touch with each other. How does that filter down to a level of the individual soldier or sailor, if they're not necessarily in their tank or in their aircraft? How will the networks change what they do, other than just bringing them more up-to-date information?

**Buchholz:** What they do is they will operate their machines. It will change the way that we employ the machines. An example: I would submit to you that you don't need as many tanks if you have information about the enemy that's very clear. You have a certain number of warfighting machines because you anticipate a certain amount of fog of war. You don't know exactly where he is. Sometimes you're going to get snuck up on. He's to your left, your right, you don't know. War is threat, war is uncertainty. Two tanks park in the night, and you think it's two buddies so you get a little sleep, but you wake up in the morning and that's an Iraqi. Then you kind of say, "How do I sneak out of here without waking him up?" That kind of crap happens. War is really a messy business. People expect it to be very neat and tidy. It's absolute chaos. So what we can do about providing more information about ourselves, the Blue Force, and about him, the Red Force, is very, very important. That will change how we employ things.

When you give what we call "sensor-to-shooter," that is, smart intelligence between something that may be moving in space, something that's airborne—it's feeding sensors and we're getting information—we know what's out there. We're queuing targets. We're moving artillery. We're setting it up. All of this is done in a matter of seconds.

Remember chasing the Scuds during the Gulf War? The Air Force did a super job during the war, but it didn't hit any Scuds. Did you know that? Why? It's hard! It's a little tiny mobile thing moving around. They did hit some Scud decoys. Our intelligence, very good photo intelligence, said: "There it is." But what we didn't have during the war was wide-area look-see. With the systems that we developed, it's like seeing something through a soda straw. We developed them for another era.

Now, here we are chasing this new mobile launcher thing. By the way, since then there are much better ones, and they're in the hands of many people whose hands we don't want them in right now. Our Japanese friend knows that. It scares the hell out of him, too. His country is now in the range of North Korean rockets, and he knows that. That's changing what's going on in Asia. Our friends the Japanese are rethinking their security policy at this time. They have to.

I'm saying to you that how we employ machines is different because of information. We can literally set up a system where a sensor tells us that there's something on the ground, this is where it is, this is the exact location, there are no friendlies there, fire! No man in the loop. We Americans should want that because that's one less American who's going to be killed out there.

We don't move the information processing there now. We leave it in the States. We link back and do our processing there—in war. Now, if you are an enemy of America, what do you want to do? You want to screw up those waves as they link back. Don't you?

The good news is that you can't get them all. I'm wired. I've got all kinds of ways of doing this. But it doesn't take a lot. Commanders are very frustrated when they can't get information, because they've gotten addicted to it. That's my theory. But, when I slow you down… Remember one thing in the digital world, folks: there's no priority and precedence. It just queues up.

My job is to give you as big a pipe as I can, move that information around as fast as we can. It ought to be relevant, so that my Air Force friend is chasing a real Scud. "It may not be there now, but five minutes ago it was." I submit to you, a good pilot is going to find it if it's only five minutes away, unless it crawls back into a hole someplace. But if I send my Air Force friend out there, as we did a lot, because we had a sighting one hour ago, he ain't got a chance.

**Oettinger:** Against a real opponent.

**Buchholz:** So I'm shortening the cycle. Are you with me? That's how we change our machines. The pilot's still doing the same thing: he's hunting for the Scud, he's hunting for a target.

Now, Iraqi tank forces made it easy. They said, "Gee, they're shooting my tanks when they're moving, so we'll dig them in." Do you know what a tank does? Do you know how sand works? Sand in the day is real hot. Sand at night cools off. It doesn't hold the heat, does it? What do you think iron does? Do you understand the theory of infrared?

So, in comes Zoomie (this is my favorite name for Air Force guys). They had a duck shoot! Here are all these little glowing targets, and by the way, they're not only there, they're dug in. They just bombed the crap out of them. I mean, the pilots came back with this big (excuse me) shit-eating grin on their faces, because the Iraqis were so stupid. They did not learn. They weren't what I call cunning. But that's information. The Iraqis didn't have the information. They couldn't even learn from their own mistakes. They were dead.

You want me tell you another war story? You like that? When we were getting ready to go in, we brought some helicopters from the United States. We knew we had two Iraqi air defense sites, control centers, that had to go because we were going to bring in our Air Force friends. That's where we were going to start the war. So, we brought the helicopters in from the States, and these helicopters had a very special capability: to see at night like you won't believe. We put attack helicopters behind them with infrared missiles, because we knew that the two sites, the houses they were in, were lit up at night. This is winter, right? So they had warmth in those houses. Remember that we had IR missiles. So these helicopters flew in a corridor here, stopped, moved over, the attack helicopters came in behind them, sensed these two sites, which were warm at night in the desert, and we have film (excuse me, ladies) of a guy stepping out back to relieve himself, and he just went away. The whole site left in an instant flash. That is using information. Right behind that came the Zoomies, without worrying about being shot down, and you saw what they did. We were winning.

I'm not telling you that war is wonderful. I'm just telling you that if you've got to do it, it's sure nice not to get shot down.

**Student:** Sir, I'm going back to the threat to our forces. Your point is well taken that right now the U.S. military is pretty much uncontested in terms of conventional capabilities, and the fastest way to increase those already dominant capabilities is with the application of information. But that same application of information is what makes the conventional forces vulnerable if the information turns out to be the weak link. Is it incumbent on the J-6, then, to try to project where that point of diminishing returns is; not just to accrue an increased capability because it's possible, because it's commercially available, but to match it not only to what our capabilities are, but also to what the threat is against them?

The example I have in mind here is the same GPS that was brought up earlier. The GPS that was rushed into service turned out not to have the resolution to pinpoint the corners of a minefield, so if you took grid coordinates from a GPS to try to determine where a minefield was, those same coordinates with the same GPS wouldn't have the necessary precision on a map. I remember some warning messages being generated as a result of that. So there seems to be a point at which we could say, "Hey, we've got enough, and more information is going to hurt us as opposed to help us." Do you all look at that?

**Buchholz:** Yes. We argue it every day. I can't define the point. How about the reciprocal? Right now, I'm in a helluva battle against five four-star generals for saying I'd even make my networks, my nets, bigger. I need to make the pipes bigger so I can move this information around. I have to be sure that all this information I have doesn't back up. They're saying, "How do you know that?" I'm saying to them, "You have already bought weapon systems and information systems, but if you don't thicken this network, you might as well not have bought this and you've wasted taxpayer's money." "How do you know that?"

See, they've got me in one place. To model this in a comprehensive way with today's technology is extremely cumbersome. Hundreds of different types of systems working over those nets is an extremely complex model. I actually have one. I can make that model do anything I want. It takes me about six months to set it up for a two-hour scenario, a two-hour piece of a fight. It takes me days to run it, and then it takes about another four months to do desktop analysis. That is stupid.

I'm trying to do something about that as the J-6, by spending some J-6 money to get modern modeling in place. Remember what I told you: networks aren't sexy. So when these guys challenge me again, I can give them, kind of, what a pound of $C^4$ is worth. All I can give them today is vignettes—vignettes, like war stories.

The guys who are selling this whole thing are the combat guys. I brought a little thing that's in today's *USA Today*. I don't know if you've read it. Right now, you have a force that's going out to the National Training Center. It's a digitized brigade. Do you know how big a brigade is? Five thousand people. Two hundred and fifty million dollars put into one brigade for a test to try to answer some of the questions that you just posed.

It goes back to what a pound of information is worth. That's my way of saying it. Is a pound of information worth having ten fewer tanks? Ten fewer airplanes? Ten fewer artillery systems? It all depends on the situation. It depends on the assumptions you make. It depends on the timing. It depends on the threat. It depends on the mobility of threats.

**Oettinger:** We're not going to be able to address that question and solve it here, and since I've committed to General Buchholz to get him on his airplane, I hate to break this up, but I'm afraid we need to give him time to disengage and get out of here by quarter of four. I just want to thank you, and present you with this physically small but abstractly large token of our appreciation. Thank you very, very much.

**Buchholz:** Let me say to you, first, that you know you go to what in my estimation is the finest school in America. Second, it gives you absolutely nothing other than what you do with it when you graduate.

I'm not a West Pointer, either. I just went to the University of Oregon. I go up to West Point to talk to cadets. Cadets say, "Sir, what's West Point going to do for me out there?" I reply, "What are you going to do when you're out there?" So, you go to an outstanding school that has a reputation bar none, but remember, when you leave, it's what you do with it. All right. God bless all of you.

**Oettinger:** Thank you, sir.

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