

## C4I Issues

Albert J. Edmonds

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**Oettinger:** It is a pleasure to introduce Al Edmonds. You've seen his biography, and so there's no need to repeat it all. I just want to point out that he is an alumnus of the National Security Fellows here at the Kennedy School and we welcome him back home in that sense. There's one other thing that I want to say: he's one of a long and distinguished chain of J-6s. Given the subject of the seminar, it's always a particular pleasure to welcome a J-6, because the person in that job is the only one in the military who has some kind of responsibility allied to at least the "C" part of our topic, on which his predecessors, right from Hill Dickinson on, have been kind enough to meet with us. So it's with particular pleasure that we welcome Al Edmonds, and the topic is one that we share a great interest in. It's all yours.

**Edmonds:** Thank you very much. I'm going to talk about C<sup>4</sup>I issues. I call it C<sup>4</sup>I because it is going to be command, control, communications, computers, and intelligence, not just communications.

**Oettinger:** They have, by the way, had a look at *C<sup>4</sup>I for the Warrior*.

**Edmonds:** That makes my heart feel good. We put that out because we want to make sure that you get a chance to see where we've come from, and where we plan to go, and I might tell you it makes a remarkable success.

I'm going to talk about what Admiral Dick Macke and I have been doing for the last two and a half years. The year before last my predecessor was here. He talked about the same subject,\* and he was delighted with his tenure here. The biggest thing I'm going to talk about in terms of programs is going to be the Global Command and Control System (GCCS). That's the foot-stomper. That will be on the test, not this year, but next year when I come to visit you.

The one thing that's most important to me as a guy who's in his third joint assignment now—and I'll be going to my fourth one in a few months—is that jointness really is the most important item we

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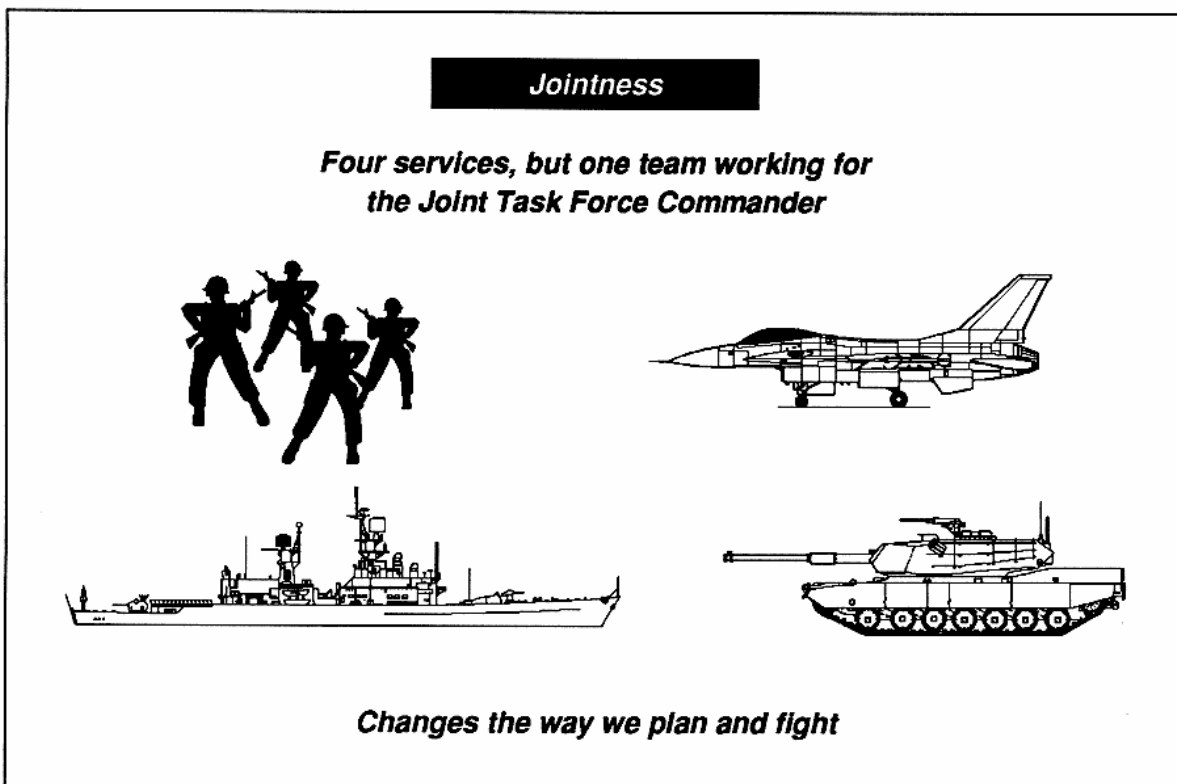
\* See VAdm Richard C. Macke, USN, "C<sup>4</sup>I for the Warrior," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1992*. Program on Information Resources Policy, Harvard University, Cambridge, MA, August 1994.

work today in the Joint Staff (figure 1). In the past, as you know, we've had several occasions where one service actually went in and did the operation and came out. I read a book, and it may be part of your reading material here, about Operation Just Cause, which was primarily the Army. We've had other excursions with one service. But in the future, the joint operations—short-term, anywhere, anytime, in the world—in my estimation are what we're going to be doing. That's what we're planning for, especially in the C4I area.

Those little funny things like snakes are stovepipes (figure 2). I show you this because this is the legacy environment. This is the environment that we are starting from. This is the environment with which we're trying to clean up the battlefield. You see intelligence, you see fuel, you see logistics, supplies—all those things: those are combat support. But let me tell you something about them. They all bring information systems; they all bring computers; they all bring communications, not only systems but also difficulties. You see Army, Navy,

Air Force, Marine Corps stovepipes; what you don't see on there, which is another big stovepipe that's a problem, is SOF, Special Operations Forces. They have their own Major Force Program (MFP) dollars. They can buy things. They may or may not coordinate; most times they do, because General Downing and I happen to be War College classmates, and I keep in touch with him. They have a very good J-6. Other than that, we would be in trouble. But this is the battlefield as we see it today in the C4I area.

One of the big challenges is that there has been a lot of money spent on legacy systems. The services own a lot of infrastructure—old spaghetti code, COBOL, big mainframes, millions of lines of code—too expensive to replace, so we have a very important thing to do. We must look to the commercial community to find relief. Now this (figure 3) allows us to get relief: a lot of changes in the industry, a lot of new materials—telecommunications, bandwidth expansions, robotics, software, computers, open systems—a lot of things that help us



**Figure 1  
Paradigm Shift for Military**

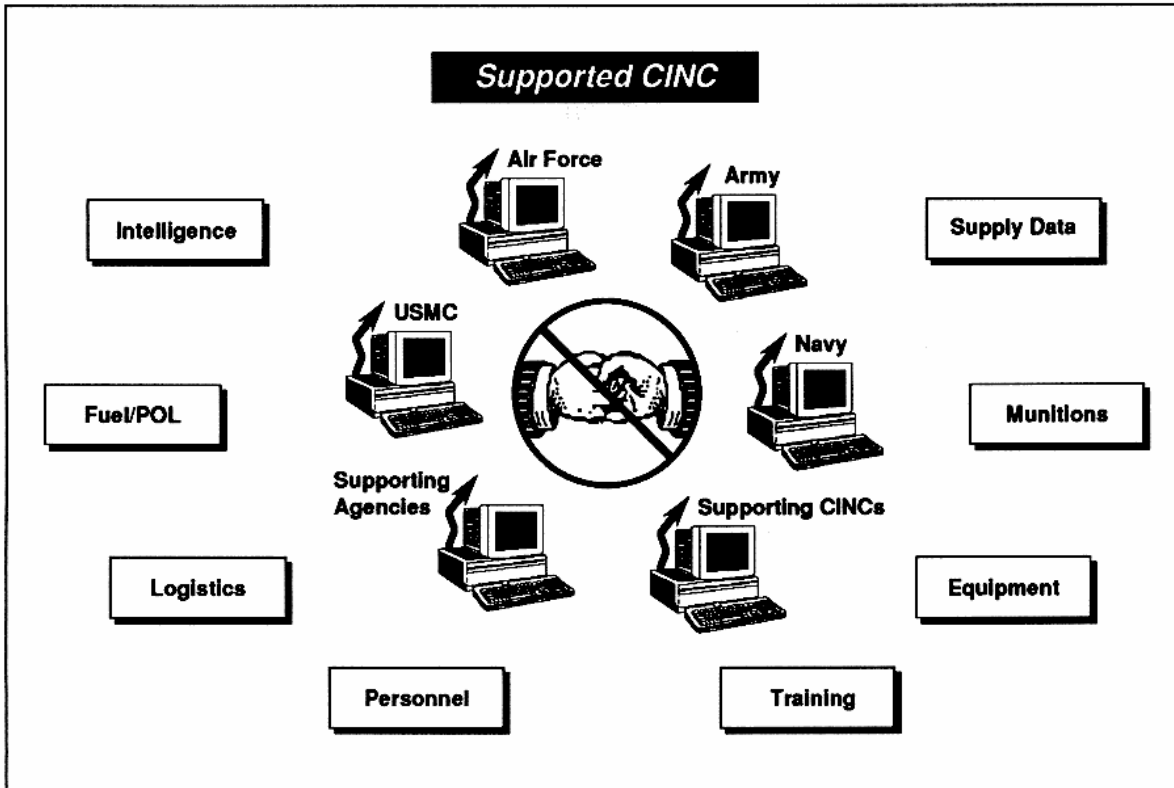


Figure 2  
C4I Legacy Environment

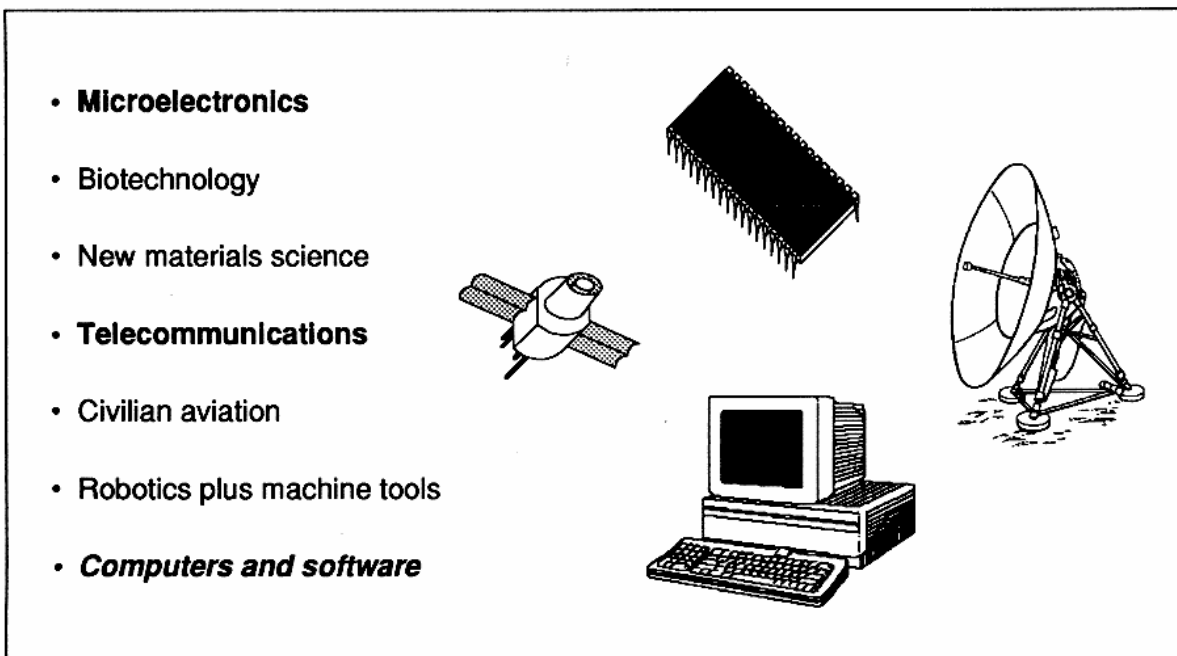


Figure 3  
21st Century Fast Growth Technologies

to change this environment so that we don't have to stay with the legacy systems, but we can't forget the legacy systems because they cost too much money, and there's no money in the till to initiate new starts. The premise here is that if information is our lifeblood for modern warfare, we must find innovative ways to use technology, and that's the evolutionary way (figure 4).

**Oettinger:** Could I ask you, as you go along here, to comment on who else holds these ideas? They're obviously your personal views, but could you distinguish between when this is something that you feel deeply about and it also happens to be everybody's truth, and when it's something that you believe in but nobody else does?

**Edmonds:** That's a very good question, and I'll tell you why. I don't know if you have both our brochures or not. *C4I for the Warrior* is the most recent one.

**Oettinger:** We have the earlier one. I didn't distribute it to the class, only the latest.

**Edmonds:** Please look at the earlier one. It's very important because of the stature of

the person who endorsed it initially: Colin Powell. When we started *C4I for the Warrior*, I understand that the very first thing the Chairman said was, "You have a lot of legacy systems. They cost a lot of money, and they don't talk to each other." Now this is putting it in warfighter kind of terms. It's not in techie terms. That's what he said. "If you're going to do anything that allows the services to talk to each other to avoid the *Liberty, Pueblo* type of situation, I'm for that. If you can define it in a way that the warfighters understand, that's even better." You'll notice that in the brochure we quote him and Admiral Jeremiah, who was Vice Chairman, as we go through. Those quotations are not just idle quotations that came out of a speech someplace.

As a matter of fact, because of *C4I for the Warrior*, Congress requires that we send a report to them in March of every year on how we're doing on *C4I for the Warrior*. We write down and put in that report these same kinds of representations, and we go down and brief the Chairman and the Vice Chairman on them. When they embrace them, we use them as gospel. The other thing we've done is that we've written a Chairman's MOP (memorandum of policy): an instruction out to the CINCs and

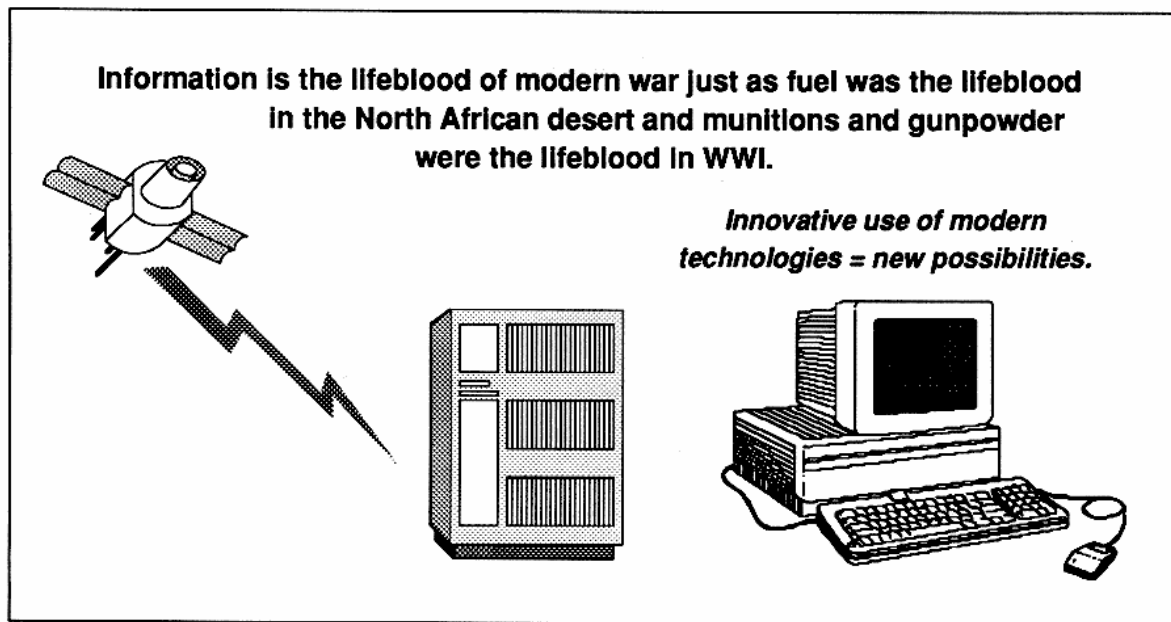


Figure 4  
Impact of Computing Technologies

services to give them guidance on how to develop C4I systems in the future. We take the same kind of thing and now we've made it doctrine by putting in the MOPs.

We also went to OSD in a new DOD Directive, 4630.5, that says: "All C4I systems are considered joint." That may sound like a trivial thing, but one of the biggest problems we've had with C4I systems is that when the services buy them they say, "We bought them for the Army, or for the Air Force, or for the Navy, and now you guys want us to give them to the CINC or the joint warfighter to use. These are my systems." The first satellite terminal that got to Somalia was an Air Force satellite terminal. The Marine Corps two-star was a Joint Task Force Commander. He needed that satellite terminal, but the Air Force said it was theirs. They needed it to do Air Force business. The J-6 from CENTCOM called me. I said, "It's yours!" It became joint instantly. So this information is critical.

**Student:** Excuse me, sir. Is there a clear enough definition throughout the Department of Defense about what a C4I system is, or is there some wiggle room in the bureaucracy for somebody to say, "Well, this isn't really a C4I system, so it's not joint?" Is there a universal definition?

**Edmonds:** Yes, there's no problem with definition. The problem is ownership and identification. What the services and agencies do is try to withdraw their systems out of the spotlight, if you will, so you don't recognize them and don't grab them. We've had people trying to split hairs by calling one a management information system, so that's business and we're not included, and these are command and control, so they are included.

As a matter of fact, one of the debates we have going right now is on one of those things I showed you about: POL (petroleum, oil, and lubricants) and logistics support. They were calling those business systems in the last regime, on the Paul Strassmann\* watch, and they wanted to

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\* Paul Strassmann, Former Director of Defense Information, OASD (C3I).

treat them differently. But we call them combat support because you've got to pay troops in the field, so you need finance systems. You have medical records, so you need medical systems. You have to get spare parts, so you need logistics systems. If you look at the definitions in the joint publications, you'll find that under "command and control" it says "all those things that the commander needs to control his troops," and that includes communications. They talk about personnel systems. You have to have those systems. As a matter of fact, if you look at the core of most of the systems we have, even the ones that are duplicative, almost all of them have a lot of the same functionalities in them. Even though the primary purpose might be logistics, you'll find some finance modules and other modules in them. So there is no real disagreement on what they are. It's just that people try very hard to keep theirs from coming under our auspices by not identifying them.

**Oettinger:** Correct me if I'm wrong, but I might add that, in some respects, this is less a game among the services than between the military and the Congress or the questioner's agency and the Congress, because which way you classify them has to do with whether they fall under the Brooks Bill and are procured one way or are part of weapons systems or part of intelligence things and are procured another way.

**Edmonds:** That student must be GSA!

**Student:** No! No!

**Edmonds:** CIA; okay, same CINC. But you're absolutely right. As a matter of fact, one of the reasons why we got in this whole debate was just exactly that: the Brooks Bill and the Warner exemption were what you had to do under certain rules, and so people started trying to classify their programs in different parts for that same reason. The other big thing in our part of this is that if you look at the "I" in real terms, most of your "I" deals with communications, sensors, and computers. The analytical work is a small part of it, but it's the most important part of it. So the

analyst will say, "My 15 percent is so critical, I've got to control my computers and my communications also." They want to control them, but when they do that, they also create all kinds of interoperability problems for you because they want to do it themselves, and they sometimes want to be very expedient and they cause us a lot of problems. So that's a very critical piece.

**Oettinger:** I trust you don't mind being interrupted.

**Edmonds:** I don't mind at all. In fact, I prefer that because I can go through this so fast that you'll say, "Boy, that was quick."

I'll show you this (figure 5) because it is very, very important for us to get a vision that the skies are full of sensors and communications items, a lot of which are commercial, a lot of which are not military assets, but they all provide one very basic thing. They provide information, and information is very, very important, as it says in one of your textbooks I saw someone with today, by Al Campen.\* Information warfare is a very critical piece. I'll talk about it in a few minutes. Information is a new battleground.

Now I'll show you this chart (figure 6). We talked about this at lunch. If I can sit at my telephone at home and dial "#" and a lot of different numbers, and check out my Visa account, my checking account, and all those kinds of things, then that tells me that we should be able to provide the same capability to the warfighter. We ought not to be artificial and to say it has to be unique, it has to be MIL-SPECed, in order to do it, because the electrons run over the wires, and over the fibers, and over the satellites. So what we're talking about here is that interoperability—the ability to exchange information—is really the key to change. Interoperability is critical.

I talked earlier about military collaborative planning. I think that is one of the biggest real-time differences that is going to happen in the future because technology

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\* Alan D. Campen, *The First Information War: The Story of Communications, Computers and Intelligence Systems in the Persian Gulf War*, Fairfax, VA: AFCEA International Press, 1992.

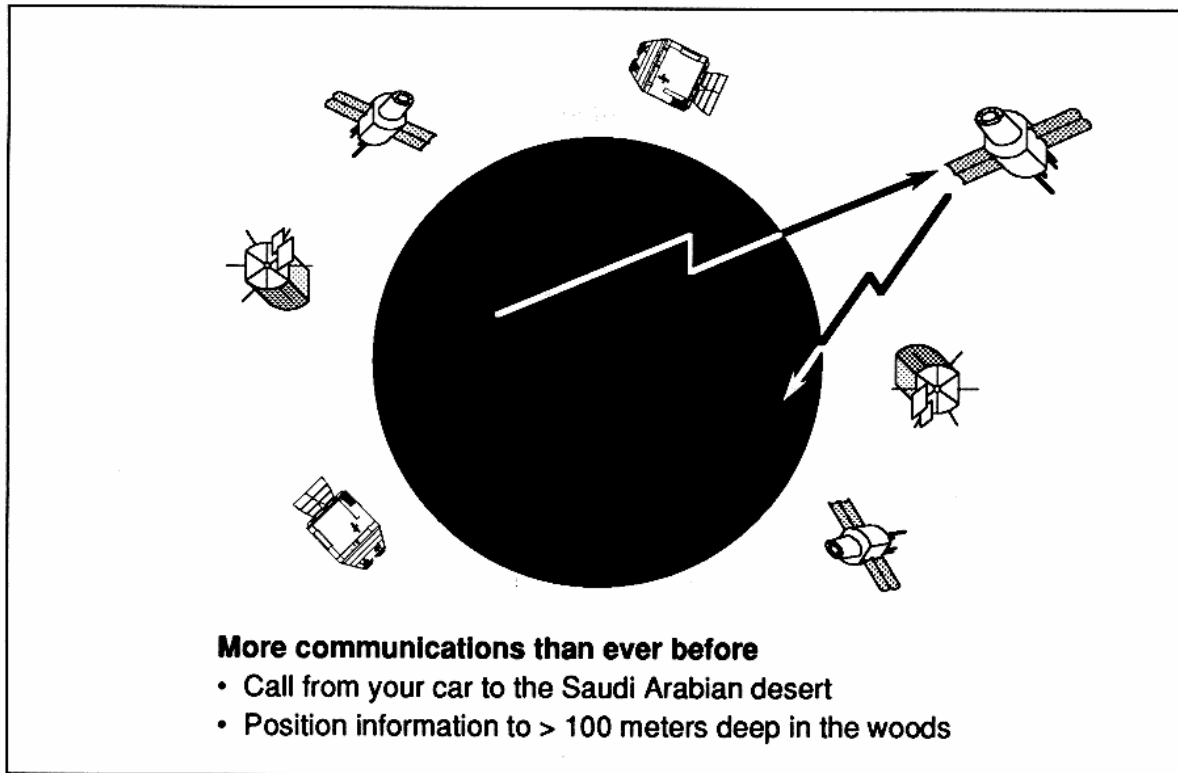
has allowed us to have real-time exchange of information, as well as things like maps and data.

**Oettinger:** Could I stop you there for a moment, sir? You were very eloquent earlier in pointing out that the "C4I for the Warrior" is a message that has made a transition from being sort of fringe to being core and being central. Now this collaborative stuff: is this sort of the current groupware, trend-surfing kind of thing, or is that real for you, or in between somewhere?

**Edmonds:** For a while it was kind of a cliché. Let me tell you when it became real to me. Last September, in 1993, I sat at NRAD (the Navy Research and Development Center) out at San Diego, and we did an interoperability demonstration on joint warfare. We do them every year; they are very important. Commercial companies, military organizations, and government agencies come and show what they can do with their systems, and as a matter of fact, that's where we shook down the concept of a Joint Forces Air Component Commander, JFACC.

We sat out there with Admiral Larson at CINCPAC, and in 30 minutes we took war plan No. 5027 for Korea as we sat around the table and collaboratively planned an excursion on that war plan. The CINC opened the session, and the J-2 at Makalapa in Hawaii gave an intelligence briefing. We had a video teleconference; we had slides, all presented from Hawaii to us in San Diego, to the guys in Washington who were playing Transportation Command, the guys at Fort Gordon who were the Army, and the guys at Langley who were the Air Force. He went down to the threat information and provided that data to us. The J-3 then gave his pitch. The J-4 gave his input. This was not just briefing and listening. People were asking questions and talking as we did this thing.

At the end of the session, we had the approach we were going to do for the 5027, and the CINC was on the line. He went around to his table in Hawaii, went around our table in San Diego, and I had some OSD people there, a bunch of people—the Navy guy at Coronado, who was



**Figure 5**  
**Satellites Blanket the World**

the fleet commander, was sitting at the table—and we all agreed that's what we want to do for our war in 5027. We did that using a software package called Target, which the ARPA guys had developed. It's for collaborative planning. When the Admiral saw that, he said, "I want that." We grabbed that software from ARPA (and they still have some cleaning up to do with that software, I might add), and we took it down to Norfolk and showed it to the Navy, to Admiral Miller. They liked it. The guys out at Scott, at Transportation Command, liked it. So now we'll take that module from demonstrating it in September, and give it to the warfighter in June of this year as a tool to do collaborative planning.

Frank Snyder called that crisis action planning,\* and that's the accepted term right now. It's intended to have a

\* Frank M. Snyder, *Command and Control: The Literature and Commentaries*, Washington, DC: National Defense University Press, September 1993.

connotation that we're collaborating, rather than just coordinating, and we'll kind of evolve this strategy as we go, and once we get it, everybody will say, "yes," and we'll go do it. That doesn't eliminate deliberate planning that you may already have on the shelf. As a matter of fact, I would suspect that a lot of your collaborative planning quality will come from the fact that you've already done deliberate planning beforehand, so everybody's familiar with their war plan in the beginning. What you're doing here is kind of deviating a little bit from the deliberate plan that you had. You know that the deliberate plan has two carrier battle groups; you only use one. It has a whole wing of 72 airplanes; you're going to use 80 airplanes because they're not quite as big, so you're going to be deviating. I suspect that in those briefings, in just 30 minutes, that's what you were getting from those folks in the areas who are very familiar with the actual deliberate plans that were in the files.

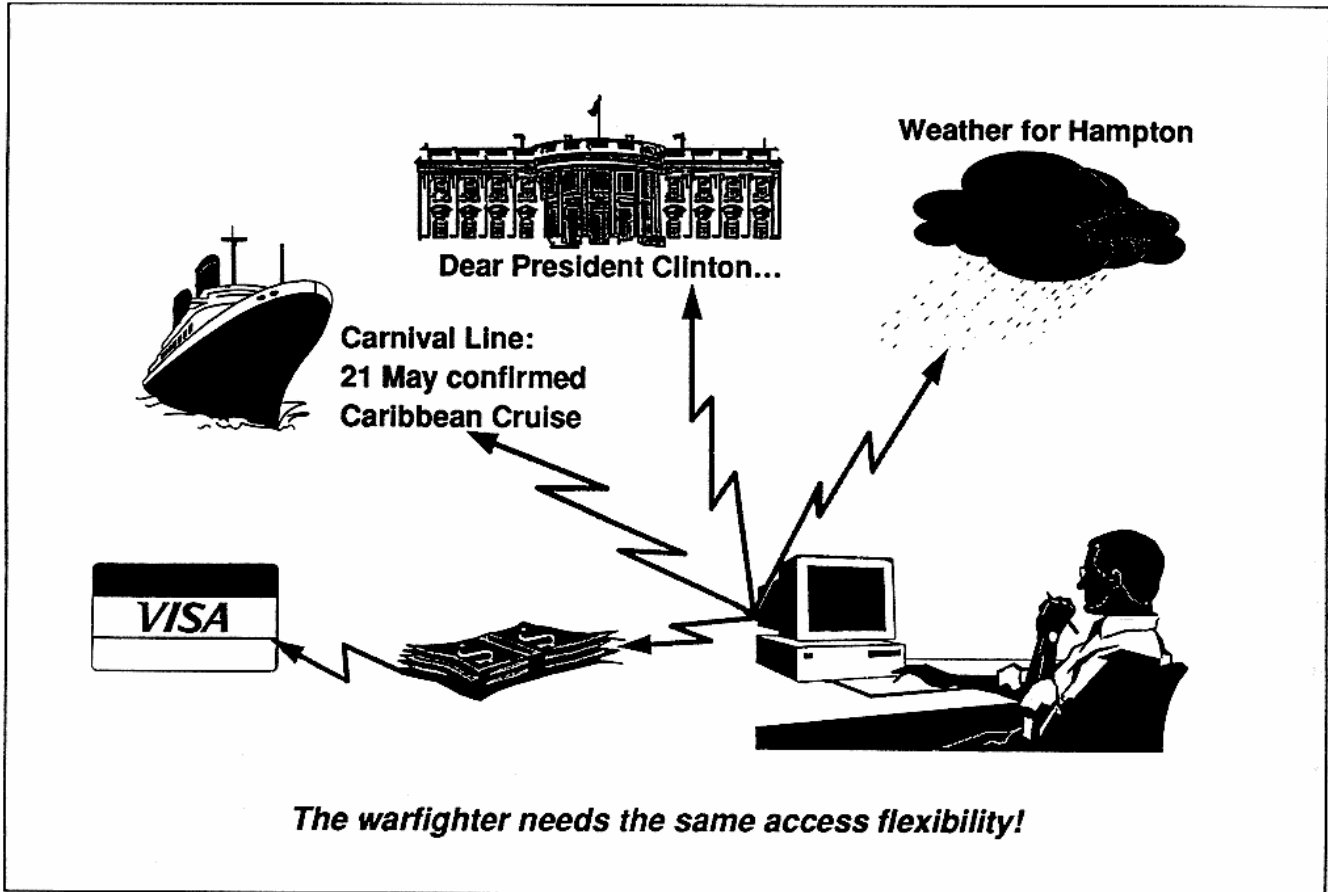


Figure 6  
From My Desk...

**Oettinger:** If I were to induce one of our students, who's doing a paper on groupware and collaborative things, to look into that a bit more, can you leave us the name of somebody she might contact to get some background on what you just described?

**Edmonds:** Sure, absolutely.

**Student:** General, I'm not quite sure where the right place to ask my question is. I think Tony's question gives me a good platform. You talked a lot about technology and the effects of technology, and how it enables different paths of the apparatus to come together. Have you noticed any effects that the new systems have had in the way in which they do their business: in other words, the non-technical aspects of technology? Are you seeing any change in how planning is undertaken?

**Edmonds:** Yes. As a matter of fact, the people who were shocked by this collaborative planning were shocked because they'd been doing crisis action kinds of planning before, and in many, many places we have developed many separate programs for crisis kinds of planning. There's no standardization. It's almost like a dealer's choice. "This commander likes this, so we do it this way." We see this package as a way to start trying to standardize this process, if you will, with the tools so that they can become familiar with it. But the other thing was that, in the past, we had started doing that kind of planning almost from a clean sheet of paper, and we'd throw the other plans away. I believe that this is going to allow us to make some kind of connection between the deliberate plans we've already done, and the collaborative planning we will do because we're going to



have a reference point. So I believe that we're redefining the whole planning area here as we go, and we don't know where it's going to take us, but we know that it's going to be better than what we have today because we had either/or before.

**Student:** Is it being done with fewer levels of people?

**Edmonds:** It will be, because right now if you go to one of these technical or tactical environments, you've got a great big planning sale with miles and miles of plans, and everybody thumbing through their annexes trying to find what to do with their piece of it. I think that as (1) we automate a lot of those plans, and (2) we connect them with the collaborative process, we're going to be able to make some faster choices and more informed choices, because you don't have to go and figure out what munitions to use. It's already in the annex now, but you're going to have to take a lot of time to dig it out.

**Student:** How far down will the jointness go? In East Germany the Army and the Navy use different coordinate systems, and the Air Force uses yet another coordinate system, because the Air Force uses magnetic north, the Navy uses true north and nautical miles, and where the Army had kilometers, maybe they have statute miles. Will that go so far down that there will be no Air Force observer on the ground? Will every platoon commander, let's say for the Air Force or the Army, give his firing commands to the Air Force coming in, or to a ship?

**Edmonds:** I'm going to show you in a few minutes that we're dealing with the data element itself in terms of standardization.

**Student:** It's not only that they can communicate, and have the right telephone to talk to each other; they need the same coordinate system.

**Student:** Sir, before we get too far off this topic, do you have a time line on how

long it's going to take you before we automate all the joint warfighting plans?

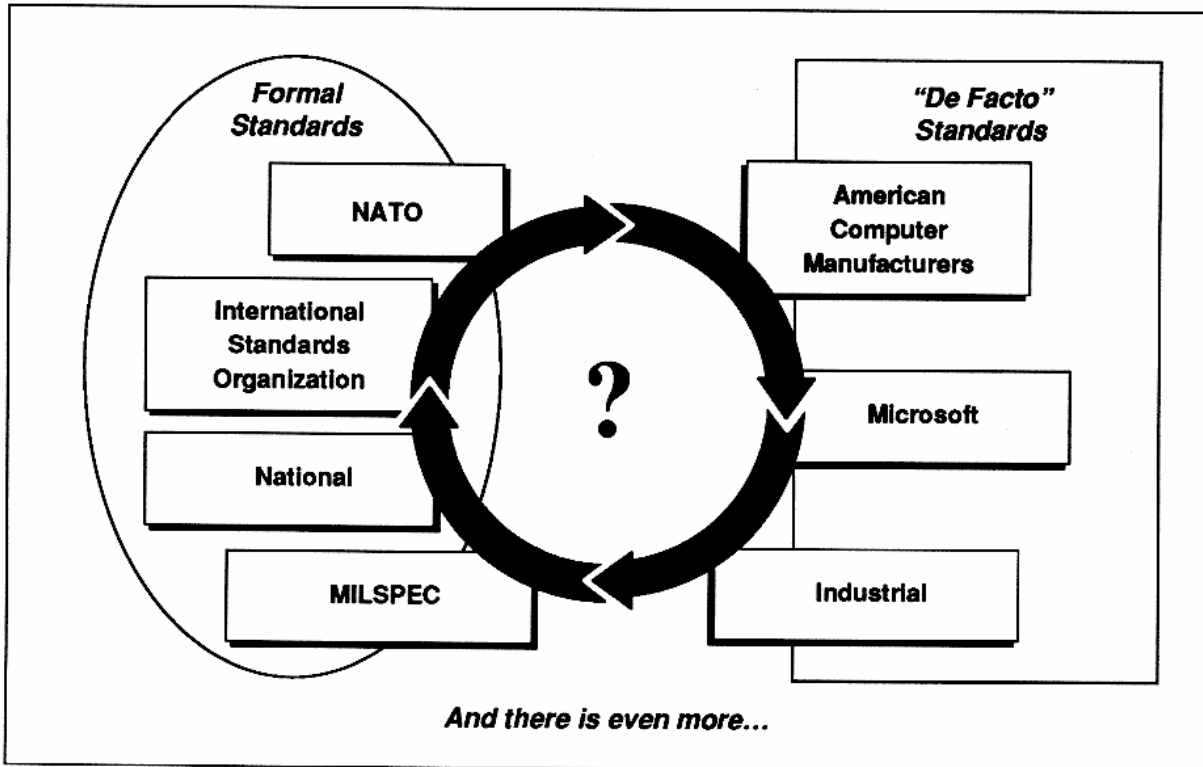
**Edmonds:** We can do them now. It's just a matter of cost. But we're beginning to automate them.

**Student:** So that's been POMed (put in a Program Objective Memorandum) and there's a plan to do that?

**Edmonds:** The J-7 guys have gotten a task to start working that with the CINCs and the services as a matter of product. The fact of it is, we looked at a lot of the war plans last year. A lot of them are very dated. Annexes have just kind of increased in volume without increasing quality. Hardly any have things such as space in them. Critical elements that we know we need are not included in the war plans. We weren't too happy with some of the quality.

Interoperability has a price to it and we all know that. This is a good chart (figure 7), because what I want to show you is that there are a lot of players in the standardization process, and we're not in this thing as a Lone Ranger. You can standardize in a service, in a department, in an executive branch, but you still have a lot of different things going through, including industrial. But here are some of the de facto standards, and this is what I was talking about earlier when I told you I was going to click on some things and find information. I'm not advertising Microsoft, but I'm telling you that Microsoft Windows is a good way to start, because people understand that, and you can click on it and find things. You can develop the same kind of capability in other kinds of programs, but that's the thought process. The American computer manufacturers are also beginning to build to open systems. They're beginning to feel that "If I can put out a good product for a cheaper price, then I'll sell more." They're beginning to get away from putting all these proprietary hooks in their hardware so that you're stuck with them forevermore, because it's just not worthwhile anymore. The big bucks are in software.

This harks back to your question. We have to make a decision on interoperability. We have decided we're going to deal with



**Figure 7**  
**Interoperability and Standards: Which Way Is Up?**

the issues like standards in data elements. We're going to find one way for the Department of Defense, and hopefully for the government, and hopefully for the nation, to show dates. Here are the various ways right now in which different systems from the services show dates (figure 8). You've got year, month, and day; day, month, year; month, day, year. These are real examples. It's the same thing for time, the same thing for coordinates, the same thing for directions. So we're going to tackle this. As a matter of fact, we're meeting every two weeks on these kind of issues in the Military Communications and Electronics Board (MCEB) that I chair.

**Oettinger:** How long have you been meeting?

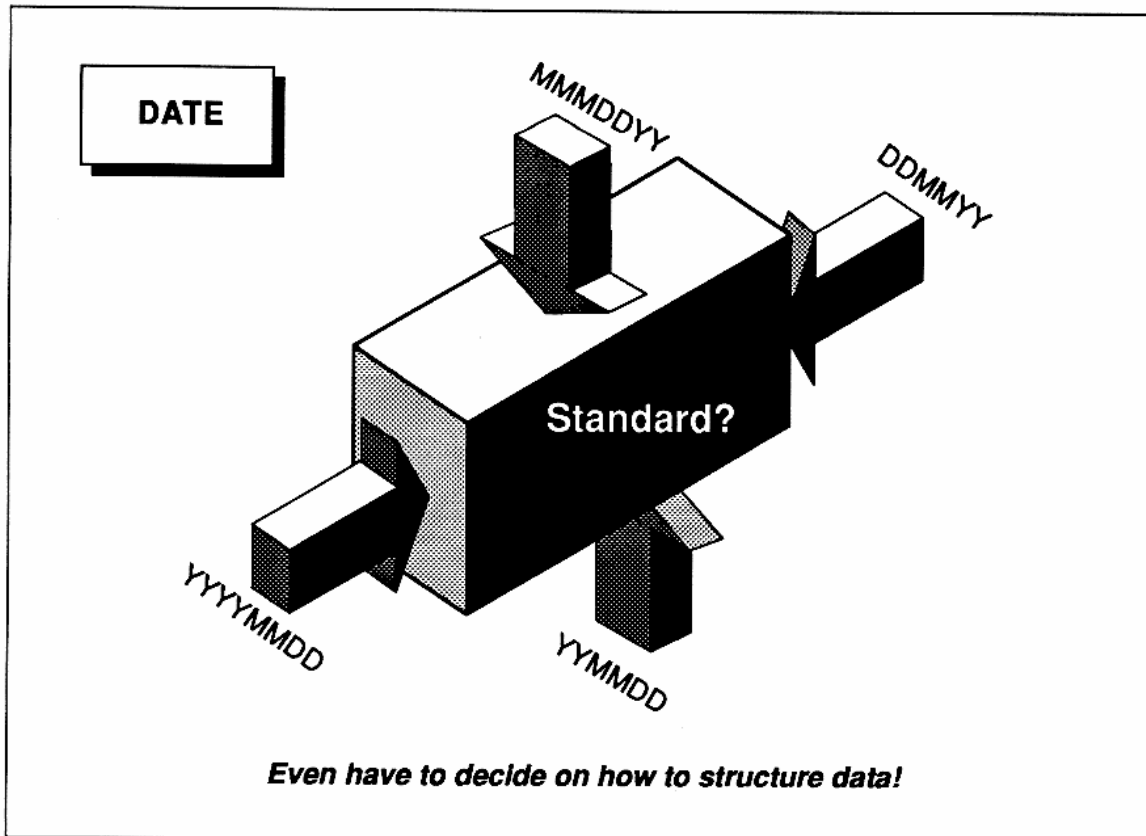
**Edmonds:** We started meeting two months ago. We recognize there's a problem, and for almost a year, we just ex-

changed a lot of letters, and everybody tried to show how much they knew about this.

**Oettinger:** Do you think that process will ever end?

**Edmonds:** The process will never end, but what we have done is started the process. The way we have started the process is that we have already nominated 3,000 standard data elements for the Department of Defense that we are going to settle on, and to which we're going to build systems.

**Oettinger:** I'm grinding an ax here. Let me make it explicit because over lunch we also talked about your notion of putting cats and dogs together, and I find what you're saying here somewhat contradictory to that. Let me give you a bit of personal history, because I got into this—it's now over 30 years ago—when I was working for the White House and we were knocking heads in what was then the intelligence commu-



**Figure 8**  
**Data Management: A Matter of Choice and Decision for Interoperability**

nity of the day. I will date it by telling you this was a committee in the United States Intelligence Board, which had been meeting as the CODIB (Community Data Interchange Board), but a bunch of guys from the military and CIA and elsewhere were arguing over which columns in an 80-column card should be used as the standard intelligence community data element. It became quite clear that this was an exercise in keeping each other's databases apart and so forth and so on. Today one of the easy ways of solving that, so that you don't have these guys around the table for six years trying to keep each other apart, is to put translators in between and let them each do their own thing. You build a translator, and you have exactly the same effect. So I was wondering why you are doing this when you could say, "Do it your own way, as long as I can apply a translator to it."

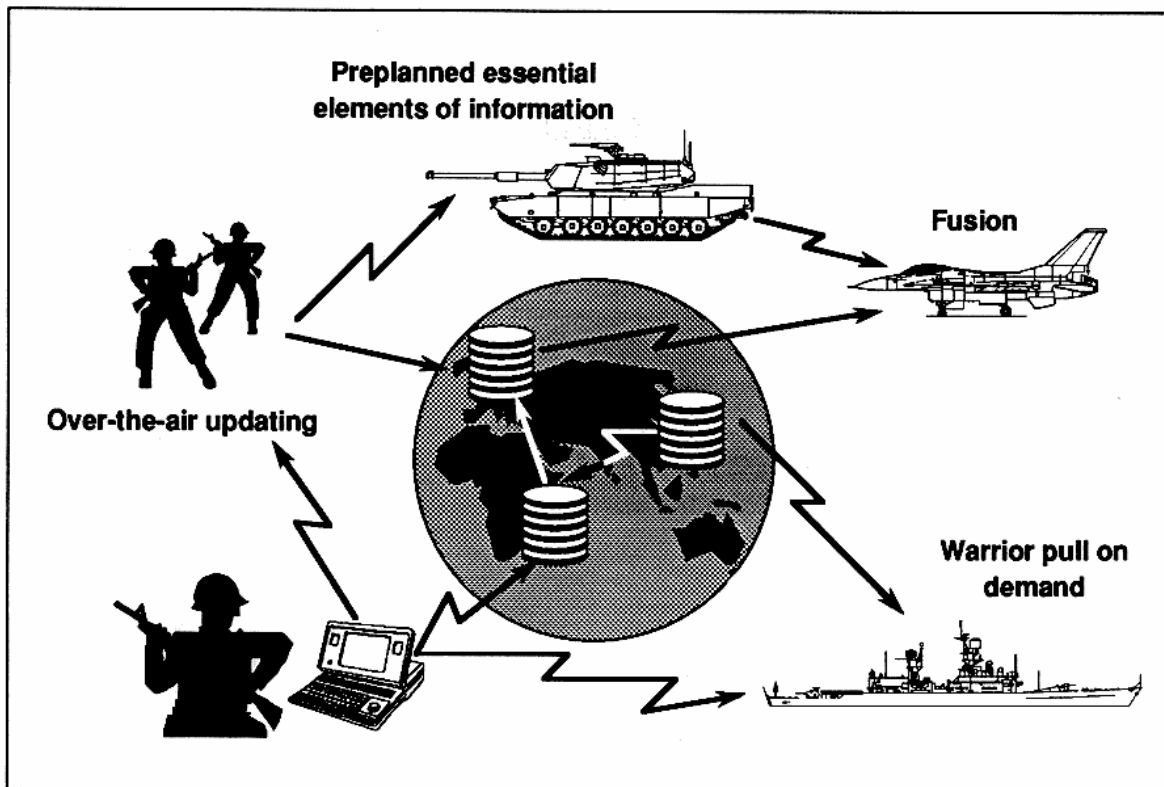
**Edmonds:** We've already done the translator. We've done the translator for the command and control system. But we found a better way. When we did the translator on the Army, Navy, Air Force, and Marine Corps systems, it took us six months to get all four services' systems talking to each other. NESEA, the Naval Electronic System Engineering Activity down at Patuxent River in Maryland, did it for us. We found out something very, very basic when we did that. Seventy percent of the functionality and the codes were the same. Why was this? Because in the past we did not work as a team. The Navy guys wouldn't let the contractor talk to the Air Force guys and the Army guys and the Marine Corps guys, so we bought it four times. Not only were 70 percent the same, but we also found out that once we discovered that, the services then became willing to start letting them merge with each other.

When I get to GCCS, I'll tell you what we did with it.

We also know that if we did what you did 20 years ago, we'd never get there. We've taken command and control and put it as a centerpiece of this universe, and we're driving ahead. You come along with command and control, or you'll be left behind, because the warfighter needs the command and control systems. If you have other systems, like combat support systems, that do not fit, you're going to be on the outside. The intel guys have already discovered that. They're coming along with us. That's why we're C4I. For this system, we're going to talk about the JDISS (Joint Deployment Intelligence Support System), because we think that the warrior needs a fused, real-time picture of the battlespace. The warrior needs everything (figure 9). To give him that fused picture, you've got to be able to give him all kinds of data. The translator's fine, but we think we can do

better because what the translator does, which we don't like, is allow people to continue to operate the old legacy systems without abandoning them. They'll become more and more non-interoperable because they'll purposely fix them so they can't interoperate. They'll want to keep them unique.

**Student:** One reason for the difference in coordinate systems may be that they also live in a coalition environment, and since the different U.N. organizations for shipping and air transport use different systems, it's difficult to fuse them and to impose a single standard. So maybe it's better to have translators, because otherwise in a combat situation you would overstress the warrior. He knows "That's a unified coordinate system, but what does it mean in the coordinate system I'm in?" and then he has to translate it. Maybe we should let the system translate it as his assistant.



**Figure 9**  
**Real-Time Battlespace Information**

**Edmonds:** We're always going to have some translators. As a matter of fact, my opinion is that the appropriate role for translators as a permanent thing is when you start doing coalition warfare. If I were to go into Korea today, I would use this universal translator we have. If I were to go into Bosnia and needed to hook up with another country's system, I would use a translator. But as a nation, or as a defense department, I should not have that as my objective when I know it's going to cost me money. So there's a place for the translator, but the other thing is I want to make a transition, if you will: I want to evolve one day to the point where these standards are not military standards, but they're commercial standards.

**Student:** That would be nice.

**Edmonds:** If they're good commercial standards, they become national standards and universal standards, just as they did in the air traffic control business. By keeping it simple and evolving it, you'll get to that point. That's why I support commercial off-the-shelf applications for these kinds of problems, because they will get you there sooner. But for so long we had military-unique things until we had to break that paradigm. There is a place for translators forever. If I were to go to Korea tomorrow, we'd use a translator, and we could go right on the air. If I were to go anywhere where I didn't have a common system, I would use a translator.

**Oettinger:** We're about to put out a book called *Information Technology Standards\** on why information system standards are both utterly, absolutely necessary and utterly impossible. We'll send you a copy, because I think you've hinted that at some ends you need the translations, in others the standards are desirable.

**Edmonds:** I'd love to read that.

The reason I love the NESEA guys today is because what they did for us when

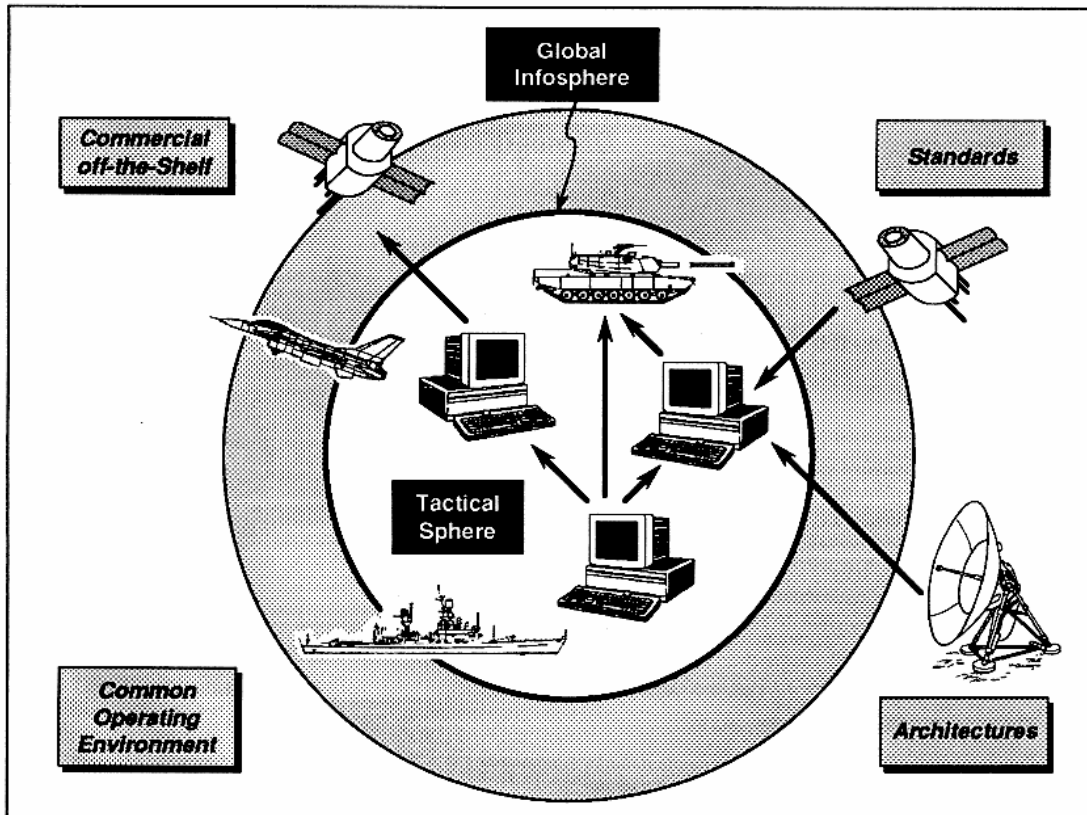
we started doing *C4I for the Warrior* we could never have gotten if we had gone through a normal program. They took those systems from the four services and got their translator done for us; they did the Navy and the Army in three months, and did all four in six months. We brought all the CINCs, every one of them, and all the Joint Chiefs, and the Secretary and Deputy Secretary of Defense—Aspin, Perry, Deutch—down to the NCC (National Command Center). We put all the systems up there. We showed the individual systems for Army, Navy, Air Force, and Marine Corps; we showed the translated system; and then we showed them the value of it. Let me tell you, when you see the Air Force information portrayed with Army symbology because the Joint Task Force Commander might be an Army guy, you become a believer. As a matter of fact, there were a lot of them who wanted that to be the solution.

The final solution is to get on with it. We're working them both at the same time because we're getting a big-time payoff by doing them both. By not selling the translator only, we've been able to kill some programs that had marginal benefit in the first place. They were content to let them live, because I could translate into the system. After we started doing the integration part of it, the Marine Corps decided not to do a system at all. They are now using the Navy system exclusively. They have killed their program, saved their dollars, and gone with the Navy because they found 80 percent of what they needed from the Navy, and now we're having them work with the Army on the ground part of their need. It is absolutely fantastic. Those programs fell out.

I just want to show you here (figure 10) that there is an integrated global environment. In the left-hand corner you see commercial-off-the-shelf, but we don't forget the standards, and of course you have to have some kind of architecture for where you're going. The common operating environment is another one of those clichés that mean a lot of things to a lot of people. We're trying to define a common operating environment so that in the future, if you're

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\* Martin C. Libicki, *Information Technology Standards: Quest for the Common Byte*. Newton, MA: Butterworth-Heinemann, in press.



**Figure 10**  
**The Integrated Global Environment**

going to develop a C<sup>4</sup>I system, if you build to these standards, you'll be okay, and when you test it, it ought to work.

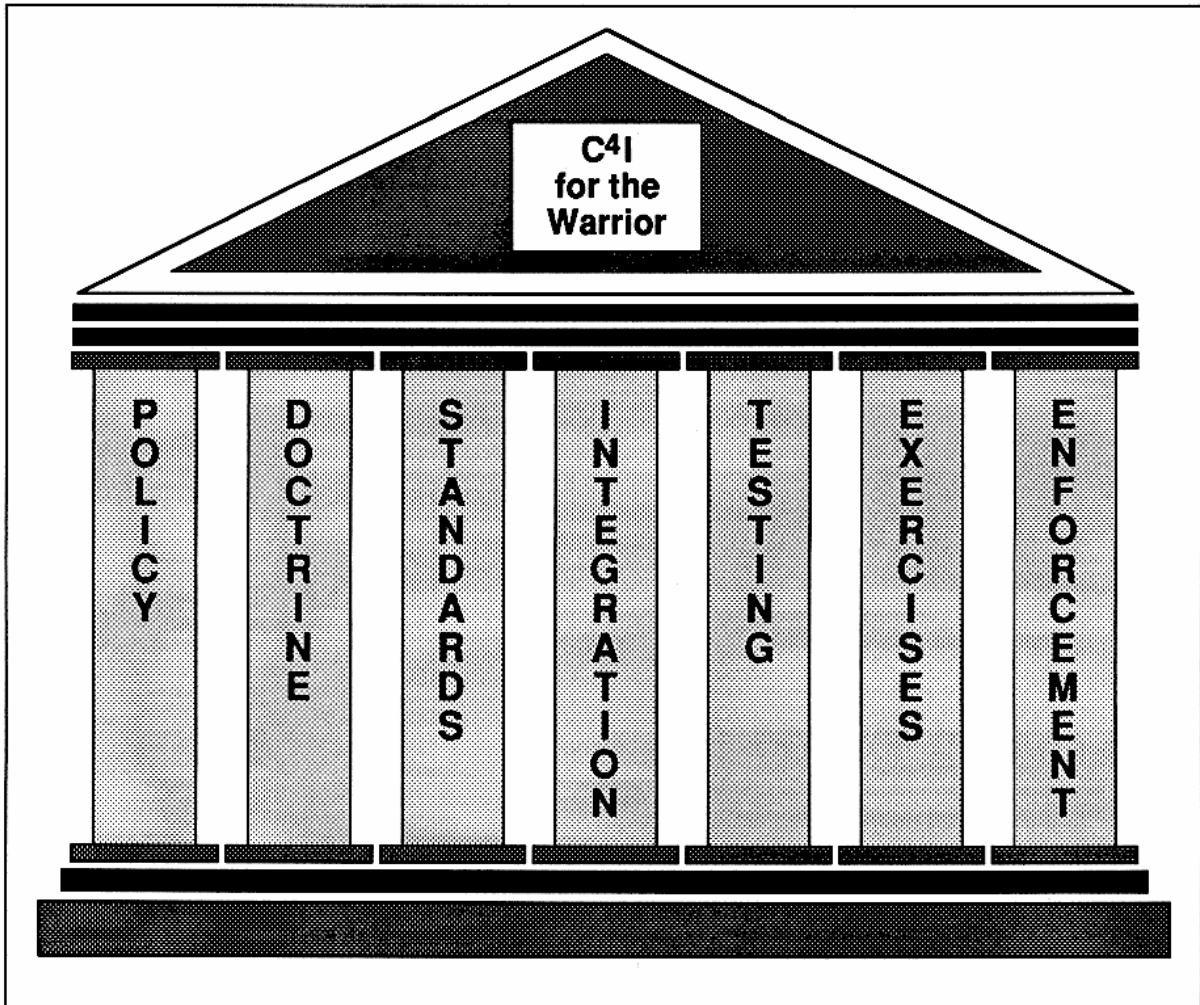
I told you about earlier about demonstrations. One of the things about the demonstrations that we also do is, if you think you're going to buy a new C<sup>4</sup>I system, we're willing to take that prototype and do a demonstration of it and tell you if your RFP, your request for proposals, is a good one or not. We've been successful once. The Air Force wanted to buy a tactical data switch. We tested it for them in this demonstration; it wasn't good; they changed their spec and went out and bought a standard system and now it's absolutely superb—all commercial off-the-shelf, commercial SPEC, no MIL SPEC at all.

We just call this our Seven Pillars [of Wisdom] (figure 11). You have to have this if you're going to have a program of any kind in Washington, D.C.: policy, doctrine, standards, integration, testing, exercise demonstration, and enforcement.

I'll talk briefly to those right quick and get through them in a hurry.

Standards and interoperability (figure 12) are my duty. This is a thing we've already done. We declared victory in that in six months. We told the people we were going to do that in five years and we did it in six months, the right-hand corner, top-side. We took STACCS (Simplified Tactical Air Command and Control System), UCCS (Unified Command and Control System), JOTS (Joint Operational Tactical System), and the others, and we integrated them in a JUDI (Joint Universal Data Interpreter) terminal, so I can pull information from any of these systems.

Let me tell you what's beautiful about that. Some of those systems are dumb systems. The STACCS could not transmit anything. The Air Force could receive; the Navy system could transmit it and receive. When we put that JUDI, that translator, on it, we could not only translate, we could also communicate among those different



**Figure 11**  
**The Seven Pillars**

systems. Every time you updated one, all of the others got updated at the same time.

**Student:** Does the warrior have this system, or is he close to getting this system now?

**Edmonds:** As a matter of fact, in anticipation of Bosnia, the guys over in Europe have JUDI in UCCS.

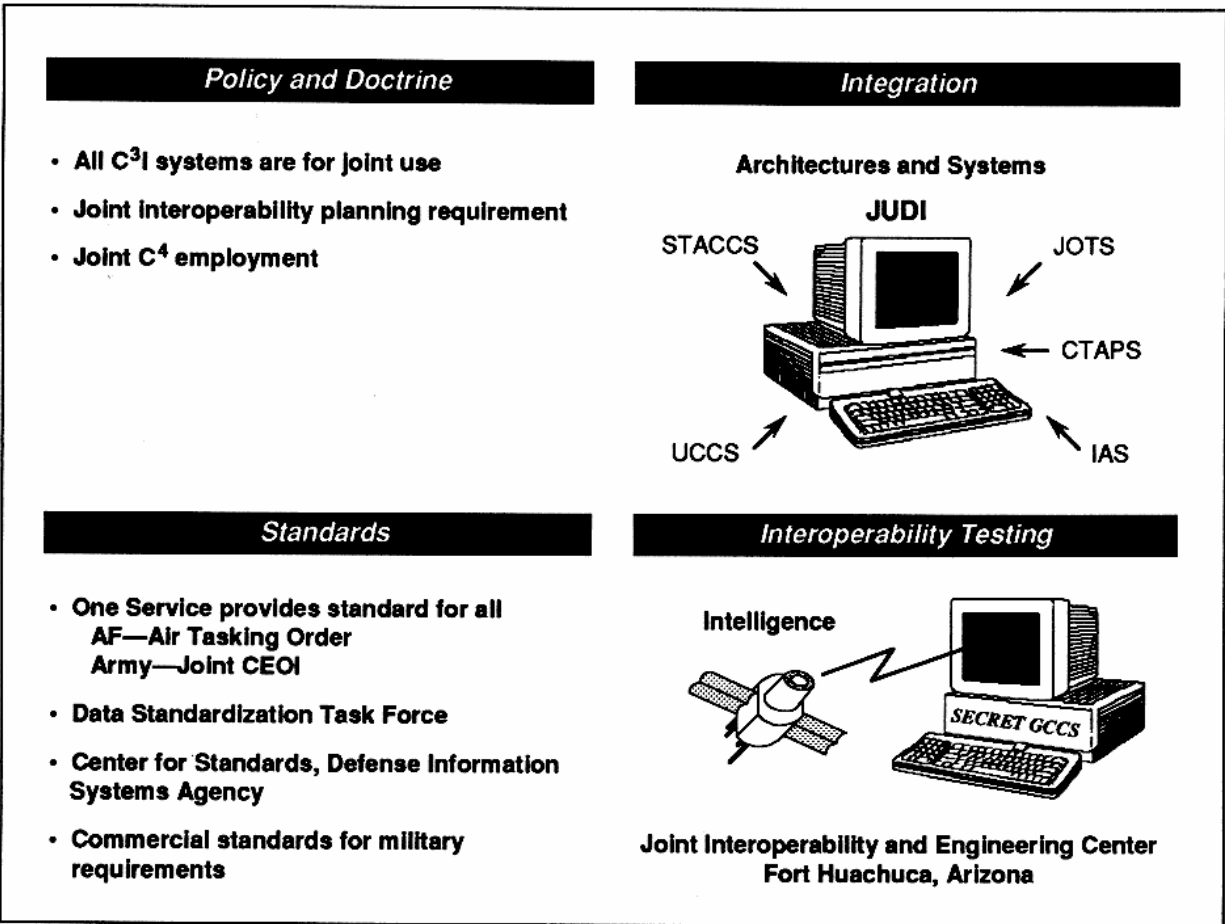
**Student:** Do all the joint commands have it?

**Edmonds:** No. I'll show you what we're putting in. We're putting in global command and control, and that JUDI is one of the functions on it, so that if you go into

Korea, for instance, with a Global Command and Control System, you have the JUDI so you can do the translator with the Koreans.

**Oettinger:** He's a submariner who has a strong personal interest in this.

**Edmonds:** I'm sure he does. So this is what we've done. Now, just to show you, we have a joint interoperability testing group out at Fort Huachuca. All of these C4I systems that we get in the future must be tested before they come on line. Of course, we're still working standards as a matter of policy and doctrine. I'll tell you about that a little bit more.



**Figure 12**  
**Standards and Interoperability**

This demonstration is just to show you that this is not just a bunch of techies out playing with hardware and software. We do the technical stuff to get started. One of the handshakes I had with the CINC and/or the Joint Task Force Commander who was playing with us was that when we finished playing with the technical aspect of it, we'd give it to the warfighters and let them play with it for three or four days, and they'd tell us what they liked about it. When they tell us what they like about it, I commit and try to give it to them. That's what we did with that Target software on collaborative planning. The admiral liked it. He said he wanted to use it. I've been trying to get it out to all the warfighters since then. We're going to do this JTF with the Air Force planners' JTF, and all those other people are playing in this exercise in August 1994.

**Student:** Can you explain the non-DOD agencies in disaster relief? They're not connected anywhere in your graphic.

**Edmonds:** Let me tell you what that is. FEMA has asked us if they can play in this demonstration. I just wrote them a letter last week inviting them to go ahead and play. If you recall, in all these natural disasters we had with the hurricanes and all that stuff, one of the things that we did differently than we've done in a long, long time is that in addition to the National Guard support we gave to FEMA, we used a lot of active duty people to support FEMA. But the big problem was command and control and communications connectivity. So in Hawaii, for instance, we took the Army's MSE (mobile subscriber equipment), which is supposed to be organic to Army units and you can't take it out of Army units, and



put them out in Hawaii to do that command and control job. We're now going to let FEMA play in this demonstration, so we'll see how we'll do natural disasters in the future with FEMA rather than doing it like a crapshoot the way we did last time.

**Oettinger:** Does that mean FEMA itself is no longer a disaster area?

**Edmonds:** FEMA is still doing that.

**Oettinger:** Are they organized now? It used to be that doing something with FEMA was an oxymoron.

**Edmonds:** They're better organized, but they have limited capability in terms of communications. If you're in an area where the AT&T, Sprint, and MCI guys can help you out, they do okay. But when we get to a desolate island, like in Hawaii where the typhoon was, they need infrastructure and they need active duty military duty stuff, and we said we'd better get it in and show you how to do that. So that's why we're going to let them play in this exercise.

This has become a best seller, I might add. This has become big-time because it doesn't have any big people in charge of it. The CINCs are in charge of it and the services are in charge of it, and we oversee it in the Joint Staff J-6. I might add that on this issue of who controls air, that's also why we solved the problem of putting technical systems out there. We found out how we could do it, whether it's with Army, Navy, Air Force, or Marine Corps systems, so that issue became almost a nonissue. The CINC or the Joint Task Force Commander decides who is going to do it because we could give them the system to do it.

I just want to show you this slide (figure 13) because it's a very important one, not because I'm the chairman of the MCEB, but because when I first got down there, we used to get a lot of information briefings. We get no information briefings anymore, except a report from that demonstration back there. We have a scheduled meeting every month, and any other time we have to meet—like right now we're meeting on this big element stuff and

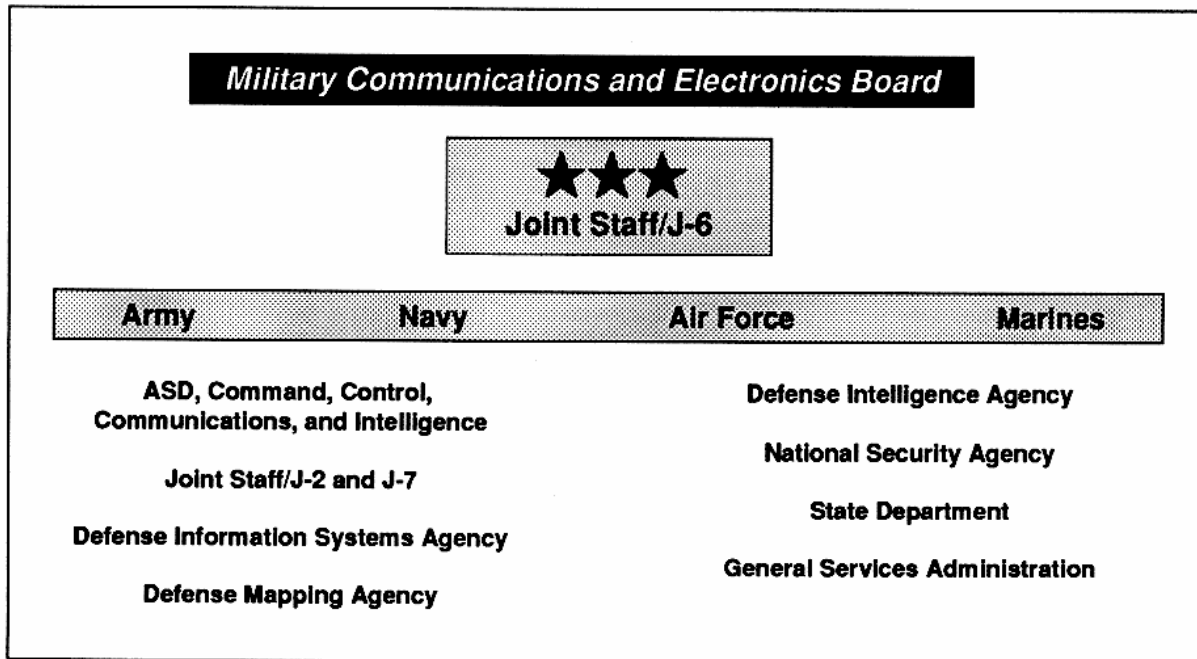
migration systems—we only deal with issues requiring decisions. We get decisions, and we don't vote by raising our hand. If you don't want to speak up and jump on top of the table when we give a presentation, we make a decision, and we put the minutes out to all the CINCs, all the services, all the agencies, so they know what the decisions are, and we send them to OSD or to the Chairman to be blessed. So every month we make five or six major decisions in the C<sup>4</sup>I area. We have all the three-star communicators and command and controllers. All the intel organizations are represented. We have GSA there. We have the State Department there. The Coast Guard and OSD and the Central Imagery Office are all there. They either stand and are counted in or forever hold their peace. We make decisions.

**Student:** I'll try to put this tactfully ...

**Edmonds:** Put it bluntly! I prefer bluntly.

**Student:** As someone who was on a joint staff, I feel there's a tension between unified commands and the JCS. We feel as though if you're in a unified command you're trying to deal with today's problems, and you're working with a JCS that is just trying to solve tomorrow's problems and force structures, and sometimes when our people went up to JCS, they felt like they got railroaded in meetings. Is there enough opportunity for the J-2s, the J-3s, the J-5s, and J-6s to speak up, because there's a big rank difference there?

**Edmonds:** I don't know what the rank difference is. I'm J-6. In my two-and-a-half years in the J-6 business, I never had the feeling that anybody in the C<sup>4</sup> business has been railroaded at all. As a matter of fact, I have three divisions in the J-6 and the only job they have is supporting and advocating the CINCs' priorities. I have action officers by name that can work what goes out to TRANSCOM, to CENTCOM, and to SOCOM. This young guy sitting by the wall here takes care of PACOM, and he's working in Korea right now. He's selling Korea's requirements for PACOM. I have not detected that kind of friction.



**Figure 13**  
**Enforcement**

As a matter of fact, when I was J-6 at CENTCOM, my biggest supporter was Admiral Tuttle. He was my daddy, and I didn't ask for a thing from him that I didn't get. One of the reasons why we have good communication on ships today is that when I was down in CENTCOM J-6, we could not do ship-to-shore communications because they had HF and the UHF single-channel communication link. We now have wideband communications on all the carriers and all the command ships because Jerry Tuttle, when he was J-6, worked that with me then. When I came to the J-6, and he became the N-6, we kept working it.

**Student:** So given that you've come to an agreement on what your requirements are, then how do you farm that out to the services so they can procure it?

**Edmonds:** Each one of the CINCs has a service that supports them. CENTCOM is supported by the Air Force, for example. We fight battles for the CINCs against the services all the time. PACOM is run by Navy guys most of the time. I fought with the Navy staff on WWMCCS (Worldwide

Military Command and Control System) support and secure voice support more than anything else on behalf of PACOM. That's a Navy four-star and a Navy three-star, but I fought for them all the time. They never get turned down when we fight for them. Their budgets get cut like everybody else, but they have a bigger stick in fighting that battle than anybody else in the Department of Defense, because the Joint Staff fights for them, especially in our business.

**Student:** Is there enough shared information so that when the commands make up their integrated priority list to bring up to the JCS they know what other commands are doing, so they share that information and we're not reinventing the wheel?

**Edmonds:** All MENS (mission element needs statements), and all ROCs (required operational capabilities) that come to Joint Staff go to all CINCs for comments, every one of them.

**Oettinger:** If I may interject an interpretative comment and, again, see if it rings true with your current experience, what I

keep hearing Al saying, and what it says to me, is how the world has changed in several important respects in being able to continue the advance and cheapening of technology, and the fact that the technology has gone out of the control of the military who once were the mainspring. But a lot of the coordinating and so on that would otherwise have had to take place inside takes place, by his testimony, in the commercial world, and therefore is unstoppable. You add to that the coercion of imploding budgets, and there comes to be a situation where people have to play ball or they've got nothing, and the logical thing to do is to buy *el cheapo el worko* from outside, which you said is already sort of the same. Then, finally, with all of that it still would not work if it weren't for personalities. There are always external forces and the rest, but if there weren't a Jerry Tuttle or an Al Edmonds or someone, it might take ten years or five years longer. But it's sort of dependent on the human personality. Those are the things I hear in this presentation, because otherwise some of the factors, the centrifugal ones and so on, are the same. Certainly you can't play the game the same way when the technology and the personalities and the economics have changed.

**Edmonds:** About a month ago, the Army three-star, Pete Kind,\* and two two-stars from the Army came down to my office and what they wanted to tell me was, "We want to give you a briefing to let you know that we, the Army, are taking the Army WIS program, the WWMCCS Information Systems program, and we're going to get in line with your C4I for the Warrior and your GCCS program because we know that in the next budget cycle, the Hill is going to ask us how we are playing with GCCS. Congress has given us almost an 18-month kind of hiatus here to get our act together. We have to do that, and it's very important that we have to do that. And we're going to do it."

Another thing has changed a little bit that we worked very hard on. One of the

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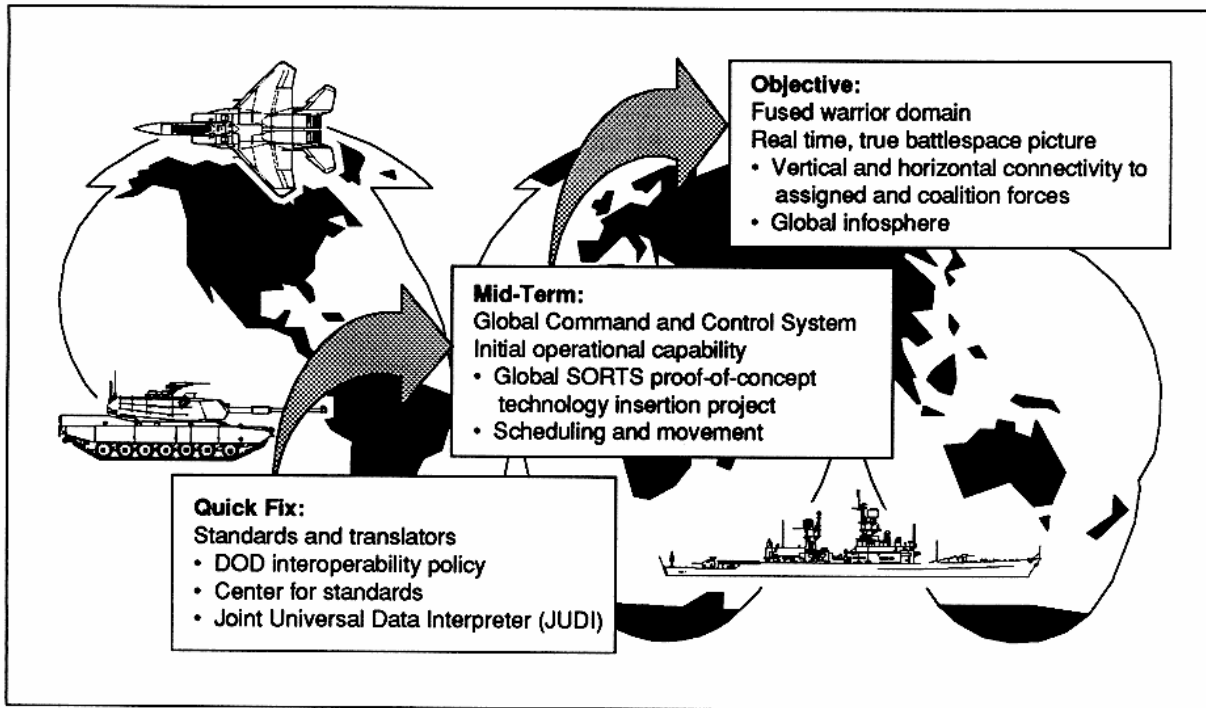
\* Lt. Gen. Peter A. Kind, USA, Director, Information Systems for C4.

problems about interoperability at the CINC level was that almost every one of the CINCs has a MITRE representative group and some ARPA kind of people out there doing things for them. For a long, long time, they were just kind of doing projects. What we've agreed with MITRE and the ARPA guys is that we said, "Look, we don't mind that you're out there doing projects, but make sure you're doing them in the course of these kinds of rules, otherwise we're going to start drying up the contracts because you're giving us some headaches." As a matter of fact, they are working very closely with us to make sure that happens.

Let me tell you about this (figure 14) really quickly. GCCS is the bridge. Remember I've talked about the concept of C4I for the Warrior a lot now, but you've got to put meat on the bones. You notice in the left-hand corner under Quick Fix, we have DOD interoperability policy, create a center for standards, and the interpreter. In Washington, you have to show some success and the Quick Fix was a success for us because we said that was the period from now to five years. When we did the interpreter, the JUDI, we declared victory on the Quick Fix.

We're now up in the mid-term. The mid-term is GCCS, SORTs (system operational readiness tests—that's the C-status kind of stuff), readiness information, and technology insertion. You've got to continue to insert technology to refresh what you're doing. Scheduling and movement is a very critical thing for moving troops and material around. One of the biggest problems we had in Desert Storm was knowing what was on the airplanes as we flew them places. That's the mid-term. That was five years to ten years, so we're supposed to finish that in the year 2003.

Now let me tell you where we are. Back to your question before, if you want to be successful in the Joint Staff, you need to be able to tell people that the CINCs have validated what I'm doing. We went out with a tiger team to every CINC and said, "If you were king for a day, Mr. CINC, what would be the core functionality you would want in a command and control system? Oh, by the way, Army, Navy, Air



**Figure 14**  
**GCCS: The Bridge to the C<sup>4</sup>I for the Warrior Objective**

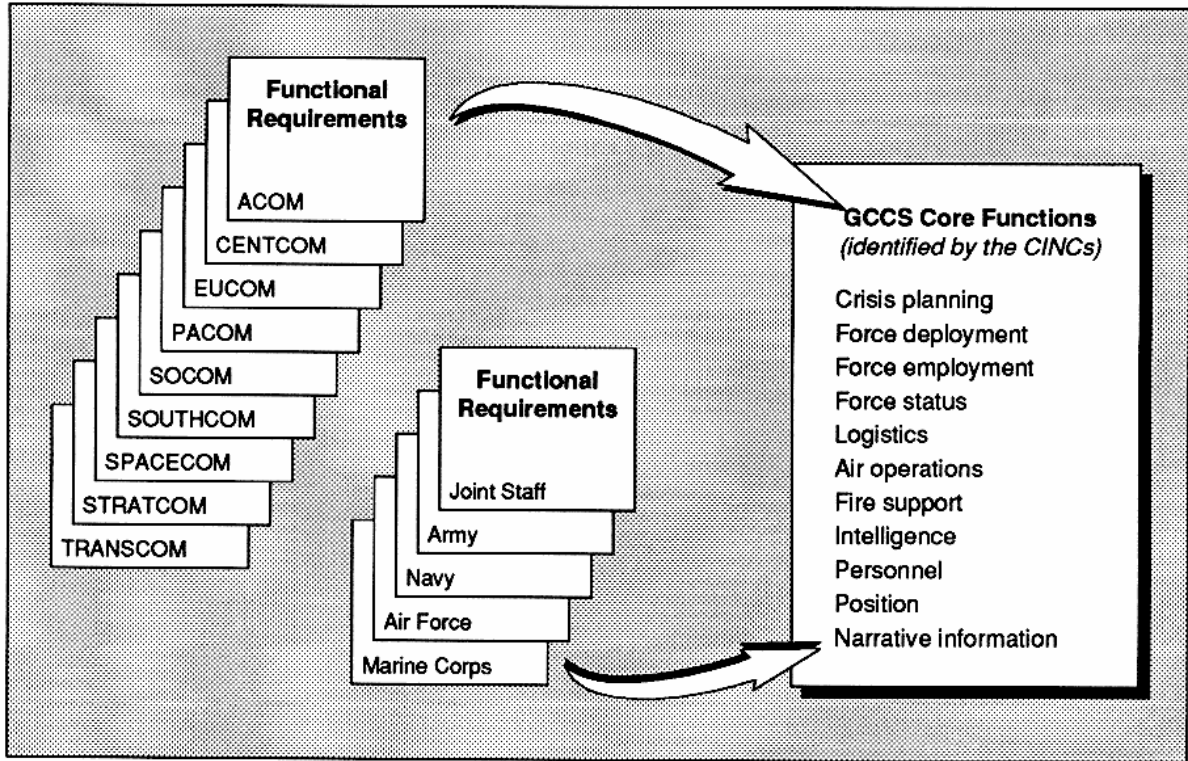
Force, and Marine Corps, you tell us the same thing, and J-3, J-4, et cetera, you do the same."

This was the result (figure 15). Some systems are operational and some are combat support. We've got all those systems out there; they already exist (figure 16). We've got logistics system intelligence, system scheduling, JOPES (Joint Operations Planning and Execution System), all those kind of things. So, on this left-hand side, there's duplication. Almost every program out there, believe it or not, has a message handling system to it. It has overhead. So if you have a thousand of those, you've got a thousand message handling systems. Sometimes you get lucky, and you get some duplication. For instance, JPL, the Jet Propulsion Lab, has a program they sell to everybody—individually or separately—over and over again.

Somebody asked about mapping early this morning. There are all kinds of mapping. You've got paper maps, real maps, blue maps, color maps, black and white

maps, database access—all those things. Most of the programs come with that overhead whether you want it or not, and you pay for that. And all you wanted was weather, but you notice that all of those other things come with it and you pay for it many, many times over.

So this is what we said we are going to do (figure 17). How are we going to get this global command and control? Again, this is part of the translator, but it's a migration kind of strategy. We went and peeled WWMCCS back and we found things that people haven't used in 15 years, but it's in there, and we're paying for it, and it's being maintained. Throw that away! It hasn't been used in 15 years! We're going to take a lot of the WWMCCS functionality that people say they like, like crisis planners. We're going to modernize those things, not just make it more like it is. We're going to move those over to the right-hand side, and those are not directly related.



**Figure 15**  
**GCCS Core Functionality**

The ARPA guys have developed some prototypes. All those things that WWM-CCS didn't do, the different CINCs asked them to please develop something to do transportation modules, logistics modules, and they did. They're stand-alone modules, so they've got to be reengineered so they can be integrated. There were some other things that some of the CINCs had, and the JUDI, and multilevel security, and some mapping. We're going to migrate some of that stuff. But there were some other requirements—operational planning, which is kind of like the collaborative planning—that we didn't have available to us. So we're going to put all of that over on this other side.

Here's our strategy (figure 18). We're going to provide on-line support to the users. Now when we started off this thing I said we could take five years and do this thing perfectly, and never give anything to the warfighter; or we can give them what we have and we can make it better as we go. I'll be very candid with you. I looked

around at all the command and control systems we had. Remember I told you how we did the translators and looked at them?

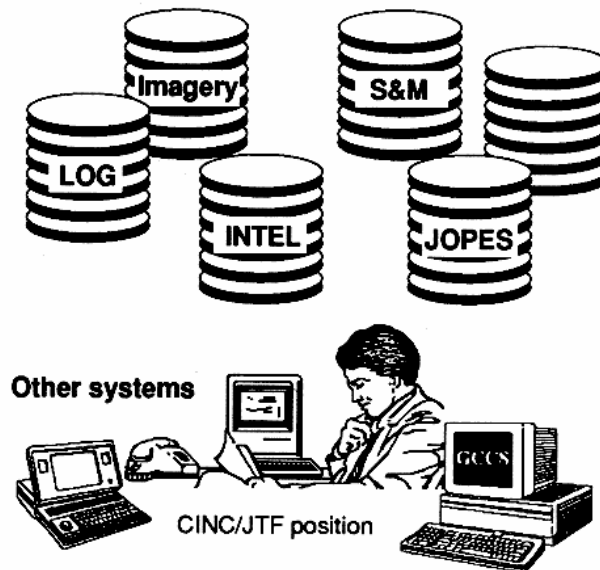
While we looked at those things, we found out that the Navy's OSS (operations support system) had more operational things that the CINCs said they wanted than any other, including the Air Force, Army, or the Marine system. So I said, "That's a good idea, and a place to start." Of course, my colleague, Jerry Tuttle, was the guy who was doing that business. I said, "Jerry, I really need you to bring this thing over here in the middle of this jointness." The Air Force and Army screamed foul. "You can't do that! We can't do that!" I said, "I can give you more with this system today than you will have with your system five years from now. Let's start with this and we'll grow it," and that's what we're doing. We're giving them help.

We've developed a network with T-1s, 1.54 megabit wideband pipes, and we're already looking at these other pieces, like the air tasking order. We took the air task-

**Numerous systems—one job: support the warfighter!**

**Duplication**

- Message handler
- Mapping
- Database access
- E-Mail
- Chat
- Word processing
- Graphics
- Communications links
- Network management



***Paying multiple times for the same capability***

**Figure 16**

**Need for a Migration Strategy**

ing order piece from the Air Force tactical system. We anointed that as being joint, and we're plugging that into the system. We are taking the message handling system from the EUCOM UCCS system, their command and control system, and we're going to plug that in as the standard message-handling system for global command and control. In the meantime, I allowed the Navy to continue to modernize and improve this other system, OSS, so that another version will come out in about six months that will solve some of the problems that we know we can't do yet.

In the meantime, we've taken the SORTs, which are the residence data, and they have one of those modules in the OSS. I can click on a ship or on a carrier. I can tell you the airplanes on it. I can give you the readiness status of it. I can tell you where it is. I can tell you the crew status. I can tell you the munitions on there and anything else you want to find out about it

by clicking on a mouse. USACOM and Norfolk have that today. Transportation Command at Scott has that today. In less than three weeks we'll have it at CENTCOM and SOCOM. Before this calendar year is out, we'll have it at all the CINCs and their components. Then we'll decide how far to go down to the Joint Task Force. We're going to put one down at the JCSE, the Joint Communications Support Element, so we can do the tactical applications for the same thing. If you were to go to a small group in the place, you could plug it in and get into the system and pull information: not push information down to the warrior, but let the warrior pull the information. So that's our support strategy. Our strategy is to move fast: give the warfighter something now rather than plan to give him something perfect ten years from now and he doesn't get anything.

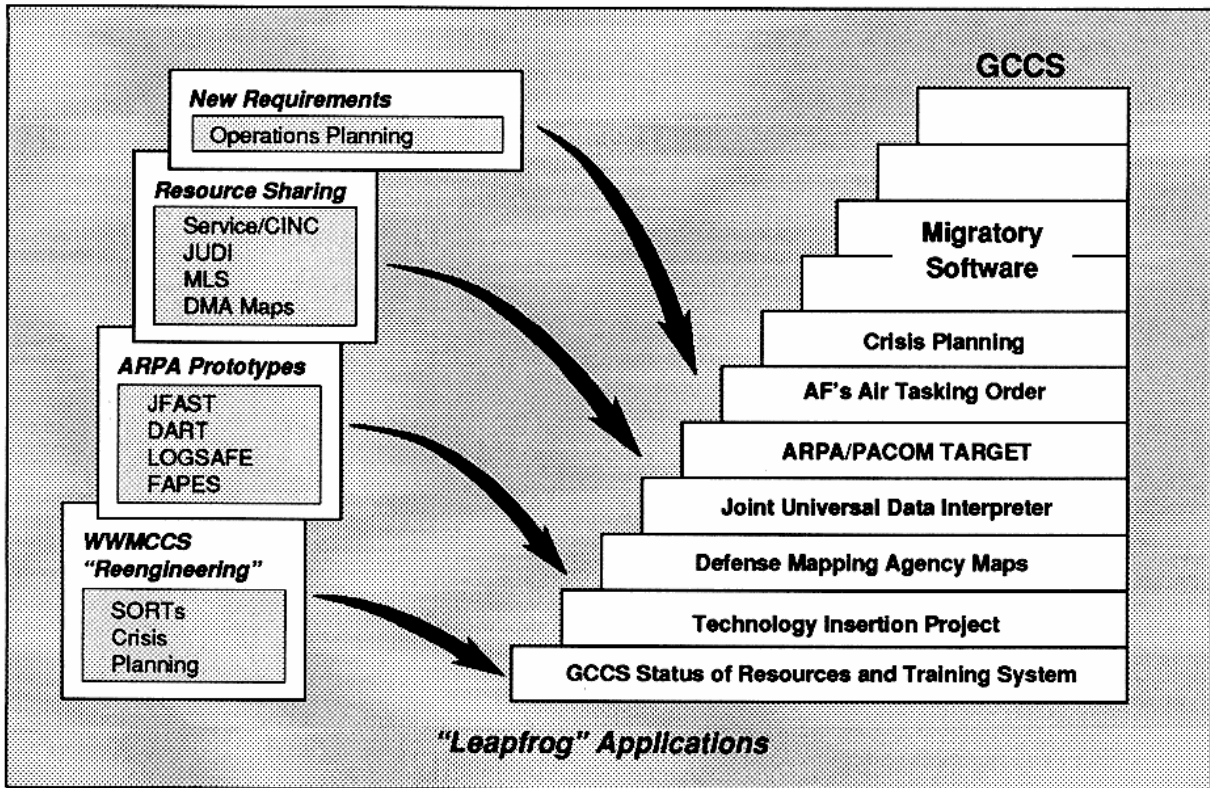


Figure 17  
GCCS Functional Development

**Student:** I know you discussed this at lunch, but I wonder if you'd say a couple of words on security. How do you protect that system?

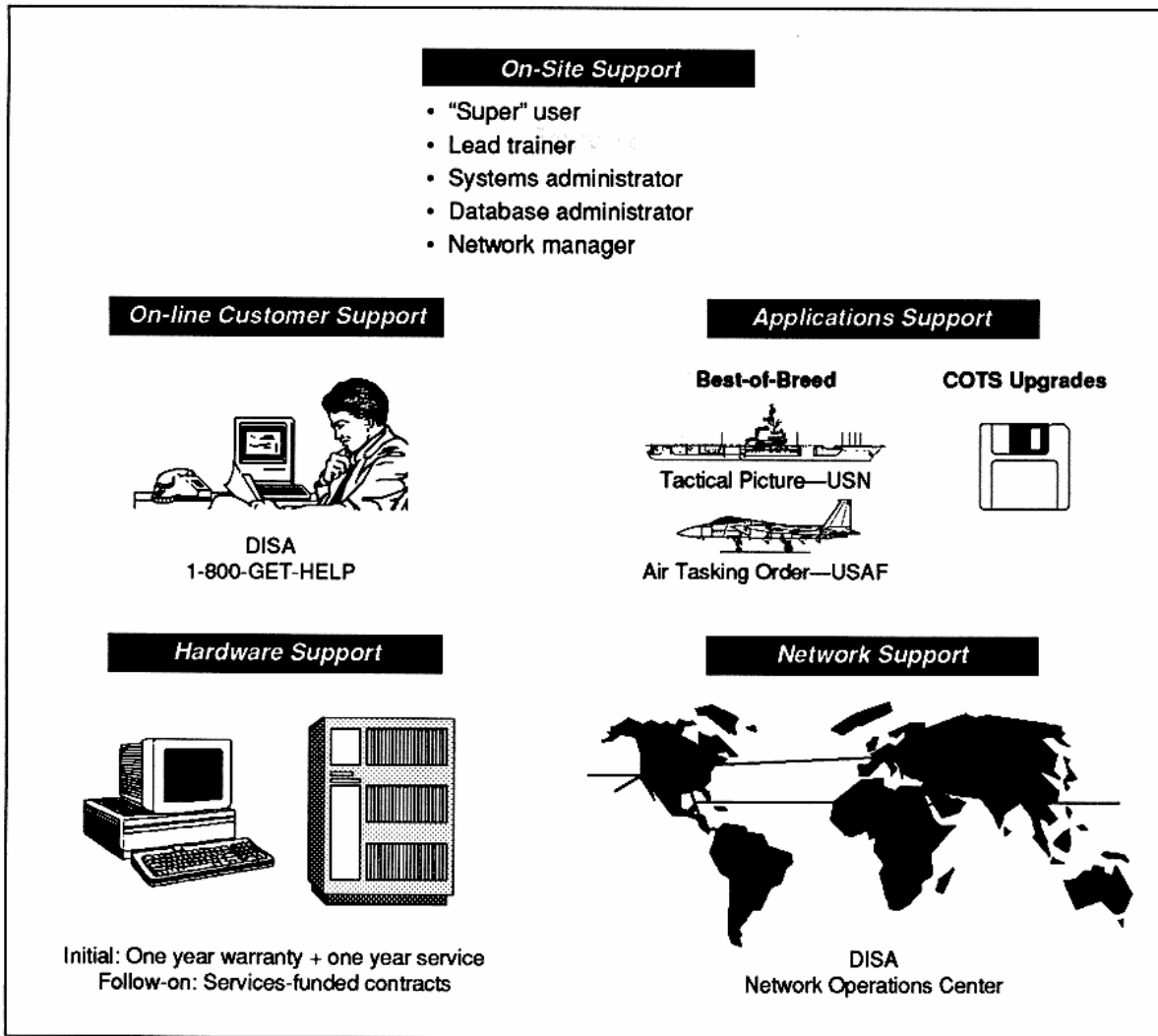
**Oettinger:** Before you get to that shift in topic, let me, if I may, request that you stay on this for a moment because you're telling what sounds to me like a very interesting and important success story. In my mind, as you're talking, I contrast that with what I regard as a failure of considerable proportions, which is a similar-sounding effort in the corporate information management system area. Maybe I'm out of date or maybe I'm mistaken, but if the observation is correct, then would you say something about what you think the reasons for the differences are? I may be wrong.

**Edmonds:** No, the reason for the difference is this. When they started doing corporate information management, back in

1989 or 1990, I recommended this approach of picking the "best of breed" to them, and Cindy Kendall,\* who was running it at the time, and Don Shycoff agreed with us, and we had started doing that. As a matter of fact, even today, the services have agreed on best of breed for fixing logistics systems. Then came Strassmann, who loved modeling and studying and that kind of stuff, and so since 1990 or 1991, whenever they came on board, they've been modeling and studying stuff and they haven't done anything.

I took a lesson from that because I've been in Washington since 1989 in different capacities. I said, "If I'm going to do this job and do it effectively, the first thing that I have to be is dictatorial, and I have to pick the right choice, go with it, and make it

\* Cynthia Kendall, Deputy Assistant Secretary of Defense for Information Systems.



**Figure 18**  
**Warfighter Support Strategy**

work, and give the warfighter something now rather than model the perfect solution in the future and never get anything." They have spent millions of dollars trying to get the perfect modeled corporate information management arrangement. In the meantime, we didn't have a system that warfighters could use to do this job. That's how we got this split between business systems and operational systems.

I split command and control away from that because I didn't want to do that. We modeled for two weeks and we only did that to get some money from them. We sat down with the inverted tree and let them play with it because we already knew. Then we took the best of breed, which is OSS.

We said, "Give that to us, because that's the only system that we know of right now that can show a warrior the combat battle space right today. Give him that, plus interface and integrate, as you can, additional capabilities." We've been doing this down at Norfolk since October. The simulation guys still don't have a success story other than something that they just picked from something somebody else had done, and said, "That's a good idea." This is scratch. We took the Navy's tactical command and control system; we put this out in the field. If I could put the JOPES, the deliberate planning piece of it, with that system today, I would wash my hands and say, "End of discussion." The only thing I'm working



now is trying to get all that old JOPES stuff modernized so I can bring it forward to the survey environment, so I can get it to the warfighter. It can do the warplans for you: building the package to deliver to the troops. As soon as I get that, my objective phase is going to be complete. They are going to cycle and just modernize and improve it—commercial off-the-shelf packages—and plug it in. We do it in modules. So that's a good package today, but if I find a better one tomorrow, take that out, test this thing over here, and plug it in. I'm going to put support teams out there to each one of the CINCs so they can do it and capture them so they'll be technically smart.

That's the other part of the problem. We still have a lot of people out there who are dated in technology and they keep wanting to have a communication solution rather than a software engineering solution. We've got to start treating it like a science rather than an art, so that you understand how to do it. We're doing exactly that, so I have satisfied customers and this is months, not years. Before this year's out, they will all have a tactical warfighting capability at the CINCs and the components and as far down as you want to take it.

About the security thing, we have made a conscious decision that this system will be Secret high only. It's almost a binary thing: either classified or unclassified. We're going to downgrade the classification on WWMCCS from Top Secret to Secret. The only thing we're going to have to do is take the nuclear part of it, or the strategic part of it, and do something different with it. The number of subscribers to that is small now in the post-Cold War era. So we don't have a whole lot of subscribers who need Top Secret access. As a matter of fact, we think we have other systems that can do the same job just by the rolling the same software on that system. We're still working the MLS problem, though, as a matter of course, because we think there's some utility for it. But I can tell you why we took this approach. We had multiple dollars on a lot of contracts for MLS, and we were spending it all and getting nothing. Those products that we were getting were primarily for unique applica-

tions, rather than something we could export to other places.

**Oettinger:** He's a Canadian civilian, so MLS is multilevel security.

**Edmonds:** They talk to me about it more anyway. The U.K. people talk to me about that more than anybody else. They like the B1, B2, C1, C2 security levels.

But it's not an admission of defeat. It's admission of reality, and we've got our warfighters saying, "We're willing to take prudent risk rather than keep wasting millions of dollars trying to get a solution." But we're still working at it.

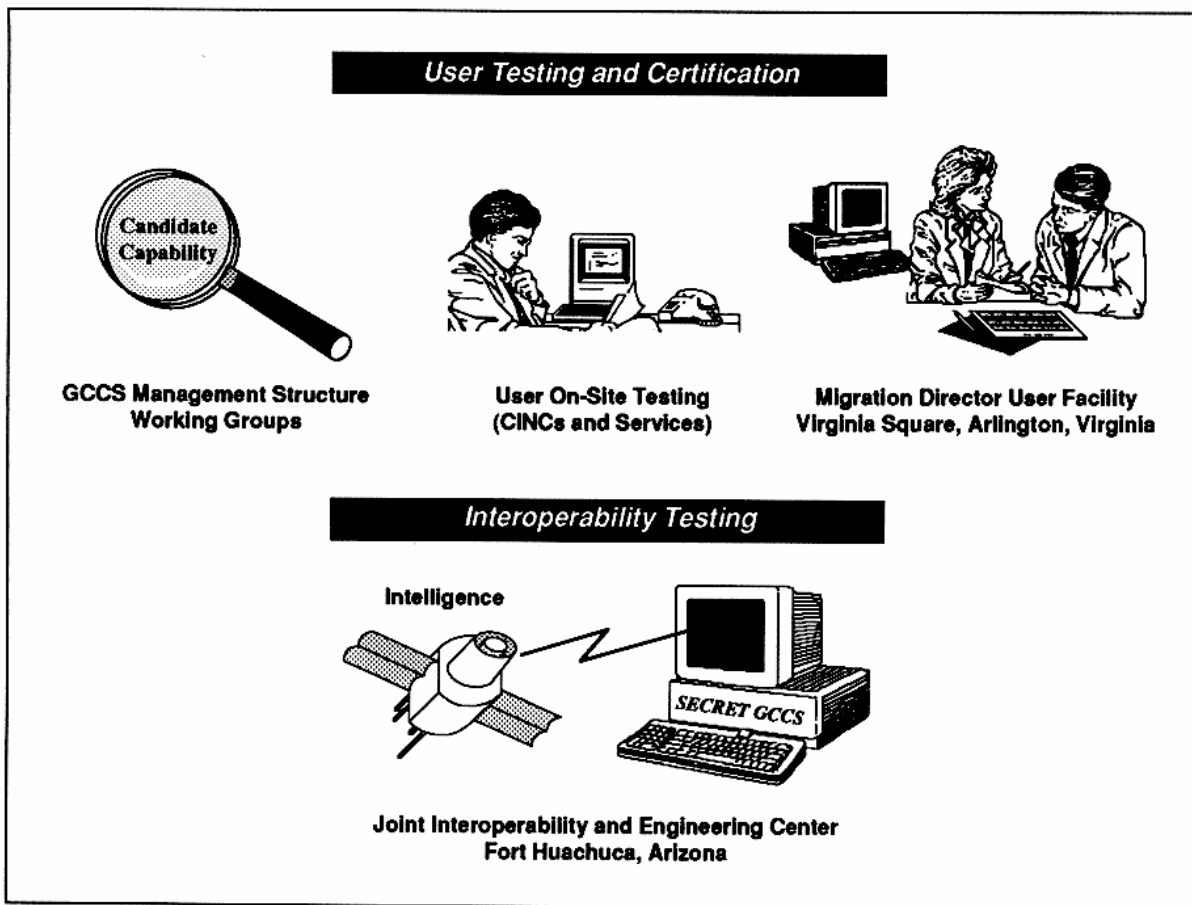
**Oettinger:** Again, if I may, I think it's worth underscoring the enormity and novelty of what General Edmonds just said. That is, the willingness to take a risk in this area is such a novel concept in a military realm that it beggars the imagination. I've heard it first here: that someone responsible for feeding things to operators is making that kind of statement. It's a change of mindset that is absolutely critical because it marks the difference between the whole civilian and military world. For years civilian folks have been refusing to buy any of this security stuff for one very simple reason: that they'd be that much more willing in their environment to take risks and say, "We'd rather lose umpteen dollars than pay ten times that to protect ourselves against the risk," in the same way that you buy or do not buy an insurance policy depending on what you think the risk is. So what I hear here is an absolutely major mindset switch, from an absolute security requirement to taking out insurance on security. Is that correct?

**Edmonds:** Absolutely. It is.

**Student:** If I could just second that, I think there's a similar novel mind switch in the civilian government area, too.

**Oettinger:** The private, commercial sector has had that all along.

**Edmonds:** I want to show you this (figure 19), just so you get a feel of how



**Figure 19**  
**Evaluation and Testing Strategy**

we're doing this. We get the users on-line. What we did down at Norfolk at the first site is we put the users on the system and we got on this other end with them, and said, "You tell us what you don't like about the system and we'll fix it as we go." They call it prototyping. You have to define these terms they use to keep the other folks out of your business, and we're doing exactly that. Then we're doing the migration, but we're also doing interoperability testing. As you find new pieces to put in there, we run a test on it before we fill it, and we're just kind of populating this system.

**Student:** General, with contingencies getting smaller and smaller, and with the ambassador being the country team leader, is the Department of State starting to play with this and getting some of the things to the embassies?

**Edmonds:** They would like to. We haven't done it yet. That's always a point of contention between State and Defense: how much should an ambassador get involved in operations? To be very candid, we keep them out of current operations. They don't like it. What and how much you tell him depends on the relationship you have with the ambassador, and the reason for that is you have some problems sometimes. You can have the ambassador reporting different information to the State Department than the operational commander on the scene, and that's absolutely a thing you don't want to happen.

But there's a fine line between them. When I was down at CENTCOM, every time we did anything out there, we got blasted by the ambassador. "Why are you guys taking out a Boghammer right off the coast of the U.A.E. and not telling me?" If

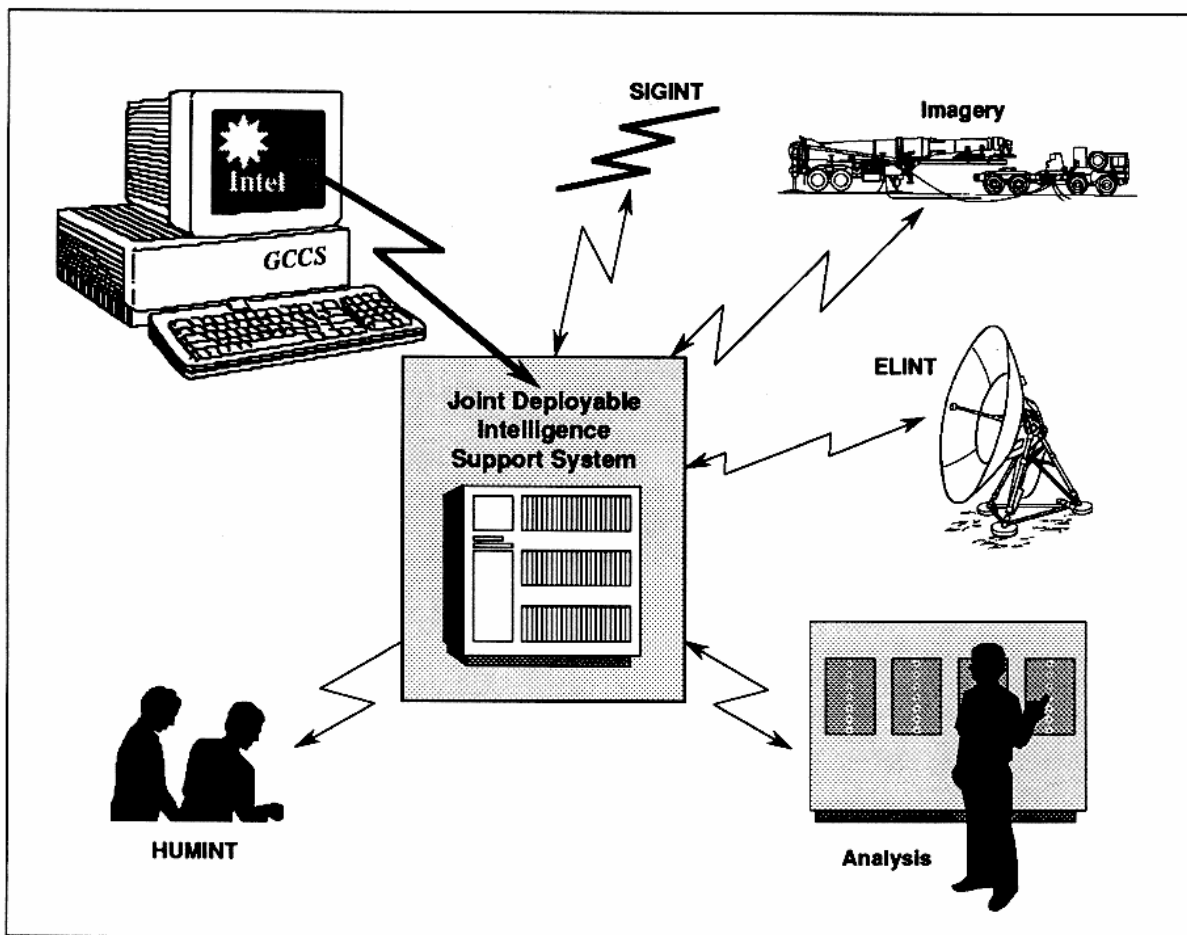
you told him, he'd go over and tell somebody and then it would be in the papers, and you haven't done it yet.

**Student:** In SOUTHCOM it was just the opposite. We had a really good relationship with the ambassadors across through the Andean Ridge strategy. It just seems like it would be a big payoff to get the State Department involved.

**Edmonds:** They will be. They're in the WWMCCS system, everybody's in the WWMCCS system all around. But the biggest payoff we find with this, believe it or not, is going to be with our allies, because they're the ones who are also going to be in here. The NATO nations, the

Pacific Rim nations, are already interested. We briefed the Canadians last summer when I was up there. We might even demo this in London this year when we go over there. They've asked us to. What we've got to do is bring them with us because a lot of our bilateral relationships—Navy-to-Navy, Air Force-to-Air Force, Army-to-Army—are really critical. So we're working all those things as a matter of course because those are the considerations you have to do.

What I want to tell you about the future (figure 20), because this is the intelligence focus for my Agency friend here, is that you're going to be able to get in this system, click on intelligence, and once you click on intelligence, you pull what you need to pull in terms of intelligence.



**Figure 20**  
**The Future**

Whether it's national intelligence or tactical intelligence, or whatever it is, you're going to click on the "I." This Joint Deployment Intelligence Support System (JDISS) is going to be the standard. Behind that icon on that window, you can get back in and find what you want and pull it out on this system.

Now to make this possible, the intelligence folks have agreed, for the first time, that most of their mapping and that stuff that used to have all those funny things on it are going to be Secret high. They're not going to be compartmented anymore. So that's very important also, because that becomes usable information. One of the biggest hangups I've ever had in the past is that you couldn't use the intelligence information. It was always too classified. By the time you got it declassified to the point you could use it, the event was over. So that's a very big breakthrough also.

**Student:** General, that is an enormous breakthrough! How on earth have you persuaded your intelligence folks to decompartmentalize a lot of this stuff? You can do it for imagery perhaps, but what about the rest?

**Edmonds:** Let me tell you what we found out. Technology has helped us so that now we can protect information and we can also do what we used to call "sanitize" information a lot faster than we could in the past. In the past it was almost a manual process. So now technology helps us to get to that point sooner.

**Oettinger:** To add a point to that: if you go back in the records in the seminar, you'll find Admiral Inman who, in his Director of NSA days, was beginning to say things like that because it was becoming obvious that one could do this.\* It's taken a decade to go from talking about it to making it a reality.

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\* Bobby R. Inman, "Managing Intelligence for Effective Use," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1980*. Program on Information Resources Policy, Harvard University, Cambridge, MA, December 1980.

**Student:** Just to be absolutely clear, what you're doing is a process of two things: first, redefining some of the material so as to keep it Secret high; and second, sanitizing the material you can't redefine to a Secret high level to push it out. The assumption you made, then, is that the commanders in the field who are going to be clicking on their icons all have Secret high clearances.

**Edmonds:** Exactly. We'll have security built into the system so that you can't have access to the information at other than the classification that you have. That's very important. That's the technology advantage that's coming in software a lot now. We used to do this all the time with hardware and with crypto equipment and stuff. A lot of stuff is done with software now. We'll still be using crypto and those kind of things, but it's important because we want to be able to allow the commanders to pull information that they need when they need it, wherever they need it. If it is not available, you cannot pull it. But if it is available, you want to be able to pull it, and you want to be able to pull intelligence as well as logistics, operations, or personnel—whatever you need to do your job and make decisions. We're improving our processes so much that we can do that now.

**Oettinger:** This is a watershed presentation in many ways, and just to answer the other question, in part, it is also a reaction to some of the rather public failures or complaints in the Gulf War. Field commanders went on record saying, "We didn't have this or that." So along with all these technical and other factors, if it were at the beginning of the semester I would at this moment say, "Here's a wonderful term paper topic," in terms of looking at all of the ingredients that went into helping what General Edmonds now described as something jelling in place that becomes workable. One, or two, or five years ago, there may have been ideas in bits and pieces at various locations, but it couldn't have come together.

**Edmonds:** Dick Macke, who is my predecessor, as I told you earlier, was an F-18

pilot, Navy type, vice admiral, and I was a communicator. We sat together for 18 months, he having the operational view of what he needed to do his job, and I having the technical background of what we can do to help you do your job. We took all these things that have been out there forever, that no one could bring together, and said, "You don't need to do that anymore. Why do you need to do this kind of thing? Let's just put out boldly."

As you take this information forward to the decision makers like Dr. Perry, Dr. Deutch, and all those kinds of people, even before Secretary Cheney and Chairman Powell, you've got to get this information to the warfighter. It's more important to get the information to the warfighter than it is to keep this stuff back here and say, "I have something you don't know. It can save lives or help you do something very effective, but I won't tell you." So you get off your duff and do something with that information. You put it in a format that you can provide to the warfighter. That's what we're talking about doing.

I'm showing you this chart because this is something that's public knowledge (figure 21). The Joint Worldwide Intelligence Communication System, JWICS, is the Top Secret SCI part of intelligence dissemination. The blue is around Washington D.C. They've all got wideband communications stuff. Intel guys love me for giving this slide. This is one they gave to me. You notice the two flags up there at the top there? Those guys get the information also. The red boxes mean they now have the same capability; they've got wideband intelligence information on-line. The other pieces will also get them. You'll notice we're sharing information with our allies, with our departments, and this is Secret kind of information. But this system is Top Secret SCI, and this compartment also has video teleconferencing with it.

This is to let you know what our real problem is (figure 22). We have no problem with disseminating intelligence down to the Joint Task Force, none whatsoever. We have the communications. We have the system to do that. Our real difficulty is getting intelligence down to the foxhole, down to the warfighter, and we're going to use a

lot of commercial communications to do that because they're available. Do you remember that slide at the beginning of the briefing (figure 5) with all those satellites and things around the world? You could do that. You might have to encrypt it, but you can do it.

**Oettinger:** It occurs to me that you could endear yourself with the Vice President, a notable Harvard alumnus, by calling those off-ramps, because the off-ramps problem of the national information infrastructure (NII) is precisely what you're describing here.

**Edmonds:** In a few months I'm going to change this briefing a bit when I change jobs, and I'm going to call this part of the information superhighway.

**Student:** Are you worried that you can overload the guy in the foxhole—that you are going to present so much information because he can pull it?

**Edmonds:** The notion is not that you are going to overload him; the notion is he pulls what he wants and needs. You don't send him anything. That's the notion.

**Student:** The more information there is, presumably the longer the list is to select from.

**Edmonds:** Let's assume this. If I'm on an aircraft carrier, I want the air tasking order. I don't necessarily want to know about the ground-order battle unless I'm going to be doing interdiction today. I pull the air tasking order. I get my mission. I frag my stuff. The whole idea is selective information. Right now what we do is push all of that to you, and I'm afraid you'll have too many zeros and ones on the floor. The pull notion is: I have an area of interest, I click on that area of interest, I pull information from that area of interest. If I need more information, I click someplace else to get more information. That's the whole notion.

As a matter of fact, the other notion is that every single server out there won't have all the information on it. For instance, the Transportation Command out of Scott is

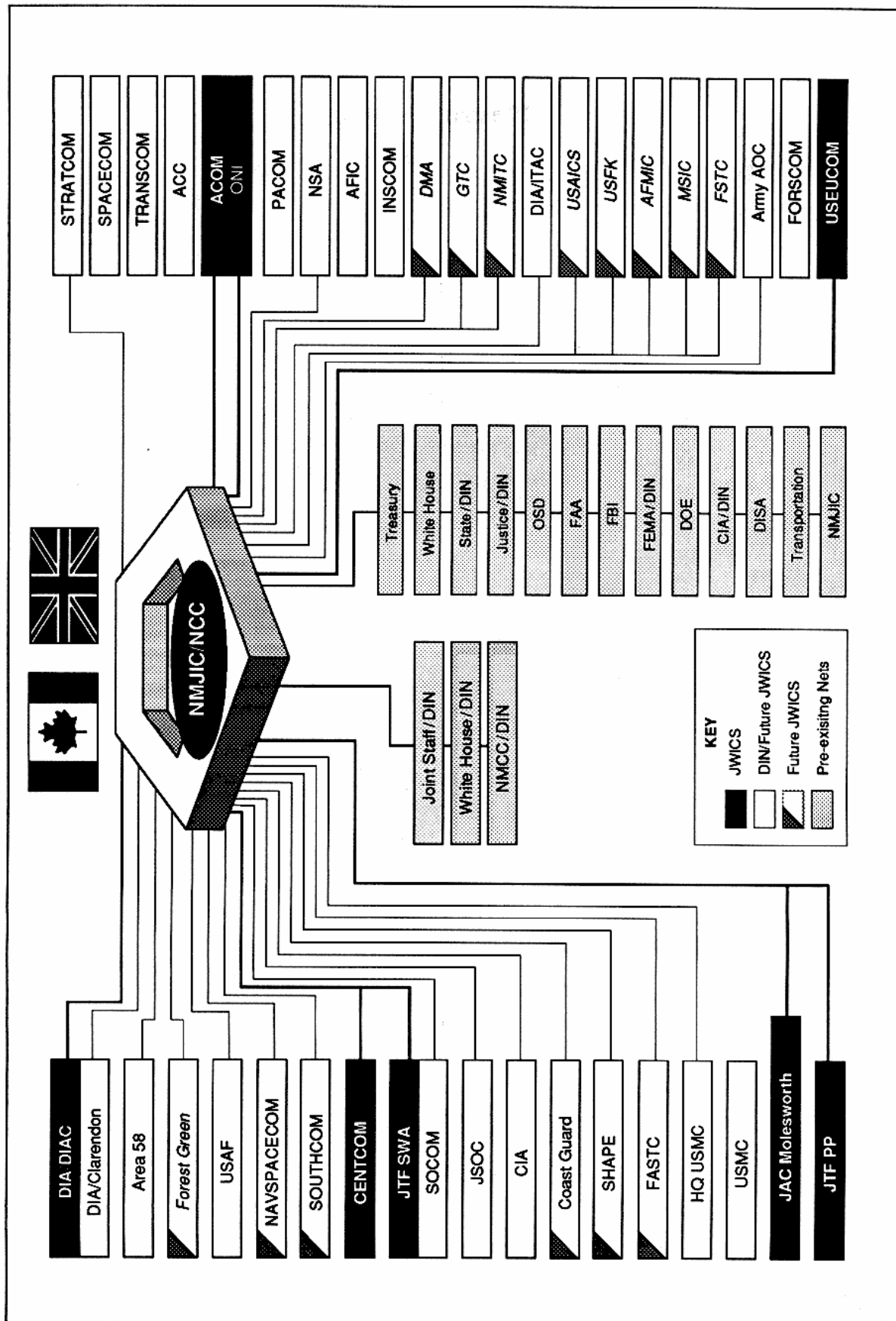
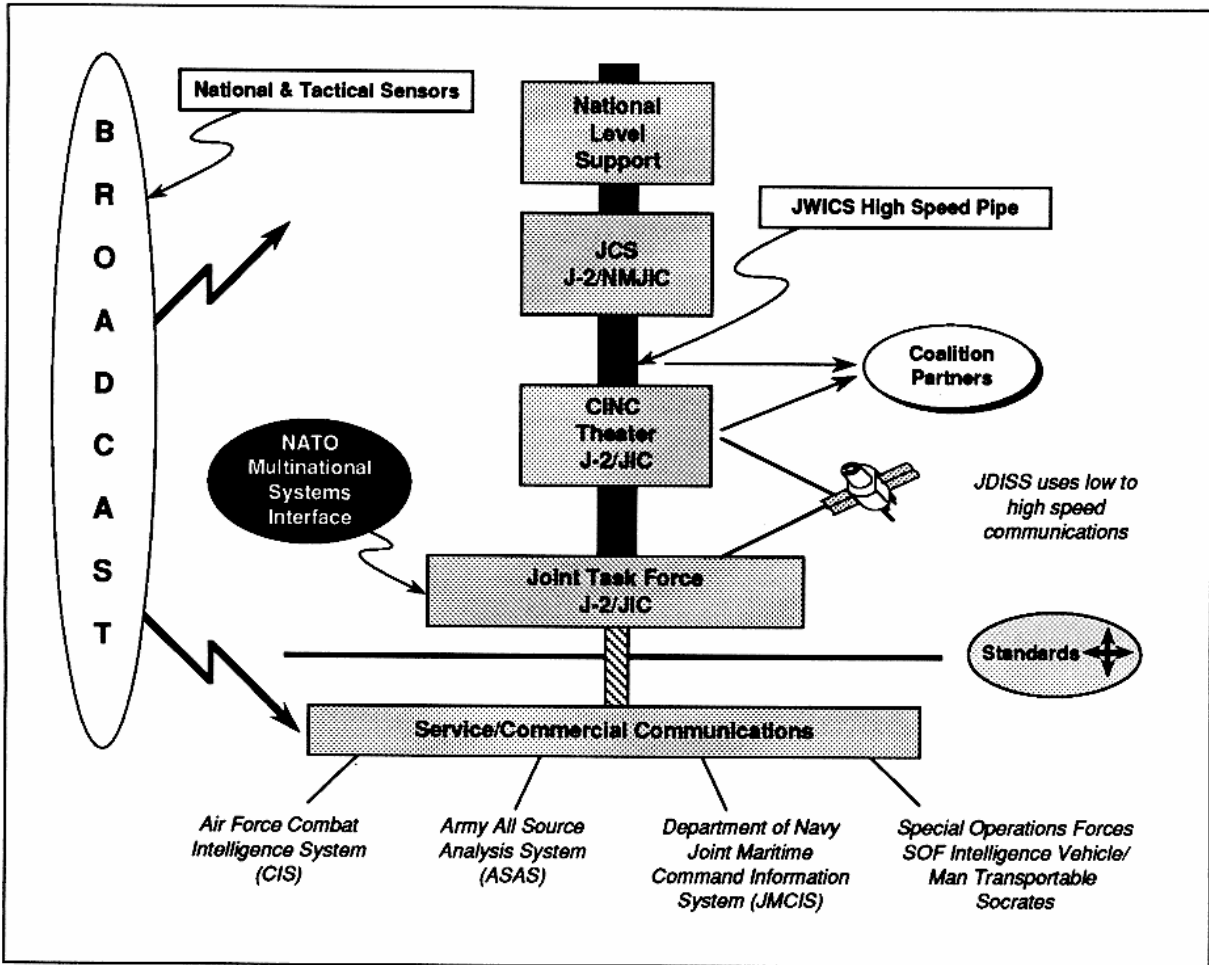


Figure 21  
 Joint Worldwide Intelligence Communications System (JWICS)



Ref: Joint Pub. 2-0

**Figure 22**  
**Joint Intelligence for the Warrior Architecture**

going to be my transportation guru. He's going to have all kinds of information out there that he has in this transportation database, so if you want to haul some paratroopers from Fort Bragg someplace, you don't have to have that on your terminal down at Fort Bragg, North Carolina. You just whip between North Carolina and Scott to do your warplan bid, your program for moving paratroopers, and you don't have to get into the rest of the system.

**Oettinger:** It seems to me this information overload thing is a bunch of bull. The civilian side, the commercial side, is beginning to have systems where you tell

them your profile, and out of the whole ocean of blah, blah, blah, they help you select stuff. Now some of that is still dreamy and doesn't work very well, but little by little the problem of reducing the complexity of this stuff is coming in sight.

**Edmonds:** When I call my bank and check my account about once a year, I hit "#" and my number and I get the information. My daughters, who just got their little jobs and don't have much money, write checks, and they call every day. They write a check this morning and call back to see if it's cleared, and if they would get that information sent to them every day, they'd be

in overload mode. But they're just absolutely delighted by the fact that they can sit down and peck out the numbers and pull it, because Dad told them "No bouncing checks!"

I use the same kind of analogy. E-mail is a good case in point. I get a hundred e-mails a day on my screen. I click on them and read the first line or so, just to see where they're from. I get the Air Force news every morning from a sergeant down in AFNIO (the Air Force News and Information Office). I don't ever read the Air Force news. I hit 8—delete—every morning; it's the first thing I do when I come to my machine. So they're sending me information, and I don't want it. If I want Air Force news, I want to be able to call the Air Force news up and read it. It's that kind of thought process.

So I'm working the pull part of this thing. I'm not working the push. I don't do push. I don't like push at all. If the warrior doesn't want to hear from you, don't talk to him. Train him before he goes out in the foxholes to know how to find his target, and if he doesn't call you, don't call him. If he calls you, make sure you have the information he wants or he can get it easily; very friendly. That's the notion here.

I want to show you these right quick because I want to impress upon you that we are migrating to standard kinds of things. Do you remember, when I told you about the JDISS, the intel icon you're going to click on? All those kinds of systems in the Army, Navy, Air Force, and the Marine Corps and the national systems, are migrating to a Joint Deployable Intelligence Support System that you can click on as a warrior and pull in intelligence out of there.

These are some foot stompers (figure 23). Intelligence is kind of more associated with C<sup>4</sup> because we need the same pipes and same bandwidth. We need a lot of bandwidth. We have a migration strategy, it's a core functionality, and we're also migrating the command and control system right along with intelligence.

Now I'm going to show you that the Army is doing the same thing for command and control systems (figure 24), and you'll notice these functions they talk about in this core. Some of these things will take the

**Intelligence becoming more closely aligned with C<sup>4</sup>**

- **Ride the same pipes**
- **Share the same bandwidth**
- **Moving to common migration strategies under GCCS**
- **Intelligence systems will be a core functionality of GCCS**

**Figure 23**

**Intelligence and C<sup>4</sup> Integration**

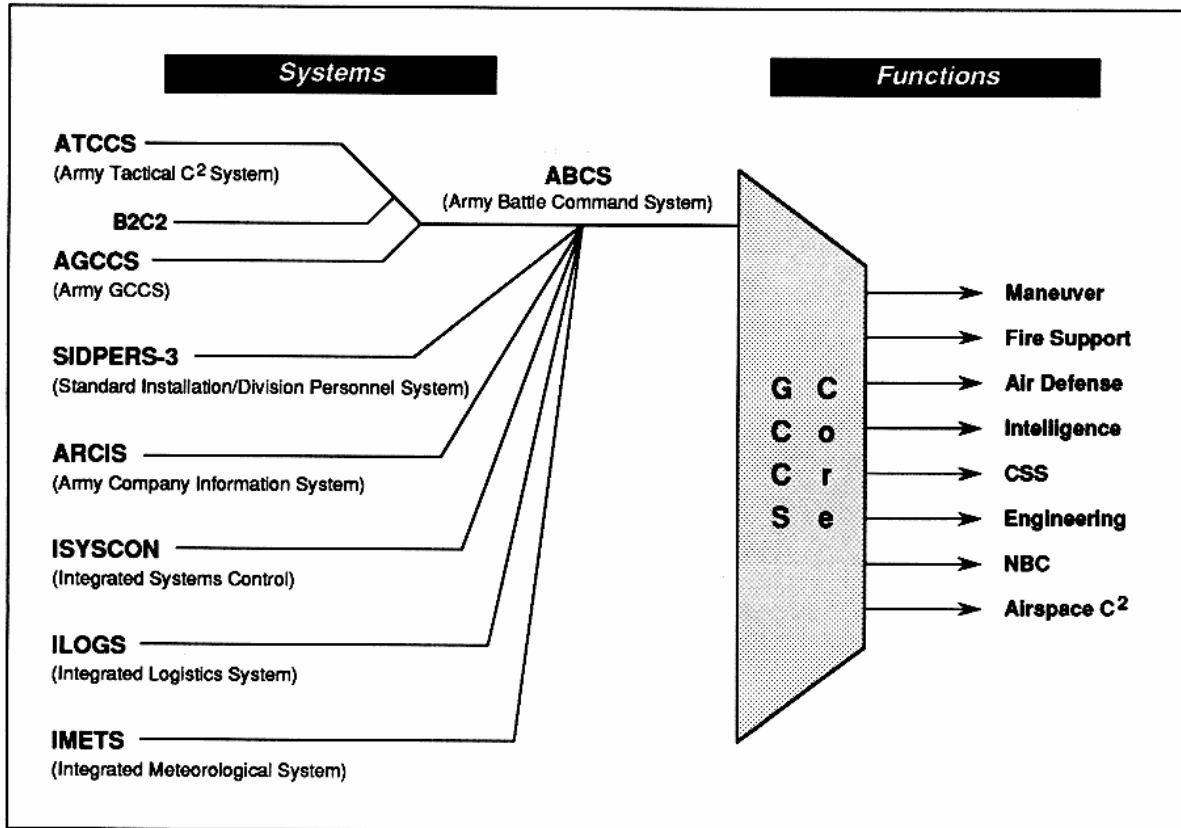
Army, Navy, Air Force, and Marine Corps, overlay them and see where those accumulate fire support, and we'll have a fire support module.

Here's the Navy (figure 25). The Navy has done a lot of good stuff. The Navy has outstripped the other services. They got on board real quick because they almost sat out the war in Desert Storm, and they won't let that ever happen again. The Air Force is doing better (figure 26). It's my service; I've been beat up on a little bit, so they're going to be glad when I leave J-6 because I've been using a lot of Navy stuff.

Space is ultra high ground. Space is really a force multiplier for communications, intelligence, navigation, and weather. Without space, we would be back where we were 25 years ago. There are a lot of things in space that make things easy for you: it's distance insensitive, superb technology; it's getting better and better and better.

We are creating, as part of the President's information superhighway, the NII, Global Grid, whatever you want to call it; you have to use all those words to be in vogue. AT&T has wrapped the world around about seven times with fiber. With the satellite systems, other terrestrial systems, and military satellites, we're going to have a worldwide network to allow you to plug in anywhere with your password and pull information. They call it the Defense





**Figure 24**  
**Army Migration Systems**

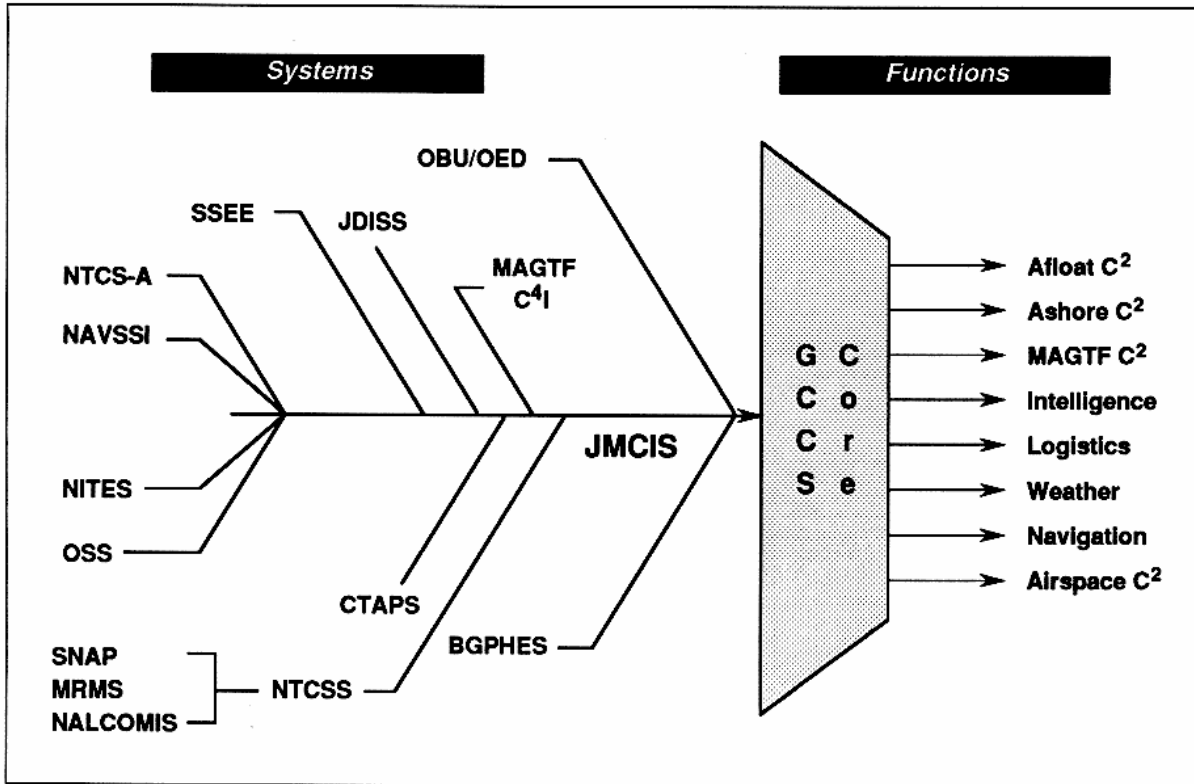
Information Systems Network. We're going to call that NII the National Information System Network one of these days. I'm going to propose that.

Now the concept is this (figure 27). The DISA had some circuits and things they called the Defense Network. It used to be AUTOVON, AUTODIN, and all those things; they had that piece. DLA, the Defense Logistics Agency, had their own network. The Navy had a network with smart multiplexers on it called NAVNET. The Air Force had one called AFNET. All were kind of stovepipe systems, primarily to save money. They couldn't exchange information between them, but it was saving money. What we basically want to do is take all that stuff and put it in one thing called DISN, Defense Information Systems Network, that will be purple and can haul all kinds of things for all kinds of people and interface and interoperate and hook up

to the tactical and give it all the duplication that cost us a lot of money. This is fast talk now.

Information warfare is a new global campaign. The threat is real. It's a national issue. We're trying to get a national policy on information warfare; it permeates all disciplines. The key word here is warfare—that's very important, because a lot of folks are trying to make it other than just warfare.

I think I have three of the pillars of information warfare, and this is a J-6-created chart (figure 28). In the Joint Staff, J-3 is OPR (office of primary responsibility) for information warfare, as it should be because they're the operators, the warfighters. Their target information system belongs to J-3. But three legs of this thing belong to me. Defend information systems, protect, is COMSEC, information security, a trusted system design; that's mine.



JMCIS = Joint Maritime Command Information System

**Figure 25**  
**Navy Migration Systems**

Assured spectrum availability: we're now creating a joint spectrum management center so we can manage spectrum—frequencies—with a single voice. When we started auctioning off frequencies in this nation, we got to a point where we had every service going over to Washington, begging for their part of the spectrum, "Save my piece, save my piece." If the Air Force got a piece, the Army was going to undermine them. So we're going to speak with one voice from the Department of Defense, from the joint spectrum center. Information technology is enabling execution of things like GPS, Internet, cellular phones. While they enable information, they also create vulnerabilities.

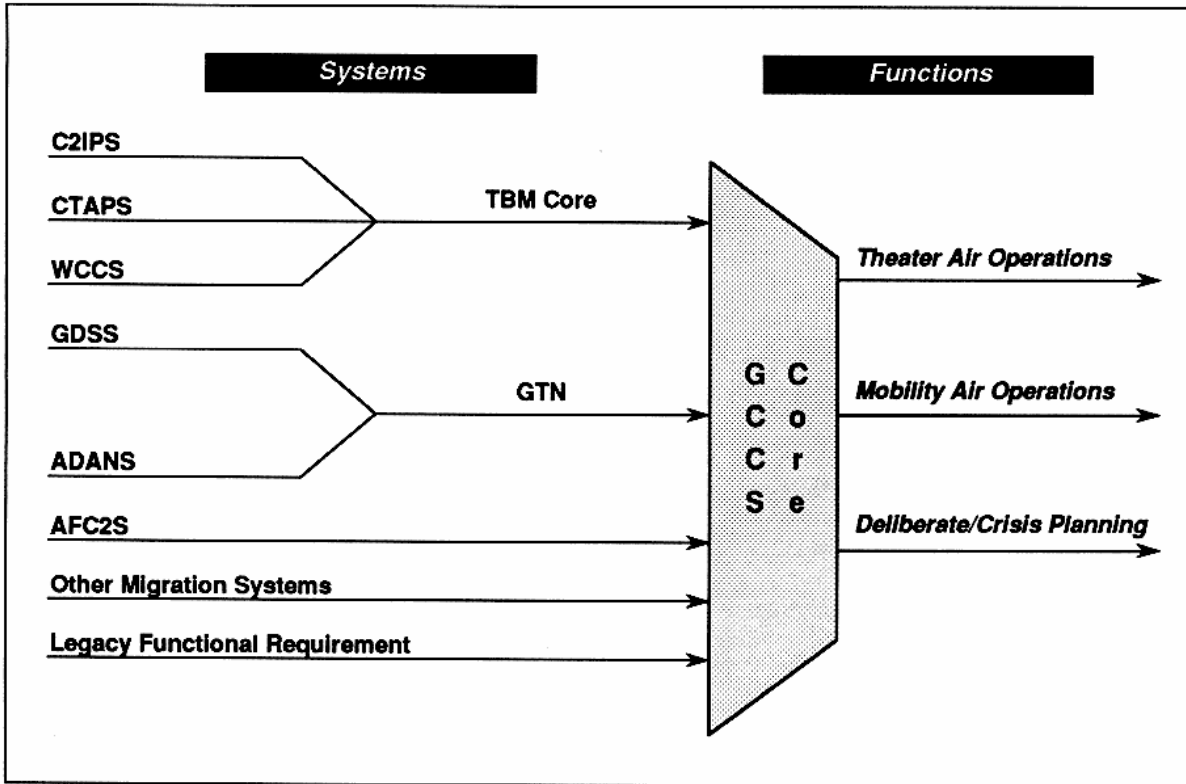
This is the command and control part, the part that we in the Pentagon are responsible for (figure 29). Other agencies, such as the CIA, NSA, and those kinds of people are all involved in the other pieces of it, in protective maintenance, software, and databases; but this part here is ours. This is

the warfighter's part, the J-3's, CINC's, killer's part right here.

You've seen the vulnerabilities in newspapers and things—jammers, hackers, deception, destruction, sniffers, viruses. We have sniffers looking for passwords to all kinds of things. So we are looking at how we protect our systems from the same things that might be of an offensive nature at another time.

Our goal is Four Services—One Team. As General Joulwarr in Europe said, "One Team—One Fight." I say that C<sup>4</sup>I, without a doubt, in today's environment is the tie that binds. End of presentation; 13 minutes for questions.

**Student:** I hate to bring it down to such a narrow perspective, but I've got to ask this question. When am I going to be able to go to my submarine, raise the periscope, flip on my computer, put in my password, and find out not only the ships that are in the way of my Tomahawk flight path, but also



**Figure 26**  
**Air Force Migration Systems**

any land elements that might be there, the weather down line, et cetera?

**Edmonds:** You can do that today if we get the money for the Navy to put that in the submarine. What I'm doing right now, this week as a matter of fact, I'm giving the services a POM wedge to put in their POM to get the money to do that part below the Joint Task Force Commanders. I'm responsible for the Joint Task Force Commander up. I'm telling them how much they need to do, what it costs them to put that in your submarine as soon as they want to, as soon as they get the money for it.

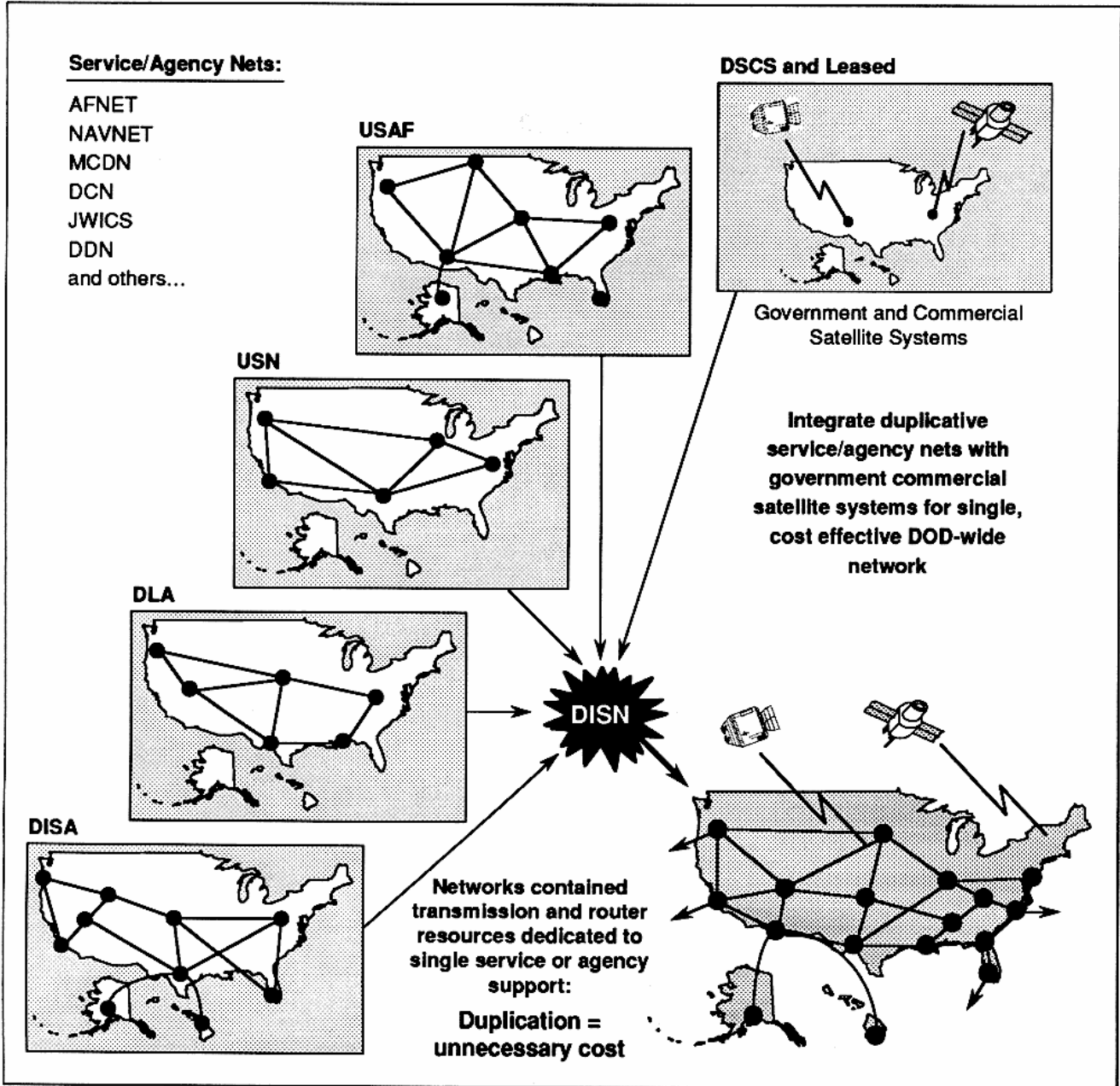
**Student:** It'll be the Navy's decision.

**Edmonds:** No, the Navy's on board with this.

**Student:** I meant, once they get the money, do they get to put it on anything they want?

**Edmonds:** Yes, and the Navy is absolutely gung-ho for this. As a matter of fact, to tell you the truth, one of the advantages of our taking the OSS was the fact that a lot of Navy ships already have it on there. When I get through with CINCPAC and EUCOM and CENTCOM, my warfighters, CINCs, will have this capability. So I'm within the lead time away here. I resisted giving dates because that's what the other programs do and when they don't make them, they say, "You failed." I'm beating mine by increments of five and ten years. I would say that if the Navy wanted to re-program money or move money around, you could get this on your individual submarine at this time next summer.

**Student:** You've talked about jointness and made a very effective point there. One of the things we discussed earlier in the semester here was coalition operations, courtesy of a publication we read. You've painted a very bright future for jointness.



**Figure 27**  
**DISN Concept**

What's your feeling on taking it further? I know you had NATO up there and that kind of thing, but how is that affecting how you develop your plans, the flexibility and interoperability?

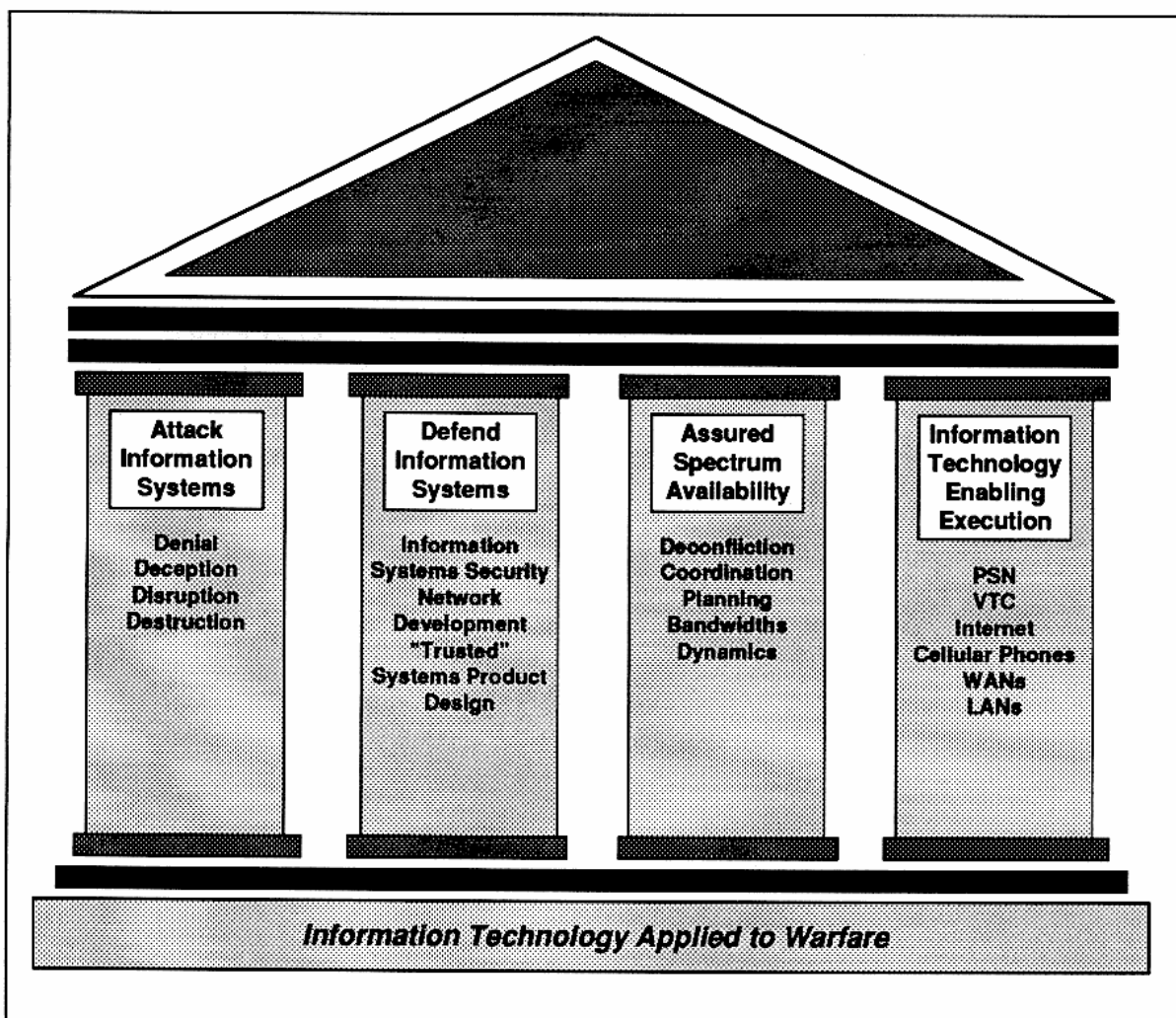
**Edmonds:** Coalition is a very important piece of it. When we talked about the

translator, we talked about the coalition, and that's our short-term answer.

We've got to be very shrewd in the coalition aspect of this kind of program, and let me tell you how we're being shrewd, so you know that we've thought about it. We have an organization called SACLANT (Supreme Allied Commander, Atlantic) down at Norfolk. That's one of

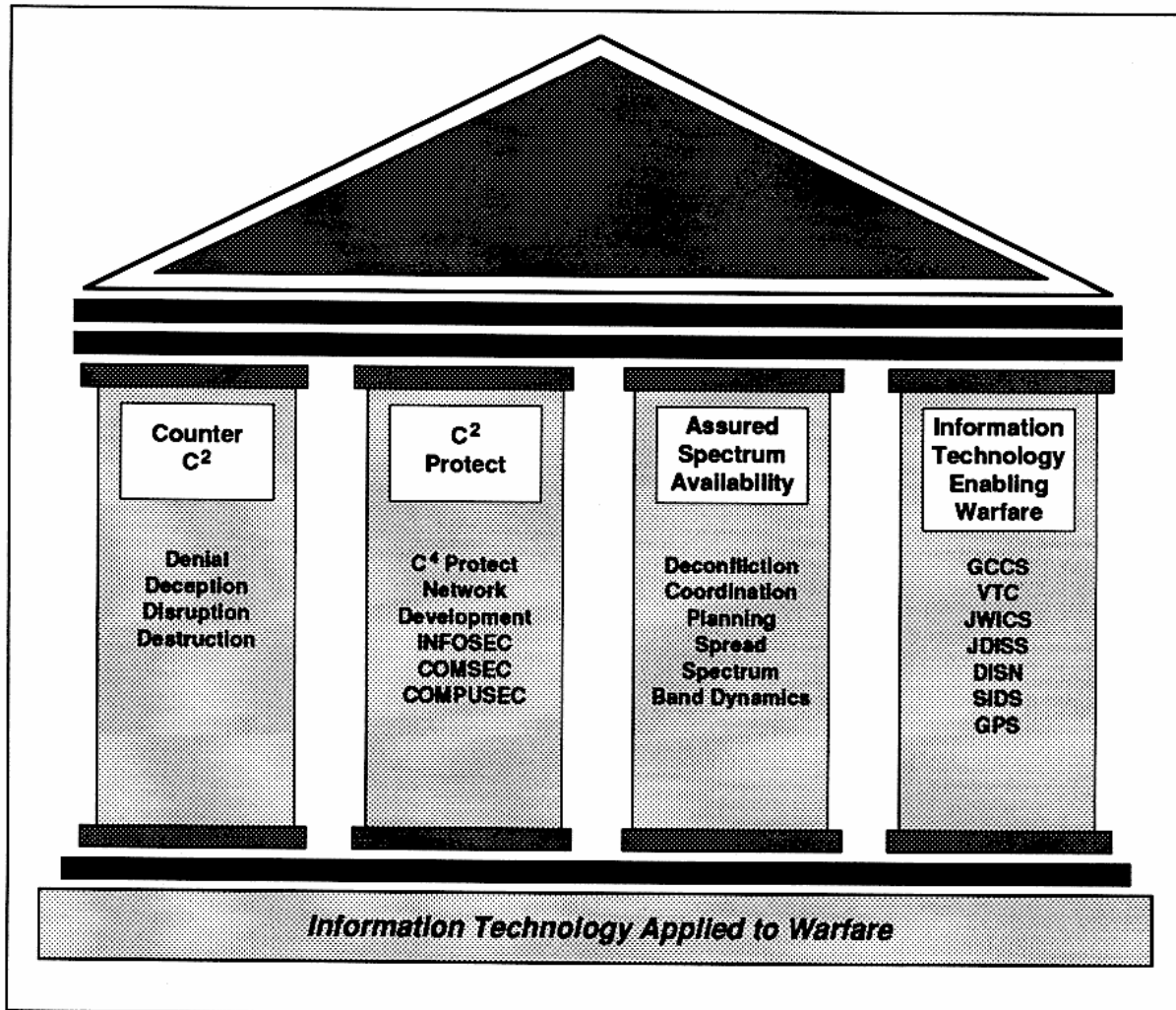
the hats that Admiral Miller\* wears as US-ACOM commander. His deputy, I think, is a British admiral. Somebody from that organization has already been up to us and asked us about how to get this for SACLANT. That's the first foot in the door for NATO. The U.K. has also asked us to come this summer in June when we have

our combined CE (communications and electronics) Board meeting (we meet every year in one of those countries) to bring a demonstration of this, so they can see if they can embrace it in the U.K. and then try to sponsor it into NATO. NATO has a system they've been trying to do for quite some time called ACCS (Atlantic Command



**Figure 28**  
**The Pillars of Information Warfare**

\* Rear Admiral William C. Miller, Chief of Naval Research.



**Figure 29**  
**The Pillars of C2 Warfare: The Military Subset of Information Warfare**

and Control System), I believe, and they've had a difficult time trying to get it. They don't have the money; they can't decide what it ought to be. I think that we can probably give them this capability without much difficulty. Especially now that we've got it down to the Secret level rather than Top Secret, you raise a lot of different kind of things. So I think that's the other part.

What we do in the Pacific is a little bit different. We let the CINCPAC work the Pacific, and Australia, more than anybody else. Once you get it in CINCPAC hands, and they work Australia, New Zealand, Japan, they do bilaterals better. It's easier getting into a coalition of bilaterals than it is trying to take a group of 16 nations and get everybody to vote on it. They're going to

vote against the United States because you are just trying to sell us your technology.

One of the beautiful things you want to accomplish with the commercial approach is that if you do it very well with commercial technology, you hope those commercial standards become national and international standards so anybody can provide the hardware. Once anybody can provide the hardware, and we focus on software only, then the nations don't worry too much about it. You charge them a small fee for software changes or maintenance if you need to, if you support them that way, and you're producing tapes for them, but you don't have to worry about the hardware. Let anybody sell the hardware to them. Let Siemens sell the hardware in Germany, let

somebody else sell it in the U.K., and then you don't worry about that part.

**Oettinger:** You've got a few good years on that because folks are catching up on the notion that the money is to be made in the software, and not the hardware. So in X years, where that may be two to ten, they'll be after you.

**Edmonds:** Absolutely. But, as I told you, once we get this thing for all the CINCs, we expect to go back through this whole process with a Herculean effort to continue to improve and modernize the software. We're going to try to build it with commercial-off-the-shelf packages, and take what the users like, and make it better.

I'll tell you who has been very helpful to us. The J-5 down in USACOM has a lady named Emily Clux, who is the JOPES expert on building these packages that deploy forces. We've had her occupied now for the last six months helping us critique what we don't like about what we're putting out there. As she gives it to us, we put it over here with our workers to improve that system as we go. So each time we go to the CINC, we're in better shape with a better system. Folks wanted us to stop and freeze it, and we won't do it, and the users don't want us to do it.

As long as we have people under the age of 45 running these terminals, it's fine. They get over 45 and they get inflexible. The younger the better; their brains are soft and they don't mind it. You can find a few over 45: Admiral Miller is one of those, and Tuttle's certainly one of those who didn't mind it; they go. But that's our biggest problem: guys my age and older who just want you to have a nice, neat package that has milestones, a schedule, and a cost. That constitutes a program designed to get you nothing.

So the first item on our big chart was: no grand design. That's the first chart. I briefed Dr. Deutch, and he told me, "Go brief Dr. Perry, and don't take any tasks from us." I briefed Dr. Perry for the first time about nine months ago, right after he got confirmed. I went to see him because they say that he's a smart man from Stanford, et cetera, and he knows his stuff. He

said, "You know, the thing you have to make sure you do: don't let the acquisition guys capture you." I said, "Yes, sir." He said, "And the next thing: don't let the testing community capture you." I said, "Yes, sir. Why?" He said, "The testing guys want *that much* documentation, and the acquisition guys want you to have a milestone with the dollars, and want to know if you're on schedule and if you're under cost, and this kind of stuff, and then you've got a successful program, but the warrior never gets anything."

I have worked very, very hard. I have taken a lot of heat from a lot of people because they want me to show them this grand design, and I'm going to show them a grand design only after I get it out in all those CINCs' hands. Then I'm going to show them what I have out there.

**Oettinger:** I'm once again fascinated. Forgive me for again underscoring the radicalism of this. The industry sector by and large still believes that strategic planning—not exactly 20 years, but give me five and put in milestones, et cetera—is the way to go. You find only a couple of people, like the new chairman of the board at IBM, the folks at Intel, the folks at Microsoft, who sound this way. So it's essentially only people who have had their noses rubbed in the extraordinary rapidity and malleability of this area who have the accurate perception that any Vision, capital V, which used to be sort of a big corporate thing, is not worth the powder to blow it to hell because it does not last more than ten seconds and, worse than that, it gets in the way. That little interchange between Bill Perry and you is an absolute gem. It's the current reality, and the number of folks who realize this is still fairly limited.

**Student:** Does the Hill give you any grief for not having a vision?

**Edmonds:** The Hill's delighted with what I've done. They're waiting to hear from me this spring because I've been going at this thing real hard with Macke. When we first started, it was just a concept. For the last year, they zeroed out all the WWMCCS development dollars because of GCCS, and

they're waiting for me now to come up and tell them how well we're doing. They're delighted with what we're doing because we're making something happen.

But the other thing that is happening: do you remember the charts I showed you on the migration stuff (figures 16, 24, 25, and 26)? We're killing programs voluntarily as we do this, because I'm finding that the Army has a fire support system and so does the Marine Corps. We don't need them both. The Marine Corps canceled their entire program for the Marine Corps Tactical Command and Control System because when they got the Navy system, they said, "We can use 90 percent of what the Navy has, and we'll do the other percent with the Army." And they're happy! I didn't take their money because I don't do money. They took their money and bought some bombs and bullets with those, and that's wonderful. That's absolutely wonderful! So the Hill is happy.

I'll tell you something else about this that is really important. I know it's good because all those guys who are out there complaining about it are people who are advocates of this ten-year cycle kind of thing, and they told people we wouldn't have anything for ten years. Now another guy who gave me some good advice was a guy who failed in a program. He's a three-star general in the Air Force named Carl O'Berry. He was the last WWMCCS Information System program manager when we were trying to create this grandiose software database in the sky to do everything for everybody forevermore, and several hundred millions of dollars later we had absolutely nothing. The first thing he

told me was, "First of all, don't let people give you requirements just because they want them." That's why I went out to the CINCs and asked the CINCs.

Now some of those CINCs don't know what the hell they want, but some do. Admiral Miller knows; he's exercised, he knows. There are a few others. General Horner knows from his Desert Storm experience. The guys at PAC know. Some of the CINCs like STRATCOM and Space Command, although Space Command's General Horner understands STRATCOM, they're in different worlds of strategic. The CENTCOM guys don't have much. Anything you give them is fine. SOCOM guys hardly have anything either, and anything you give them is fine. But none of them has a real-time, tactical picture of the battle space. So when I give them that the first day, they have 100 percent more than they had the day before. In the first round I'm paying for it. So it is absolutely wonderful, by order of the J-6. What you get is more than what you already have. You can't fail with this approach. So every time they try to give me these tasks to come bring something to a board to review it, I write them a letter back and tell them I'm not ready. In the meantime I keep pressing on.

**Oettinger:** I'm conscious of the clock and I want to reserve the last minute to thank you very, very much for a fantastic presentation. Here is a very small token of our appreciation. It's been great having you here.

**Edmonds:** Thank you very much.