

***INCIDENTAL PAPER***

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**C<sup>3</sup>I Systems at the Joint Level  
Clarence E. McKnight, Jr.**

**Guest Presentations, Spring 1986**

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## C<sup>3</sup>I Systems at the Joint Level

Lt. General Clarence E. McKnight, Jr.

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I'm delighted to be able to talk to you about the integration of command, control, communications, and intelligence (C<sup>3</sup>I) systems at the joint level. To start with, I'd like to give you some background on the organization, so you have a little better feel for the Joint Chiefs of Staff (JCS).

There are four Joint Chiefs, namely the Chief of each service: Army, Navy, Air Force, and Marines. Then you have the Chairman. As you probably know from reading all about the reorganization endeavors by Congress and so forth, the Chairman is the spokesman for the Joint Chiefs of Staff who are driven by this national policy (figure 1). The reason I wanted to discuss this up front is because any architecture that you develop should really be under the overarching objectives of U.S. national policy: preserving U.S. institutions and values, advancing the national well-being, preventing Soviet adventurism, promoting worldwide strategy, and using the alliances and arms limitations. We have to convert all that into a military strategy.

How do you develop a global architecture from the Joint Chiefs of Staff, each of them having their own separate doctrines and developing their own programs, to support these national objectives? The components of military strategy (figure 2) have changed a little bit between the two Chairmen for whom I have worked — General John Vessey, who

retired back in October 1985, and Admiral William Crowe, who is there now — but they essentially spring from the same national objectives. It's a matter of semantics sometimes as to how these things fall out, but there was no deviation from these first four components as far as the two Chairmen were concerned: the nuclear deterrent forces, the forward deployed forces, the strong central reserve, and control of the seas. Security assistance and arms control are more a focus of the new Chairman and his way of looking at national objectives.

Admiral Crowe, the new Chairman, comes to the Joint Staff with a wealth of command background and experience. His two previous jobs were as Commander in Chief of the southern NATO forces in Naples, and most recently as Commander in Chief of the U.S. Pacific forces. So he has had a perspective at the very senior level, both in Europe and in the Pacific, and he certainly has a great appreciation for the importance of our Pacific allies.

What I have tried to do in my two years at the JCS, as the director of command and control systems that support the architecture for these national objectives, is to weave these overarching strategies into a technical master plan, or an architecture, that makes sense not only for the government but also for the taxpayers and for each administration that comes along. The four Chiefs and the Chairman each, as I

- PRESERVE U.S. NATIONAL INSTITUTIONS AND VALUES
- ADVANCE NATIONAL WELL-BEING AND PROSPERITY THROUGH A GLOBAL FREE MARKET ECONOMY
- PREVENT SOVIET ADVENTURISM
- PROMOTE STABILITY WORLDWIDE
- ALLIANCES
- ARMS LIMITATIONS -- DRIVEN BY NUCLEAR WEAPONS

**Figure 1. National Policy Drivers — Joint Chiefs of Staff**

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- NUCLEAR DETERRENT FORCES
- FORWARD - DEPLOYED FORCES
- STRONG CENTRAL RESERVE
- CONTROL OF THE SEAS
- SECURITY ASSISTANCE
- ARMS CONTROL

**Figure 2. Military Strategy Components**

said, have their own particular doctrinal evolutions that must be seen against a background of years and years of doctrine and strategy within their own services. Moreover, as you realize, we have changed our technologies tremendously over the last 20 years, and yet we have some systems within our forces that are 50 years old. You just can't strip out those older systems and start all over again.

The organization at the very top level (figure 3) takes its principal military advice from these Chiefs — the National Command Authority (NCA) being essentially two people, the President and the Secretary of Defense — so that the Chairman sits as an advisory member of the National Security Council, and in that relationship they're working against that overarching national strategy, particularly the elements of strategy from the military position, in order to create a doctrine on how to use the armed forces. Well, underpinning that is the execution of the force structure, and that's where C<sup>3</sup> systems play a tremendous role, because they're extremely important in the execution of strategy.

The next chart (figure 4) shows how we have progressed in responding to threats, specifically how command and control systems have evolved in support of U.S. capabilities against a threat. This is a very subjective chart, but it's designed to provoke thought. Back in the 1960s, when we had the missile crisis, the EC-121 crisis and the *Pueblo* crisis, our response to those from a command and control standpoint was to create a Worldwide Military Command and Control System (WWMCCS). We also looked at creating interoperable kinds of equipment. A project called Mallard, in which some of our allies participated, was being pursued. Then Congress came along and said, "Look, you can't even get your own services together, so how can you get the allies together in a joint equipment configuration"? So Mallard became TRI-TAC (tri-service tactical switching system) so that we could get our own services to work together and get their equipment to work together.

As we move across the spectrum of different threat responses, of MIRVing and EMP (electromagnetic pulse) and so forth, we see other things that we also started to develop as responses — creating space communications, doing hardening, looking at redundancy, taking a look at the national systems, looking at survivability of connectivity, and then looking at flexible responses. All of these kinds of responses greatly affect the command and control systems that are often already in place, all over the world. And

when you talk about national systems, you're talking about a very loose confederation of systems.

As we move into the 1980s we get a lot of direction from each administration when they write their National Security Decision Directives (NSDDs) from the National Security Council; but it's much easier to write a directive, to correct all these things in a broad sense, than it is to execute it from a budgetary and engineering standpoint. It's easy to say that I want my systems hardened, survivable, and redundant.

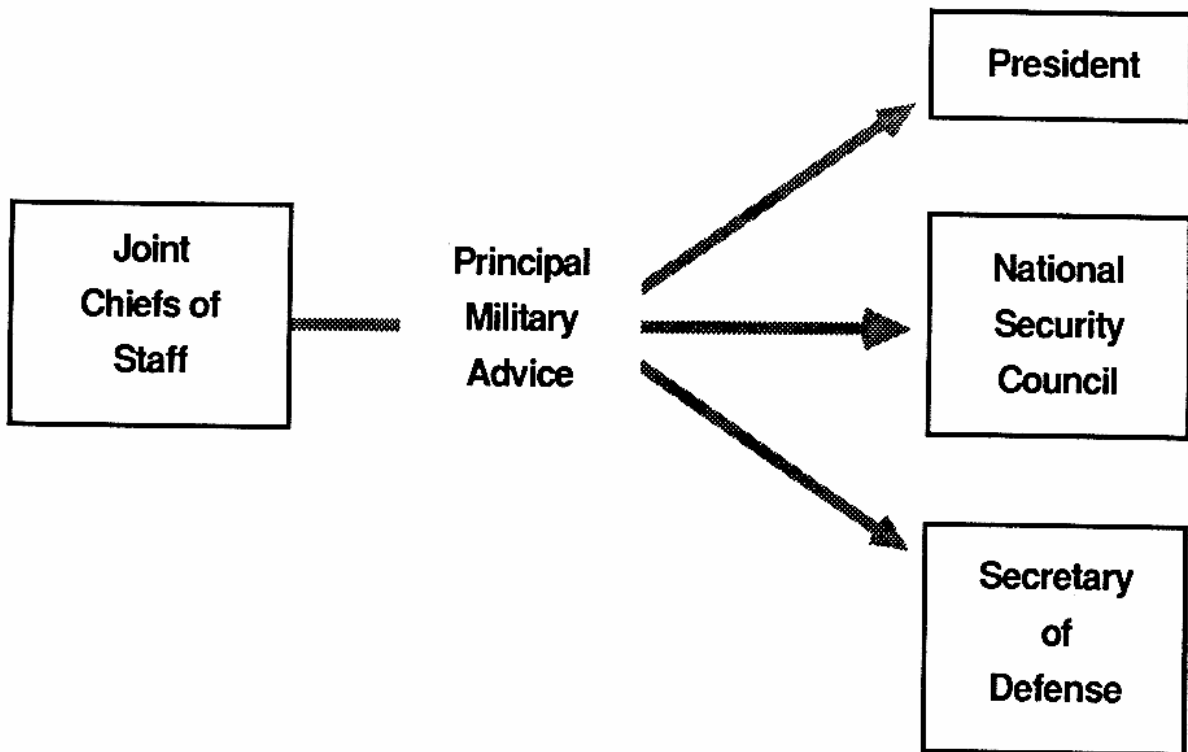
As we move across this increasing spectrum of capabilities and threat toward the 1990s and the Strategic Defense Initiative (SDI) programs, we have to look at the tremendous demand that all of this is placing on command and control systems, recognizing that most of them have evolved from existing systems and are actually just extensions of what is already there today. So if you give a dictum that you want all of that to be surviving and enduring, you're looking at systems that become more and more and more complex as we start our electronic expansion around the world. So I've used this subjective chart quite a bit in the last year or so to try to put into context what we're attempting to do, starting at the top with the National Command Authorities and their directives — which are in some cases different with each administration that moves through the White House — and showing these kinds of responses to the threat as it changes and as the threat and the capabilities move closer together.

**Oettinger:** I'm curious about that one. I would have expected, given the subjective character of this, a crossover earlier; many of your predecessors and others — doomsday sayers and so on — have had that line crossing, oh, you know, way back, every year in fact...

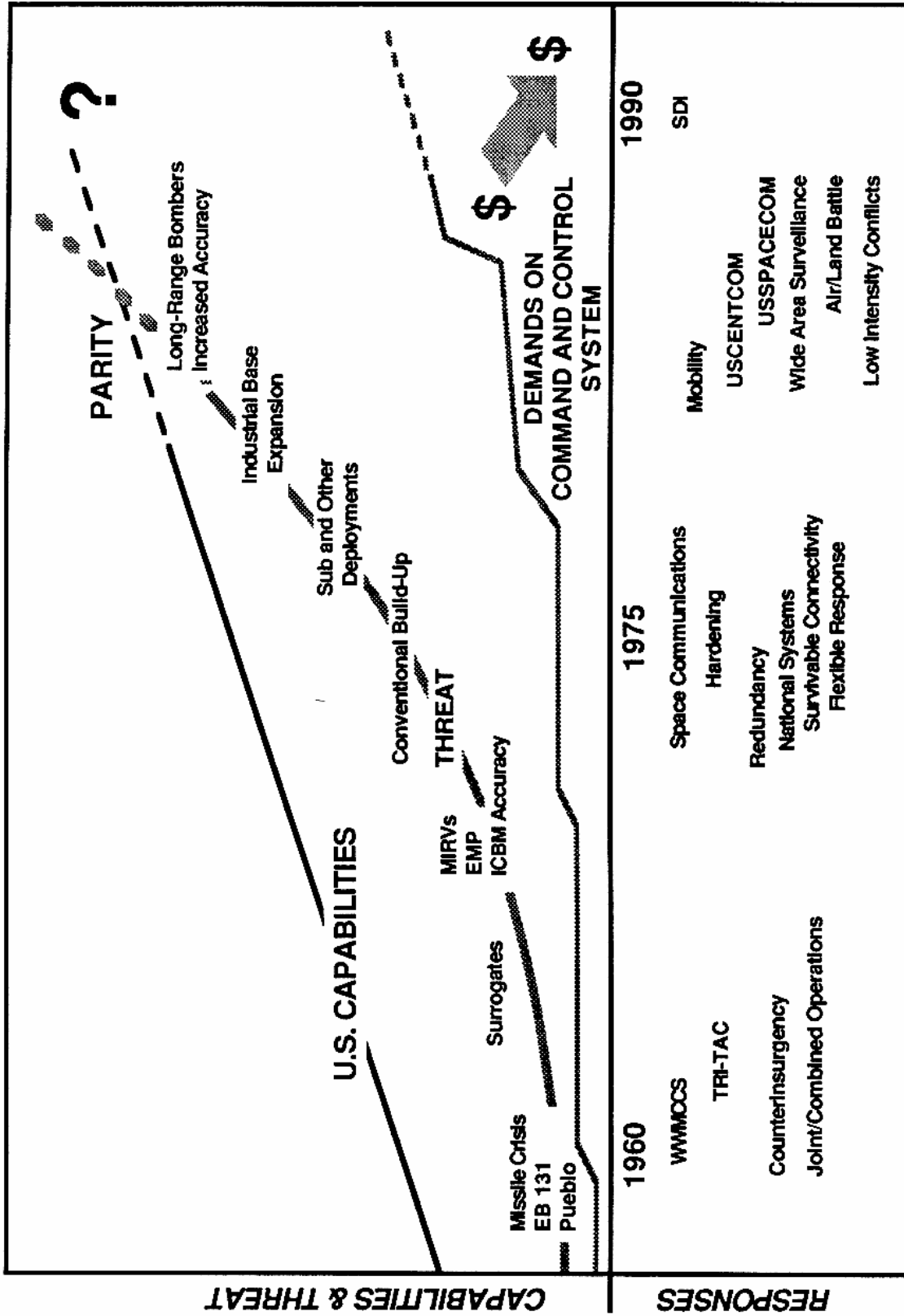
**Student:** It did in the Carter Administration, particularly.

**Oettinger:** Right, so I'm puzzled as to...

**McKnight:** Well, you're looking at someone who's been in this business for almost 34 years, and I wouldn't be in it if I weren't an optimist. So, having been able to stay in this business as long as I have, I couldn't stand to say that we are moving rapidly towards Armageddon without moving it more to the right and saying that it is my personal feeling that we are in a constant psychological struggle with our greatest adversaries, the Soviets. There are many things we have to do, such as build tanks, B-1's,



**Figure 3. Joint Chiefs of Staff — Advisory Function**



**Figure 4. Progress in Responding to Threats**

Tridents, and so forth. The glue holding those systems together, often transparent, tends to be treated as a low priority because it's the up-front kinds of things, the weapons, that are the lethality and that have to be psychologically orchestrated. I certainly am not a doomsday sayer. If the line were crossed way back here I would be considered far more of a pessimist. Since I am an optimist, I don't believe the line was crossed that early in time.

As you know, early in the Reagan Administration they wrote NSDDs that put a high priority on strategic systems, but in my little dissertation with you I would like to set the stage by saying that part of my charter is to extend balance across the board. A little bit of my background includes a whole lot of tactical communications and it has been my experience, from my viewpoint in the past, that all the money went to the strategic systems and very little trickled down to the other systems.

So I feel comfortable with this subjective psychological chart, if you will, that lists a lot of responses. But I point out to you that the more you study communications, the more you understand the vulnerabilities of our systems, and the more you try to work towards a balance so that you do have credible systems linking the lethality and sufficient control over those systems that control the greatest lethality, it's very difficult sometimes to rationalize why you don't get more in certain areas.

When you look at C<sup>3</sup> systems, you have to take into consideration their drivers (figure 5), all of which have an impact on the national strategy and the elements of the military strategy that were derived from those national objectives. Naturally, technology drives C<sup>3</sup> systems. So does where we are in the world, our geographic responsibilities. A big part of the equation as far as the C<sup>3</sup> systems are concerned and how they are put together has always been the land mass of Europe. As for architectures, in 1962, when the Defense Communications Agency was created, everyone expected a big metamorphosis, big architectures to be formed. Well, what happened is that they merged the administration and command networks in the services, and they've been laminating those ever since. The new kinds of architectures are the satellite constellations and we need to look at what we can do to harden those and to move into other arenas that are being forced into being, such as the joint and combined interoperability networks, constantly pushed by the threat. But we have to look at these new architectures in context with what

already exists, and that's a big chore because we are heavily capitalized in older equipment, particularly in our analog equipment. It would be nice if it were all digital equipment, but we have an awful lot of analog equipment.

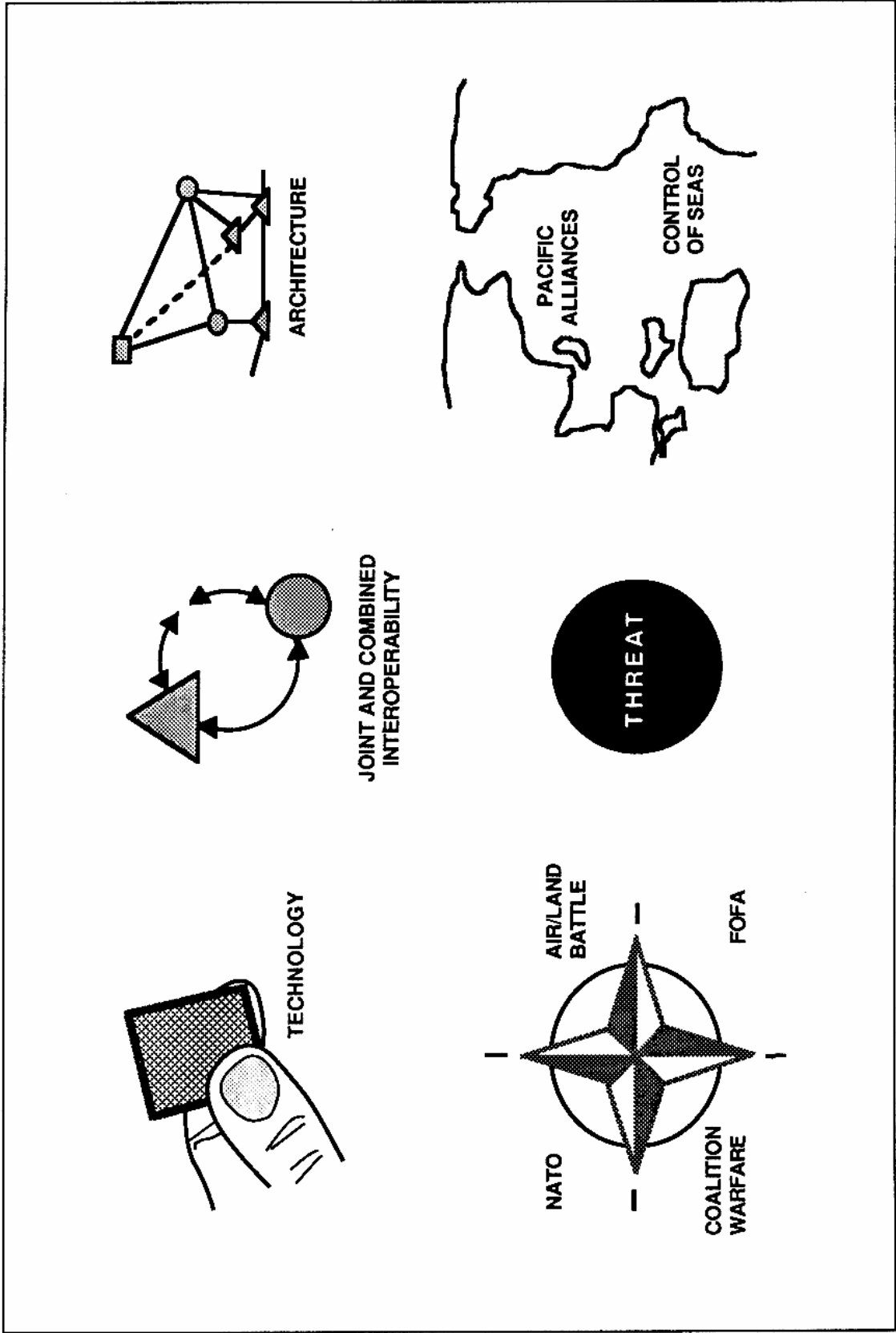
When you look at the connectivity between the National Command Authority and his commanders in chief who are his warlords, if you will, you have an expansive amount of territory to cover for that connectivity. It's global. And you can finesse it with force structure in other areas but you cannot finesse it with command and control systems. You can do a lot of things with wires and mirrors on a limited exercise, but if you want to have a robust global communications system, you have to make the investment all over the world.

Now, for you gentlemen in the State Department, you know you have the Diplomatic Telecommunications System. There are many crossovers between the Diplomatic Telecommunications System and the Defense Communications System. But neither one of us has the robust linkage that we would always like to have because we are using national and international systems as the connectivity from all of those systems. We do an awful lot of handshaking around the world as we try to create systems that can posture our forces and also accomplish the diplomatic nuances necessary for deterrence.

**McLaughlin:** I assume, when you refer to finessing with force structure, you're talking about something like CENTCOM (Central Command) where all of the units are assigned elsewhere or have other missions.

**McKnight:** Right, absolutely. Let's talk just a minute about the creation of USCENTCOM. This started out as RDJTF (Rapid Deployment Joint Task Force) with essentially the same forces that were assigned to Strike Command, before Strike Command became Readiness Command. So you end up with two commands there, but psychologically you now have one focus on a particular part of the world. But you have essentially the same force packages and the same small amount of command and control equipment that allow you to extend those forces. So it's a balance, it's a juggling act, except that I have to be the one to step forward and say, "You can't commit this amount with that small amount of extension capability."

Now what I've tried to do with the young people who work for me is to be the one to explain that we



**Figure 5. C<sup>3</sup> System Drivers**



have been, in the past, in the wire world (figure 6). Essentially we have tried to extend the wire world all over the world — sea cables, in World War II — everywhere we went we carried the Bell System with us. Back in 1860, in the Civil War, there were just several hundred signal officers and maybe several thousand enlisted people in the Signal Corps (figure 7). It peaked somewhat in World War I but in World War II it went from relatively few people up to 23,000 officers and 279,000 enlisted people; that was just in the Army. They had those kinds of surges. How did they do that? Well, they brought in the Bell System, the electronic industry, all in one swoop. We had reserve battalions that were AT&T battalions. So there was no problem in bringing these people in and surging them and moving from several hundred regular Signal Corps officers to 23,000. We brought them in right out of the electronic industry and they were very competent people. They understood the technology. But they were coming from the wire world.

What happened after World War II? Naturally they went home. They were brought back in during Korea but, as a nation, we should have insisted, "For your armed forces you should start concentrating on radios and not on wire systems, because you need to have more mobility without having to carry so much into the field." In wire systems, if you have a switchboard in a building, you carry a switchboard to the field; if you have a mainframe, you have to carry a mainframe to the field; and so forth. But right at that point, just after Korea, we kept a lot of equipment in the inventory that caused the training base to continue to train young people to climb poles, to string wires, to do all those things that should have been moving towards radio and early satellites sooner. But hindsight is always better ...

What we also have, right in that same period, is some of the early TRI-TAC equipment. TRI-TAC was getting better and better at switching, but the sense of that is if you want to use equipment all over the world, you need to have smaller packaged equipment — equipment that can fit on an airplane and go anywhere and come back and maintain the connectivity.

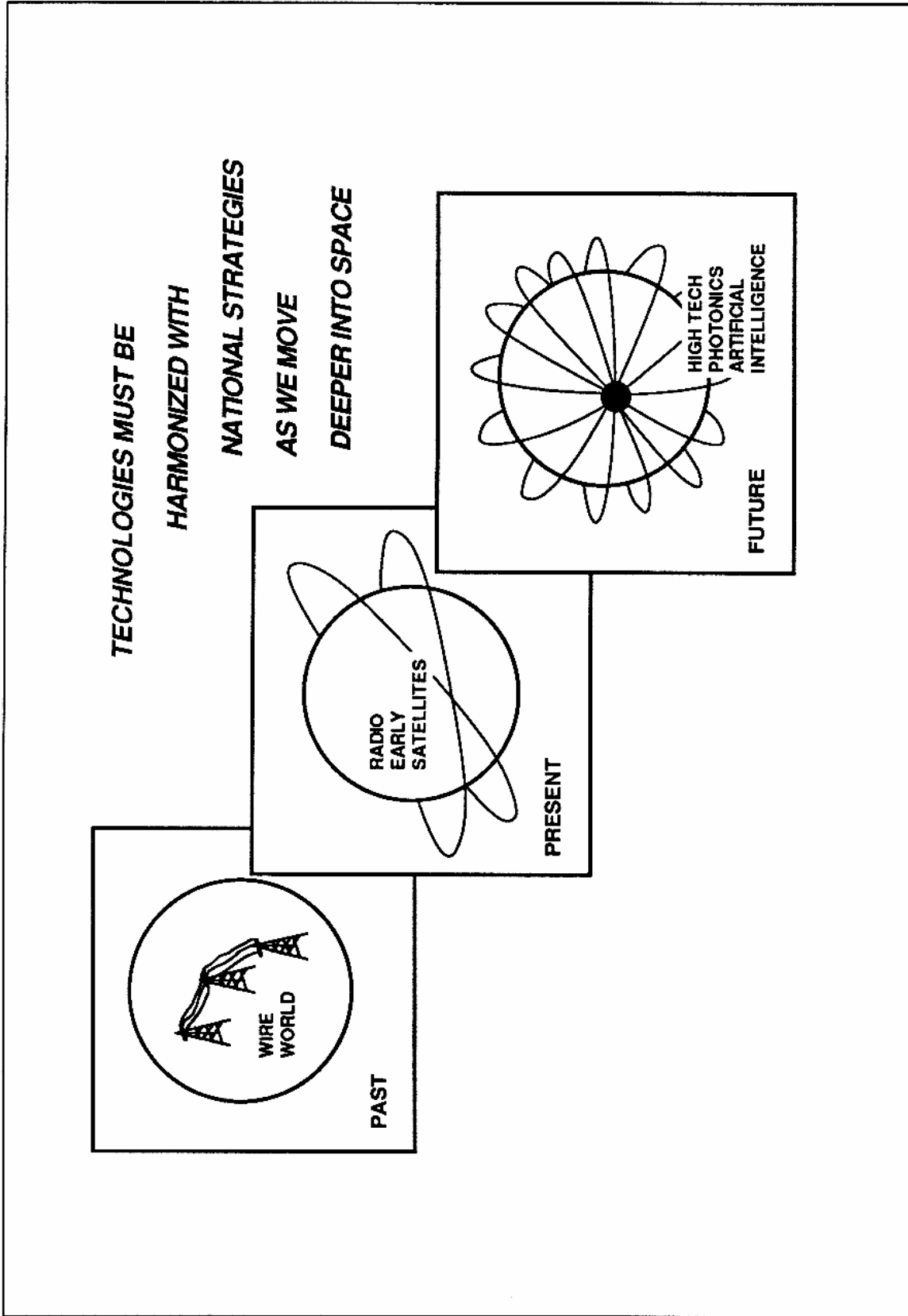
Going back to my earlier diagram (figure 6), where we are today is in radio and early satellite systems, but as we look towards the future the world gets smaller and smaller as we look into every diplomatic nuance around the world. So our systems need to be responsive to this kind of view.

Now in my business down in the Pentagon, it's not an easy task to take all of our C<sup>3</sup> elements (figure 8) and try to integrate them into an architecture, knowing that they're not all progressing in the same technological half-lives, if you will. There are folks who like to say, "Hey, our problem's going to be solved with fiber optics." And I say, "Which part of the problem? Is that going to solve my connectivity between my space warning systems, my terrestrial connectivity — what's it going to do"?

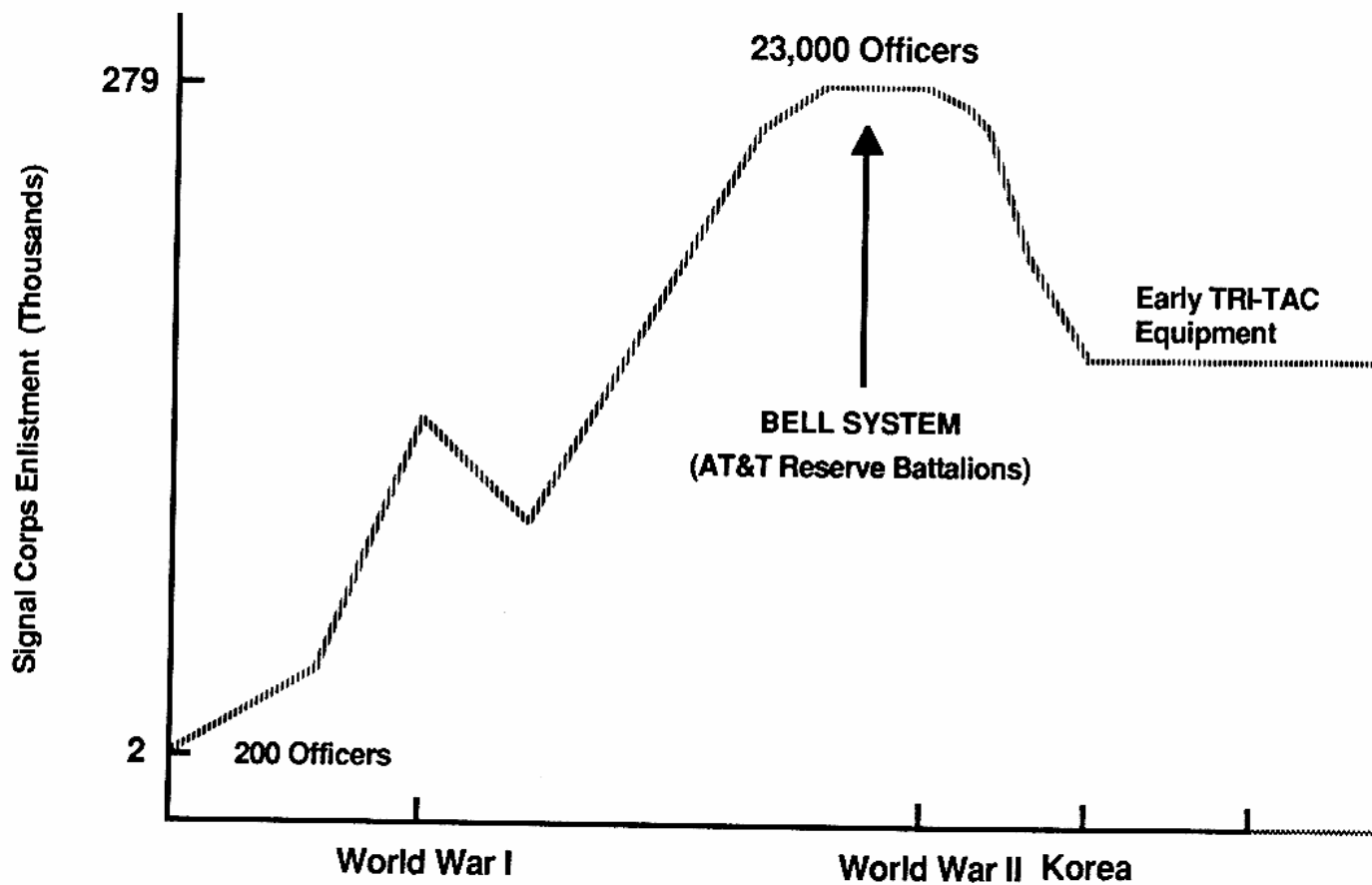
I've had the privilege of traveling around the world, having headed the Army Communications Command for several years, and I can remember traveling to sites where the only piece of fiber optics they had was between the satellite station and the power system. Now you're getting buildings where complete local area network distribution systems are being built right into them with fiber optics. But you can't take one piece of technology like fiber optics or microchips and say, "That's the solution," because they're all part of subsystems; they need to be integrated into a much larger mosaic.

**Oettinger:** I'd like you to go back to something that you said earlier. Here you're talking about integrating technologies. A bit earlier you were talking about worldwide responsibilities and worldwide connectivity under a variety of circumstances and so on. You have just made the point explicitly that you can't do everything with fiber; depending on what, where, and how, you may want different things. In the earlier point about worldwide I got, perhaps inaccurately, the sense that you might be arguing for dedicated military or U.S. government systems.

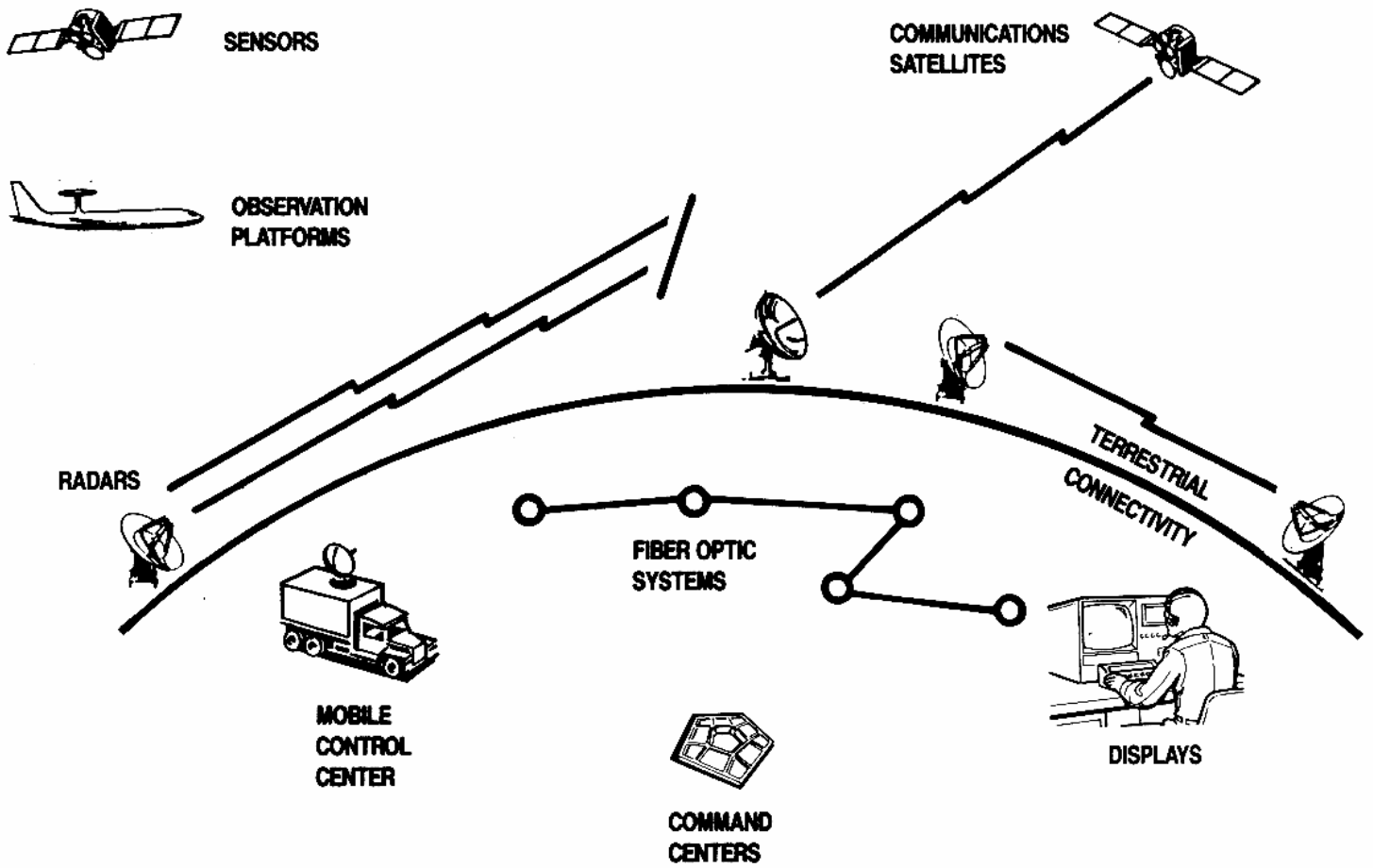
**McKnight:** No, I'm not. Possibly a very small hard core, which may be a minimum essential type of thing. But no, I'll clear that up right now. I'm a great believer in using every bit of technology that's there today, particularly in our communications systems, and I'll show you why (figure 9). This diagram shows my interpretation of the man/machine interface along a spectrum from crisis management needs to public awareness, and again, it's subjective. Only a relatively small part of your equipment should be military equipment, long cycle. Most of the stuff should be off-the-shelf; when you train people how to use the latest technology, you teach them technical expertise, which overflows into the national education systems. That training and that education give you the greatest ability to do crisis management, giving you in turn a profile of peacetime readiness, which is then reflected in the public state of mind. And it



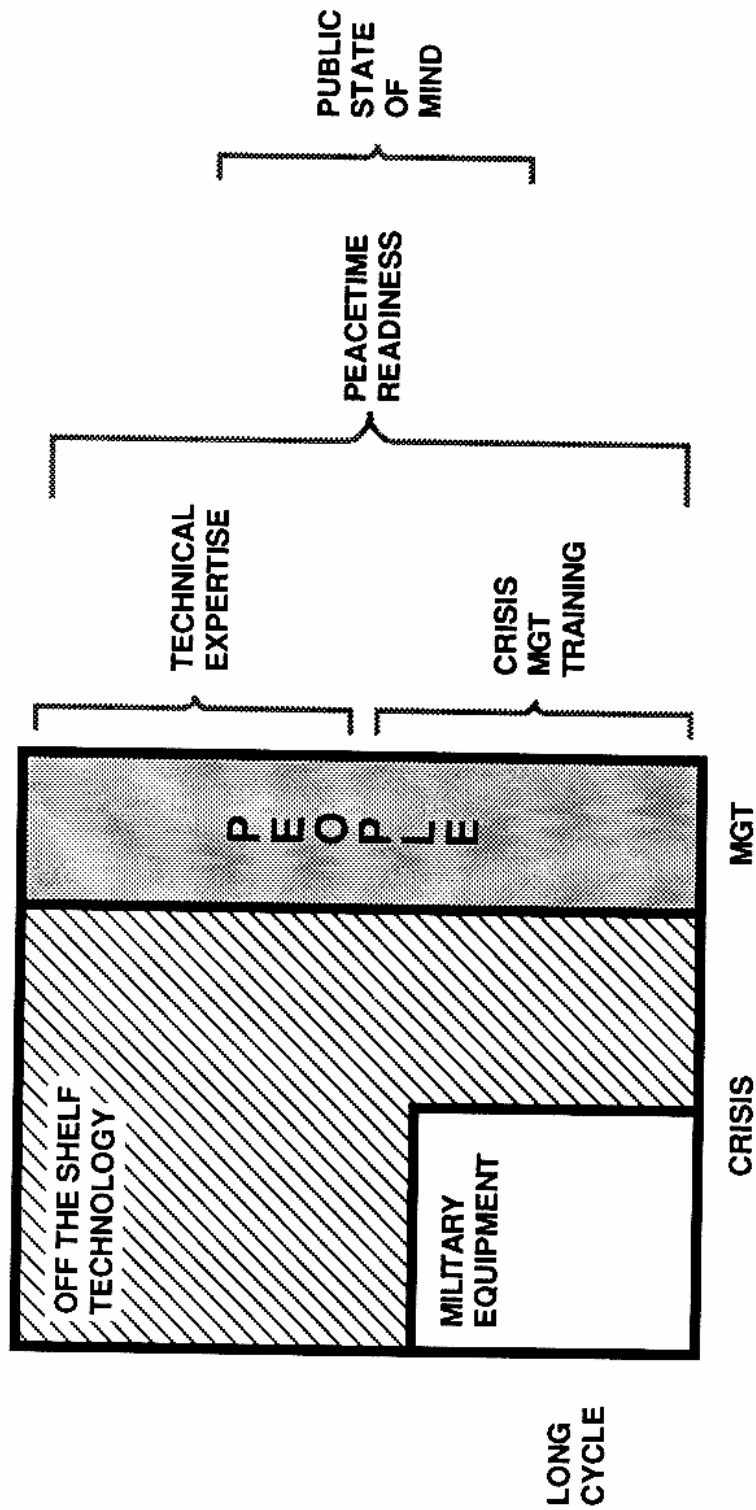
**Figure 6. Technology and National Strategy**



**Figure 7. Signal Corps Enlistment**



**Figure 8. C<sup>3</sup> Elements**



**Figure 9. Spectrum of Communications System Needs**

is just that simple. When I was on the tactical side of the world, struggling along with 40-year old equipment and trying to look very professional, that was really tough.

So we should be using what our industrial base is surging toward in order to project confidence among the great American public that we know what we're doing. This has a better spinoff than a lot of other things that are related to weapon systems. That's why I think procurement of C<sup>3</sup> systems/equipment should be different. However, we shouldn't limit ourselves to just "off-the-shelf" procurement being pursued uniquely. Procurement in general should be different. C<sup>3</sup> equipment should be purchased in a different mode from the way we buy just pure weapon systems, although the two processes should be closely related. I do not believe that you need to have a lot of dedicated military equipment that ends up in motor pools around the world and is not used, because it quickly decays and it's very, very expensive.

My own prescription for command and control, and one of the challenges in our command and control systems, is that command and control really is a philosophy. How are you going to do business? What is your mode of operation? You can take 12 four-stars, from different services, mix them up, and they'll all have a different philosophy of operation. So in designing your system, you must recognize that the core of the whole system is going to be human intelligence, and that behind all this human intelligence will be reasoning based on, and biased by, the experience of the people within that command and control system.

For example, how well could the National Military Command Center (NMCC) handle connectivity over to the White House on crisis management? That will depend very much on its connectivity elsewhere and on the experience factors of both its own staff and the people feeding information into it from other nodes (figure 10). We have a duty officer, a brigadier general, at the NMCC 24 hours around the clock. While he becomes best after he has been in that position for a while, he is good because he already has a wealth of experience before he tackles the job of trying to be in the center of a command and control network.

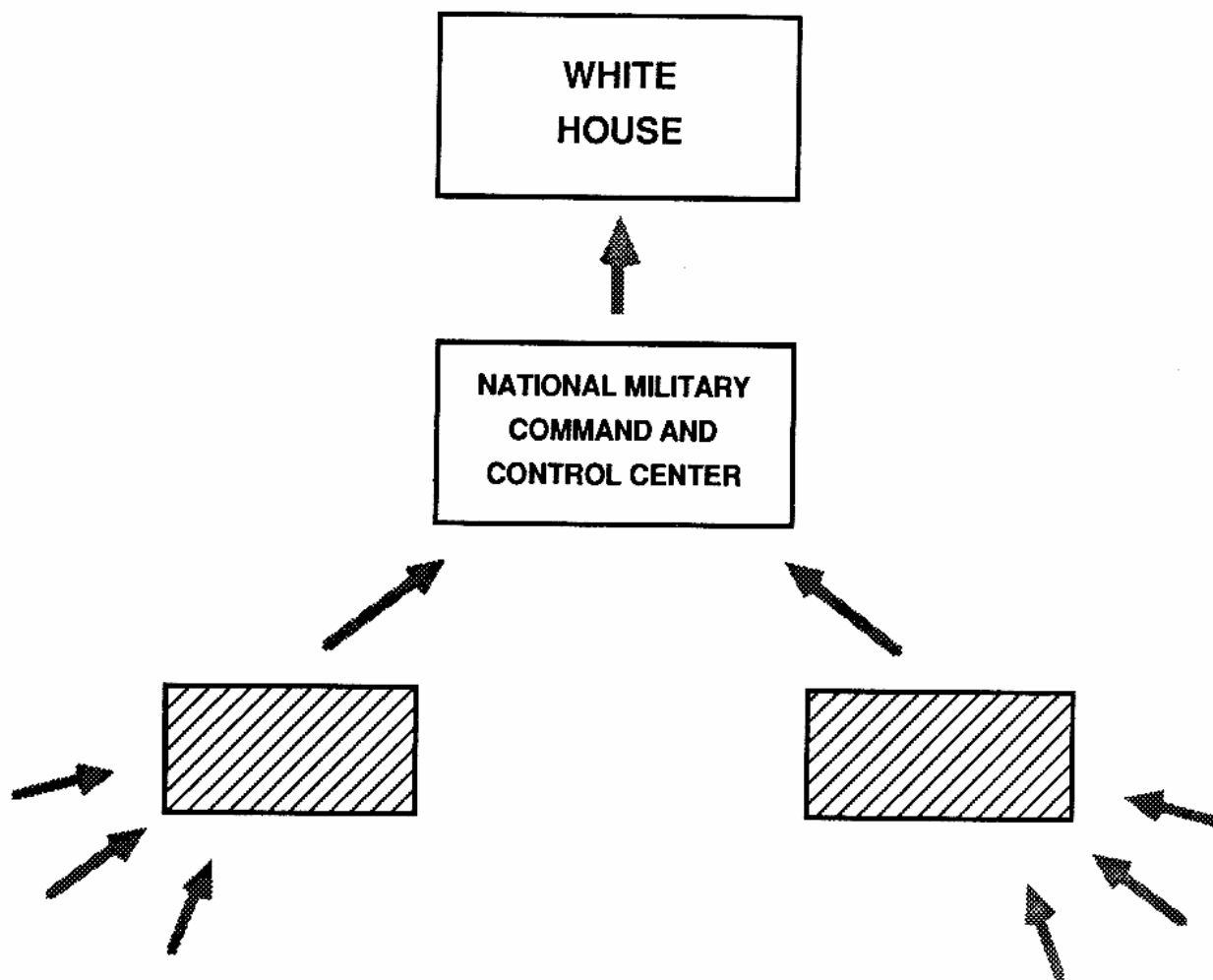
When most people start talking about architectures, they like to start drawing circles, and then lines and

arrows between the circles, and connecting everybody up before they ever understand what it is that they want the system to do for them. It's most important in the creation of any system, in my opinion, that you should design it as a pyramid (figure 11) so that all the actions that are down at a lower level stay at that level, and only a few go up to the next level, and very few go up to the top. But in a system where everything is moving massive amounts of information to decision nodes too rapidly, you get mass confusion as more and more information is being generated and then distributed at a higher and higher level.

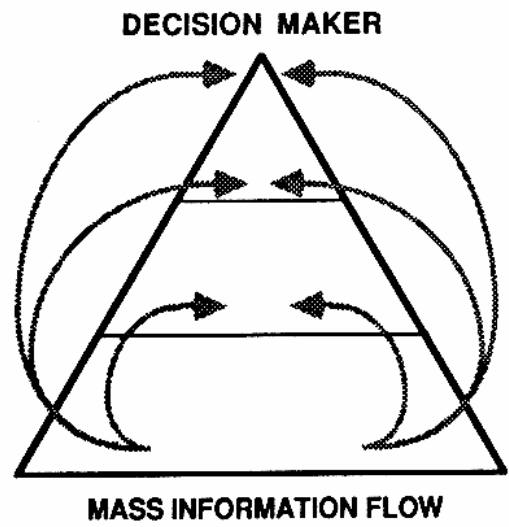
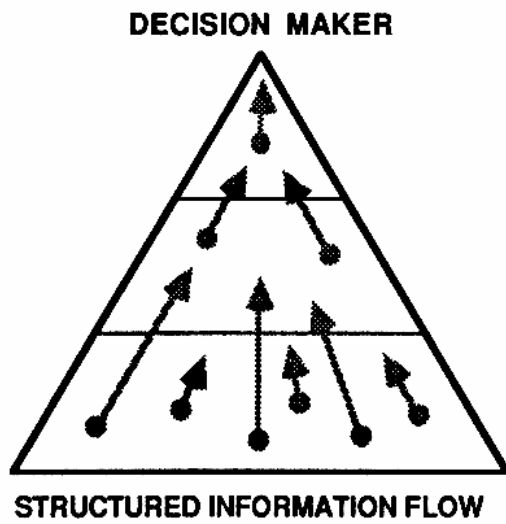
If you look at the genesis of C<sup>3</sup> networks (figure 12), they deal with sensors, correlation, analysis, decision making, and the posturing of either military or diplomatic forces, all of which constitute a feedback loop that comes back and forth but is primarily centered around that human intelligence in the center and the experience of that decision-making node — be it the President and his advisors, or the Chairman and his advisors, or the duty officer and his people on the floor. You've got to design your systems so as to take into consideration the experience of those people who are in the system; yet this is one thing we forget, and we put in last.

**Oettinger:** I'd like to go back to your pyramid and the notion of limiting communication between the layers rather than having a jumble. In talking about your earlier experience at the tactical level, you said you thought at the time that all the resources went to strategic systems. You didn't finish that thought in terms of where you sit now, in OJCS, as to where you see the resources going. The reason I'm bringing it up at this point is that when you were drawing that pyramid, it wasn't too clear to me what kind of event we were talking about. In your other chart where you had the lines crossing (figure 4) you had things on the scale from *Mayaguez* to Armageddon. Would your view of that pyramid and its connectivity in what goes up and what stays on what level be any different for different events? In other words, the world situation is one in which somebody has to give the alert for everything, from a little incident that might grow into a big one, to a full-blown nuclear alert. It wasn't clear to me in what context you were using that pyramid.

**McKnight:** You have to keep the decision maker in the loop and you shouldn't have to climb a ladder to hand him a piece of paper. But there are tons of

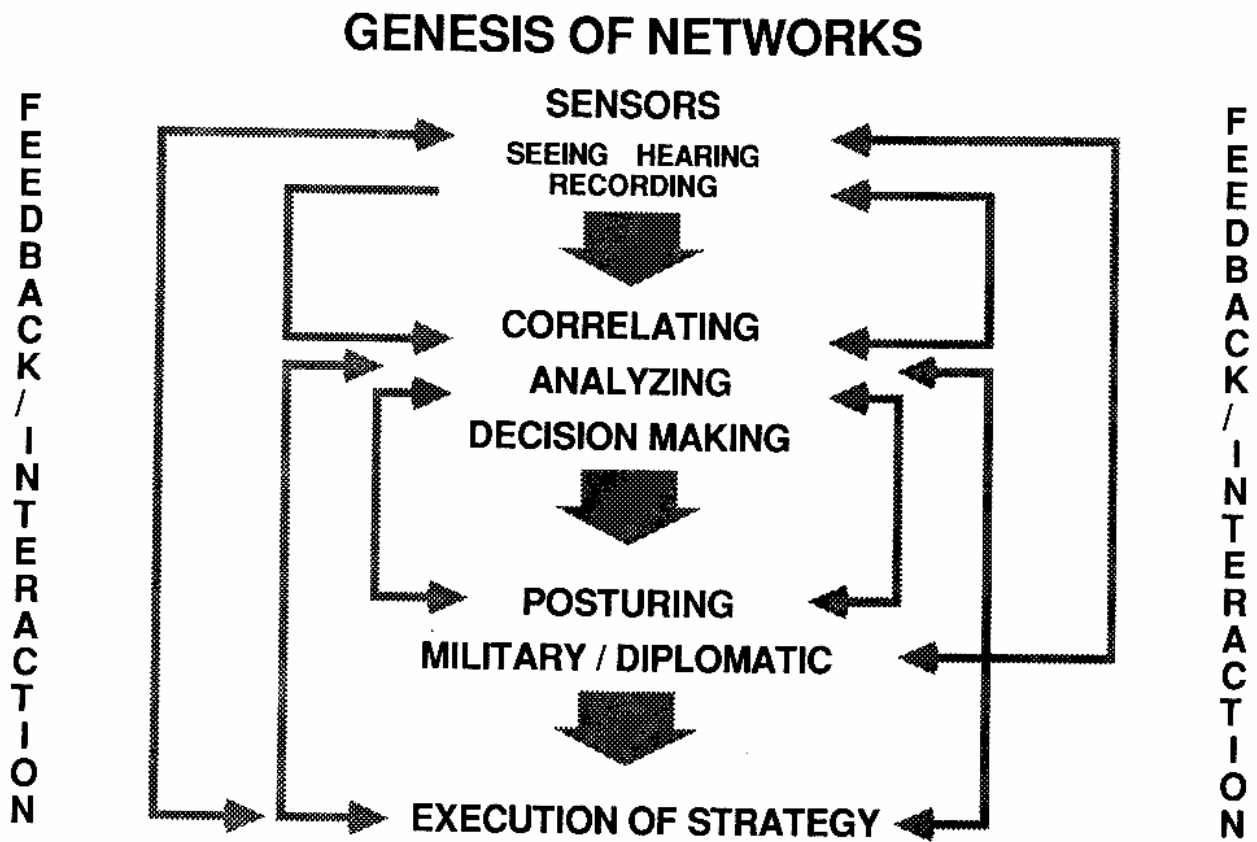


**Figure 10. NMCC Connectivity**



**Figure 11. Architecture for Information Flow**





**Figure 12. Genesis of C<sup>3</sup> Networks**

information that flow back and forth from local area networks that keep the worker bee, so to speak, informed. That doesn't mean that you shouldn't have trap doors or crisis management equipment going through. But in one of your earlier presentations, Dr. Beal\* talked about how to boil down 600 messages on the Iraqi-Iranian War into two minutes to tell the President. I defy anyone to do that very intelligently. I have seen the Chairman get intelligence briefings from a whole battery of subject matter experts. A lot of this stuff needs to be correlated by subject matter experts, because otherwise it is premature many times. Now, that's not to say that you can't have information go all the way up to the top. But 600 messages in one day? Trying to force a correlation with all that? What I say is that you have to have hedgerows of competent people; but what we have done today is to build bigger and bigger staffs. Washington has absolutely turned that pyramid upside down. They're running back and forth from the Hill to the Pentagon, and it's a constant interchange of information at the highest levels, most of which needs to be trimmed down and pushed back to where it can be processed closer to the source, in order to get a better flow upward of critical information.

**Student:** Isn't there a problem now, though, with these hedgerows filtering? Isn't this why some people at NASA may lose their shirts, because no one at the top knew that this rocket booster, at 7 degrees Centigrade, was just too cold? That was part of NASA's hundreds or millions of bits of information that had to be filtered out to get a coherent picture, and someone picked the wrong bit. My point is that the NASA shuttle is one kind of thing that operates on a compressed time scale. In most command and control situations today, we've got less and less time to make decisions on the basis of which we could win or lose. Increasingly, that's the way wars are going to be fought. That's why lots of information has to be processed very rapidly. You can't wait two weeks for the staffs to give the go-ahead.

**McKnight:** I understand. What I am saying is that there needs to be a flow of a lot more information than we had before. That's why I defy anyone to take 600 messages and come up with two minutes of meaningful information for the President, unless

they are indeed the experts on Iran and Iraq. And there again, we need to develop the competency. The guy who stands at the top has got to know more about technology, which gets me to an off-line plea that I've had all along: Let's upgrade the technological backgrounds of the people who are dealing with this. I always felt we had more managers than we had people who understood the technology that was moving the information.

So if you get spread out too much at the lower levels, you're right, you get so much data there that the critical information doesn't reach the decision maker. You've got to keep him in the loop. And there are risk assessments all the time. You know, the nation's built on risk; if it weren't, the settlers would have stopped at the Ohio River and the Mississippi and not gone any farther. What I'm trying to say here is that I believe many of our systems lack the discipline they need in order to tap that action officer traffic off without just putting everything in the hopper.

I have a message reduction program going right now with the services. The narrative message trend over the last few years has increased dramatically.

**McLaughlin:** It gets worse the more fiber optics you give them!

**McKnight:** What has happened, though, is that you have fewer people reading more and more traffic and not becoming better at screening it, but being able, on automatic distribution, to send things to 97 offices with 179 copies — whereas, in fact, the target audience probably is more like five offices and no more than 10 copies needed. And yet, it's very convenient to program our automatic message handling systems to dump all that in. That's where you get this 600-message flow, and the State Department, by the way, does have a lot of information that flows from around the world very quickly. I won't comment — you'll have to tell me whether you think it's a tremendously efficient system — but we work hand-in-glove with the State Department in trying to move information back and forth and trying to keep the meaningful information at the right levels. But it takes very large staffs to handle this kind of information.

One of the other key things in our C<sup>3</sup> systems today that I need to comment on, and that I've had to talk to some irate Senators about, is the interoperability issue. I don't believe everything should interoperate. Certainly, our industry does not permit us to

\*See Richard S. Beal, "Decision Making, Crisis Management, Information and Technology," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1984, Program on Information Resources Policy, Harvard University, Cambridge, MA, January 1985.*

make everything interoperate because many times equipment is built on a competitive basis, with some features added specifically to make them unique so they won't interoperate. We really need to ask ourselves the why, how, where, and when kinds of questions so that we get an overlapping of the services' needs and tie their systems together in such a way that will make us more able to create the entire architectures without having to worry about everything. We tried in TRI-TAC to build "purple" equipment and we found it's very expensive to do so. It's much better to build equipment that will work together by defining the interfaces because there are so many unique service requirements that you cost yourself out of the arena very quickly, which brings me back again to the off-the-shelf kind of equipment.

People and procedures have to meld all of these kinds of things together (figure 13) — communications, the warning and surveillance data processing, new programs, all your command centers, and then you have a little bit of mobile equipment that you can use to extend the systems you already have. And these are used again and again and again in our contingency plans. The same double accounting again to which we alluded before takes place.

And it's a global complex of systems and programs (figure 14). We have — and I don't mean just on paper, these are absolutely in being — thousands of installations in the Continental United States, thousands overseas, foreign military sales, global service, all of which have to be synergized, again looking back up to our national objectives.

What is our capability? We need to be able to surge critical skills and supplies, just as I showed you before (figure 7). We surged in World War II because we brought in AT&T battalions, and we brought in people like David Sarnoff, Chairman of the Board of RCA, and we hauled all that expertise from the consumer electronics industry right into the Signal Corps, into special battalions. And we didn't just surge; we started, back in Lend-Lease time, building our industrial base. Moreover, we had an industrial base that could surge. Can we surge today? It would probably be a lot more difficult today, with the kinds of equipment that we have. So, the people again become part of the deciding factor. What's your manpower pool today? Can you surge the people to take care of surging the equipment? We must recognize again that what we have is an amalgamation, an unholy alliance between national and international systems and all of these little special subsystems that

we use for administration, command and control, and crisis management. None of them is really stand-alone (figure 15). They all hook together one way or another, even the commercial systems; the little guy walking down the airport aisle there with his brick radio is not a stand-alone, he's got a base station somewhere.

**Oettinger:** I think you implied, if I heard you correctly, that the surging ability is gone.

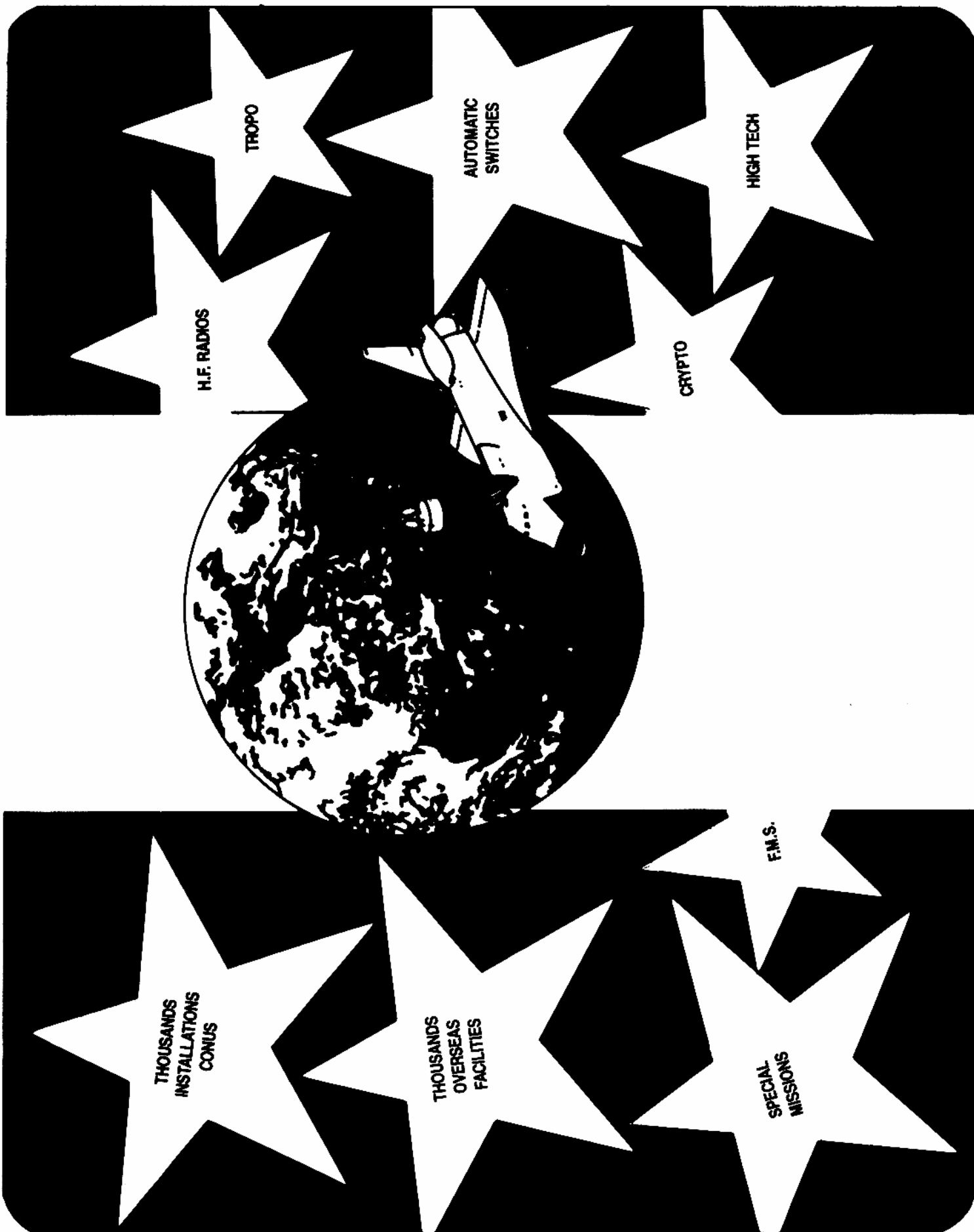
**McKnight:** No, I don't think it's gone, I just think it's not as well organized as we had it in World War II. But it takes planning. We had people who focused absolutely on that kind of surge planning.

**Oettinger:** But it was in an environment where the assets were pretty much those of one company because of the then-prevailing order of the telecommunications world.

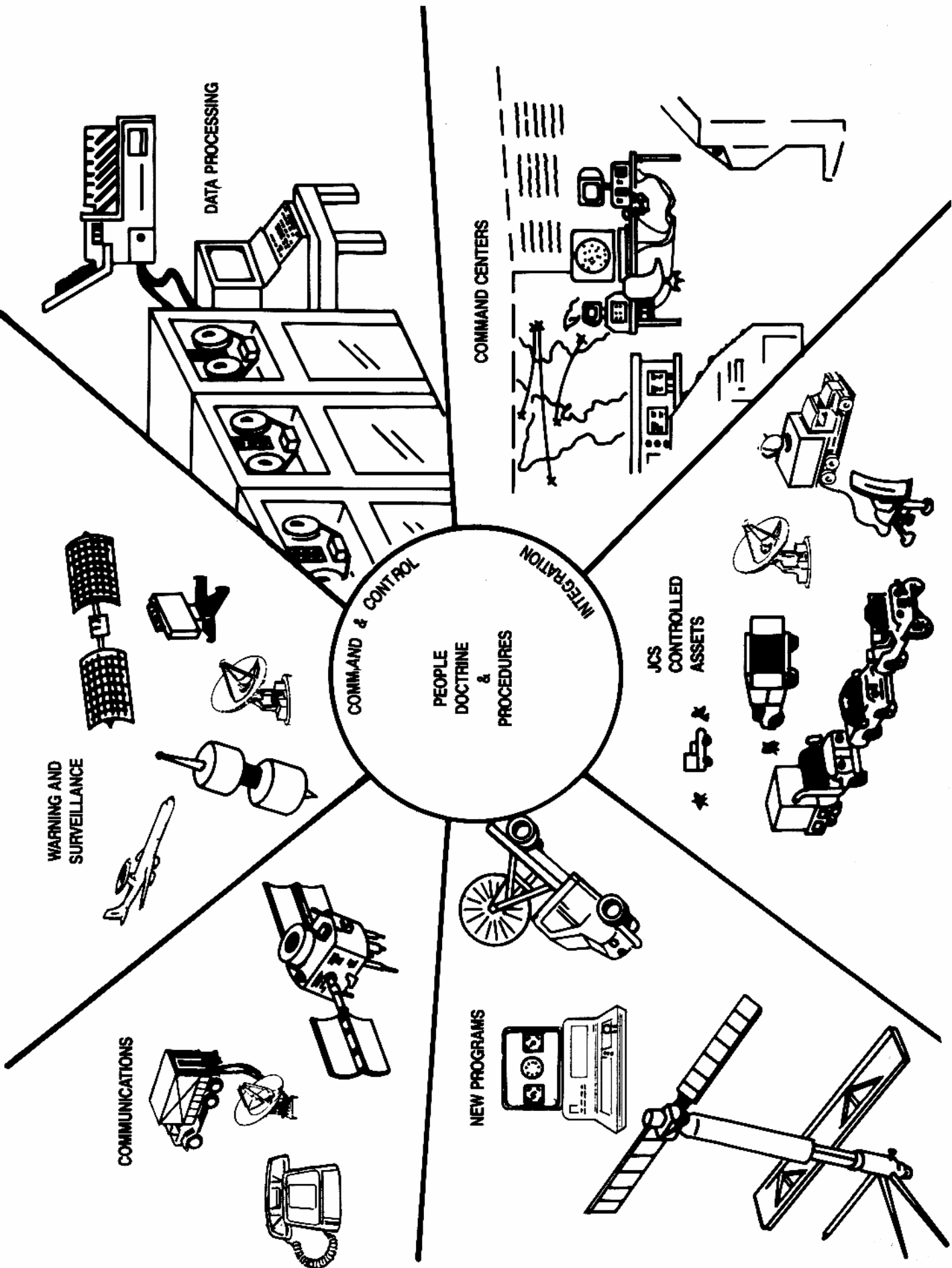
What I'm driving at is that it seems, by this chart and by what you just said about the guy walking down the airport aisle, that we may have some of the modern equivalent of that kind of organization or planning. Right now, this bank and that credit card company and the XYZ manufacturing outfit have set up more or less autonomous networks, all relying on roughly the same physical base but in different patterns. If we were to link these in systems — commercial, military, semi-private, etc. — would we perhaps have a surge capability that might be organized from what are now worldwide, diversified trading and manufacturing patterns?

**McKnight:** The trend in our national communications system(s) is to take all the federal agencies and work with them very closely in networking, which is just what you're talking about. This community, by the way, is drawing closer and closer together because of divestiture. There are many strengths coming from that in the NSTAC (National Security Telecommunications Advisory Council) which advises the President. Some of our leading CEOs advise the President on how best to use our national assets in communications. It's a direct derivative, and a very good derivative, from divestiture — one of the positive things about divestiture.

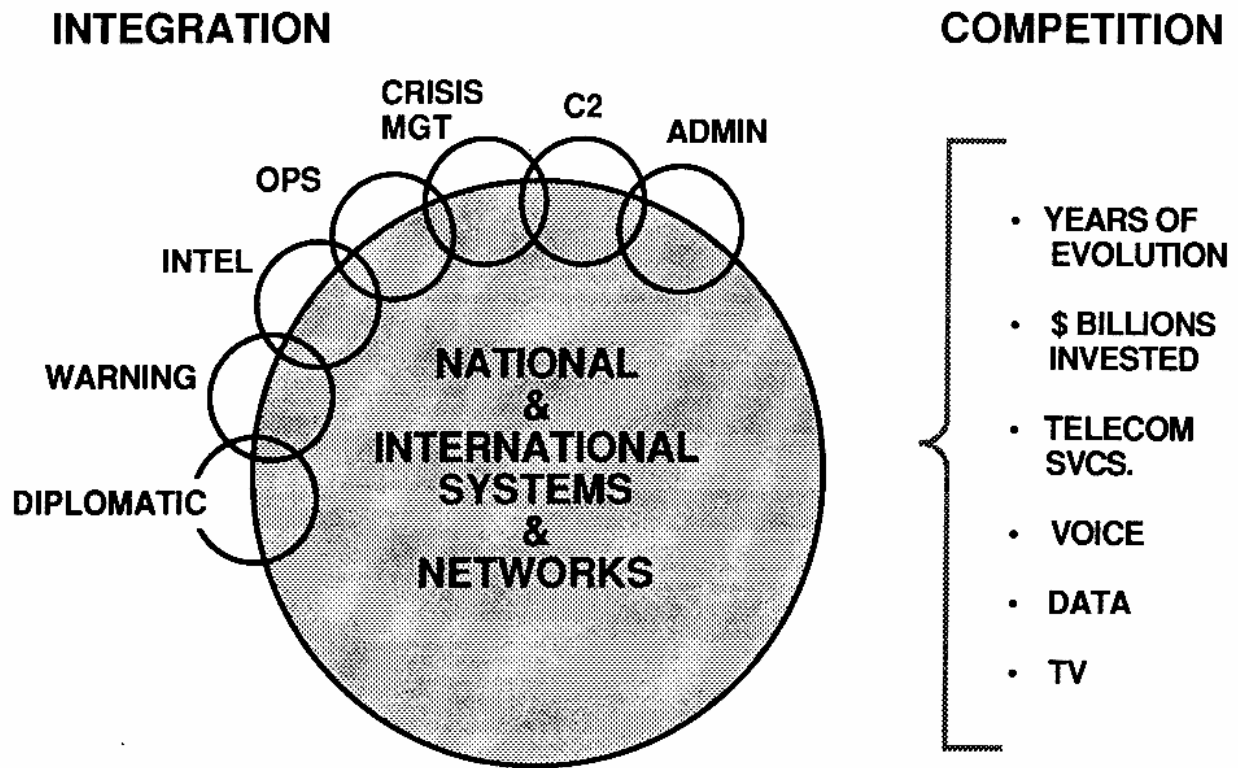
But there are very few stand-alone systems. We need to have some kind of institutional way, at least academically, to enable us to integrate. We can't do it at the last minute; it's too complicated to try to integrate ahead of time without a national planning base. Now, again, it comes down to balance: How much do you want to spend to do that?



**Figure 13. Global Complex — Systems and Programs**



**Figure 14. Global Service**



**FEW STANDALONES – HUMAN AND ELECTRONIC INTEROP VITAL !**

**Figure 15. Interoperation of Systems**

**Oettinger:** Do you think that the National Communications System structure as now organized and the NSTAC apparatus is capable of doing that? Or do you think that we do not have enough capability in place?

**McKnight:** I think we're making progress. Having looked at the Defense Preparedness Agency, the Federal Emergency Management Agency, and a lot of the systems that have evolved over the years, I think we've got a long way to go.

But I see the telecommunications/automation industry as a very dynamic, very cooperative one. Back in 1984 any nation in the world could see the Olympics in the right language, focused on their national athletes, and that was done because of a very cooperative venture between literally thousands and thousands of communications technicians around the world. Tech controls all had to be orchestrated, the timing had to be in — it was marvelous that this whole international conglomeration could present that kind of show in living color in people's living rooms wherever in the world they wanted to.

**Student:** I understand that part of the President's budget is to subcontract all of your operations to ABC as part of this divestiture and privatization campaign. Can't these guys do it better? Why shouldn't we let ABC run our military communications system?

**McKnight:** Well, I have my doubts altogether about that; but they're pretty good. This morning at about 5:30, I watched one of the ABC reporters who was practically going down with the submergible. His camera was right on the submergible that was going down to pick up a piece of the booster rocket. They have become very aggressive at being able to get that news in. We certainly use every bit of intelligence, whether it comes through our own sources, or through the cable, or over the networks. They pay a premium price and we might as well use it.

**Student:** Less frivolously, but on the same subject, it seems we've subcontracted to ABC to do my kind of business. The Philippine election has been a case in point: It was declared and announced on *ABC Nightline*, while parts of the campaign took place in direct interviews on American television. So the broadcast media may do us both out of business, although they're encroaching more on us than they are on you at this stage.

**Student:** I'm not really familiar with the whole issue of the effects of the AT&T divestiture on U.S. mili-

tary C<sup>3</sup> needs. Can you explain about this in a bit more detail?

**McKnight:** About 95 percent of the connectivity that we use in the military is from common carriers; before the divestiture we normally used AT&T as the prime agent to obtain that connectivity. But divestiture made it a more complex thing from the military's viewpoint. We now have to deal with far more agents and on a more competitive basis. We no longer can insist on end-to-end; we may buy one piece of the connectivity from one vendor and one from the other, so that the integration of all of that becomes more a burden on the military command and controllers, and the Director of the Defense Communications Agency becomes the true integrator rather than AT&T. It has quite an impact. We're growing, and as the Bell System spins off, it does not have the same hierarchical control over its operating companies that it once had. They're becoming more entrepreneurial. Bell Labs used to focus on quality and connectivity — end-to-end connectivity. Their focus now is turning more towards the entrepreneurial evolution of salable products.

**Student:** In other words, there is a divergence between commercial and military goals that has been steadily progressing since divestiture?

**Student:** You have to cope with AT&T and the breakup the same way the rest of us do.

**McKnight:** Yes. But it has a greater impact from the standpoint of national defense.

**Student:** You also have the standardization issue, because where you had Ma Bell in control years ago, setting the standards that were followed throughout the country and in many cases throughout the world, you now have different vendors going off on their different ventures.

**McKnight:** And they only control a little piece of the subsystem.

What's my bottom line? Well, one of my bottom lines is that we have had competent people focusing on these systems, all the way from the Wright Brothers through the satellites. We have a very cooperative community of C<sup>3</sup> professionals around the world. We need competent people in the C<sup>3</sup> arena, and especially people who are technologically trained to work with large systems. I'm encouraged that you're having these kinds of classes at Harvard; it is very encouraging that people from parallel walks of life are interested in what is going on in this particular

world. We are moving much faster than most people anticipated in the integration of automation and communications. For many years the communicator merely said, "How big a pipe do you want? I'll build it for you." He was oblivious of what was pouring through the pipe. Now he has to get into the mind set of the user and work with the automator, because that pipe is carrying literally millions and millions of decision-making bits. He has to be more adroit in the design of the systems.

We really have to look at our master plans and see whether they are achievable across several administrations. We want to try to design things so that they don't hiccup. We should be as apolitical as we possibly can because our C<sup>3</sup> planning is a national resource. It spawns an awful lot of technological prowess. The military services have always trained their technicians very well; when they go into the industrial base, they become very productive citizens using that technology. The kinds of architectures that we develop — the master plans of the CINCs (Commanders in Chief), and the master plans that we produce — should be so logical that they are achievable regardless of which administration is in office. As a final shot, I'd like to think that we could get some kind of a balance in the systems that support intelligence and command and control. That is, balanced in the perception of the Russians, such that we have a credible system out there for the tactical forces, a very credible system in the strategic world, and a crisis management system that is second to none, giving us the warning and the time to negotiate ourselves out of an unwanted war.

**Student:** You referred to the problems of building "purple" equipment and said that instead of focusing on "purple" equipment we should define the interfaces necessary to accommodate unique service requirements. How is that best orchestrated?

**McKnight:** We get an awful lot of help from the Office of the Secretary of Defense (OSD). That function should be placed in the government, where you would get the best institutional configuration for management and where you could constantly go back and recheck to see whether you, as taxpayers, are getting your money's worth or what you're paying for in these sophisticated systems. Because it's not just the technology that you're paying for. You're paying for the training base, the logistics, and the life-cycle costs in all the systems.

**McLaughlin:** Let me start with something very basic

here. One of the things that intrigues me and that I've been trying to track down is what people in the military mean when they say command and control. You can go to Pub. 1\* and get a good definition of command; you can get a definition of control that I don't think is what people are necessarily talking about when they talk about C<sup>3</sup>. Can you distinguish what control is as opposed to command in your function?

**McKnight:** No, I don't distinguish between them. There's a merger there, but I think it is very logical that command comes first. I noticed in one of your earlier seminars that Dr. Beal stated how much he admired General Alfred Gray, the Marine General who could move so many forces without having the horizontal directions always given. I think that you have to have a system of command before you can have the proper control, and that is part of the argument today about how we are organized to do business, to do war fighting around the world.

So in command and control, I book myself as the silent partner of the J-3, because he's the JCS Director for Joint Operations. He still maintains he is the czar of command and control. Actually, command and control belong to the commander. The commander is the one who executes. As I pointed out, the philosophy of how you do business comes from the executive suite. It comes from the command.

**Oettinger:** We're there at the heart of the tug-of-war over military organization in that requirements and needs are inherently those of the commander who executes, be it one of the CINCs or the Secretary of Defense or the President as Commander in Chief, whereas procurement and training and so on belong to the services. So you have an inherent crosscurrent. You're the third incumbent of your job. Can you comment a bit on how it feels to live with that current?

**McKnight:** Well, it's not an easy thing to do joint systems because so much of the system is below the surface. The joint part of it is the iceberg above the water, and in order to do the networking at the very top, at the NCA level, many times you're trying to push together systems that have evolved out of the doctrine of a particular service. I could cite all kinds of examples of service doctrine driving a particular,

\*Joint Chiefs of Staff, *U.S. Department of Defense Dictionary of Military and Associated Terms*, JCS Pub 1, Washington, D.C.: Government Printing Office, 1979.



very sophisticated way of doing business. For example, in the JTIDS (Joint Tactical Information Distribution System) arena, when the Navy was using DTMA (Distributed Time Division Multiple Access), and the Air Force was using time division (TDMA), which was a different modulation, they could be made backward compatible but they were very difficult to orchestrate, particularly for Congress.

**Student:** Sir, you mentioned earlier that you thought tactical C<sup>3</sup> was relatively neglected as opposed to Department interest in strategic C<sup>3</sup>. I suppose you might have in mind something like the correlation between tactical doctrines and C<sup>3</sup> requirements. The newer doctrines, say, of battle in Europe, like air/land battle, would probably have more stress on the requirements in that regard, or is that not the case?

**McKnight:** Most definitely. Air/land battle has tremendous requirements because you need CD (controlled dissemination), you need to synchronize. To give you an analogy, in air/land battle you are no longer in a football game of opposing forces across from each other, but more like a soccer game where you're entwined, and there is a lot more mobility on the battlefield. The essence of air/land battle is flexibility and synchronization, and that requires an awful lot of command and control support systems.

**Student:** Is that necessarily reflected in the procurements, the buildups into the organization of C<sup>3</sup> systems so far, or is that only in the offing?

**McKnight:** No, it's in the offing right now. I think you will see far more mobility stressed on the battlefield. We certainly are pretty well tied down like the Lilliputians with the very heavy equipment and the wire systems that today prevent us from having rapid movement of our command centers around the battlefield. The mobile subscriber equipment which they have just started to procure should in the very forward areas give much more flexibility in moving command posts in more compressed time frames.

**Student:** You talked earlier about "purple" equipment and said that in C<sup>3</sup> it was better to focus on the interfaces rather than trying to get "purple" equipment, primarily because the services have unique needs. I can see the services making that case since they're the ones who usually do the programming and the justifications for that. But would you say the unified commands share that outlook, or are they more concerned about a need to push toward some

commonality in terms of equipment, rather than just focusing on how they network?

**McKnight:** Well, I think we're discovering more and more that it's not necessarily the incompatibilities of equipment that cause the big disconnects as much as the doctrinal differences and the inability of the various services to work together in harmony on a common mission. What we have stressed is techniques and procedures. We're now placing a tremendous emphasis on joint exercises so that we will be able to use the equipment that is available and bridge the differences in doctrine by a better understanding of working together toward common goals. That means having to learn a little bit about the other services' doctrines in order to make those crossovers.

**Oettinger:** Let me pursue that a little bit in the following direction. You also spoke earlier about learning how to live with older equipment. I bring that up in this context because it deals with a similar problem: You have to live with older equipment because you can't get rid of the whole base and reinvest from the start. I'm wondering whether we haven't come through a period where, for reasons that I don't fully understand — that's part of the question, as to whether it was naiveté or a Machiavellian scheme, or maybe a little bit of both — there was a pervasive belief in systems as technical pipe dreams where everything would be the same technical generation, all fully integrated and up to date, etc., etc. The reason I say it might have been naiveté is that, if you take some of our technical colleagues who sincerely believe this, they might even have believed that that's the way to salvation. But one could look at it in another way, and say that so long as there's a search for the Holy Grail, then the underlying service doctrinal incompatibilities don't manifest themselves because there's always the excuse that the equipment doesn't work.

Now, there seems to be a more pragmatic view: We have to make interfaces because we're never going to have everything exactly the same, not only among the services or among units or among national components of combined commands, but also chronologically, because there's always this old stuff sitting out there someplace, and then we've got to plug in new stuff because, realistically, we can't operate unless we do. Is it possible that because of that more realistic, technical attitude now, the underlying real problem surfaces?

**McKnight:** I think the communicator has been the whipping boy for years and years, and I don't say that he shouldn't have been in certain cases. But we've had big exercises, and people have come back and said, "I could have been a Napoleon if it had not been for my bad communications." I think that's a cop-out, because there are doctrinal differences and they need to be addressed. It goes all the way back to Eisenhower, who said: "I cannot visualize employing a single service to do anything any more. It's going to be a joint response."

So that being the case, if we as a nation are going to go forward in employing forces, we need to get with it as far as the techniques and the procedures are concerned; we need to stress the kinds of things in peacetime that we may be called upon to deal with in contingency operations or in wartime. Then, as I showed in that one chart (figure 9), using the technology we have today in great amounts builds up the technological proficiency, not just of one service, but of all services. They become computer literate, systems literate, technologically literate, and it projects as a proficiency during their exercises, during overt kinds of things. The services don't have a space launch with which they can demonstrate their proficiency. It's demonstrated in training exercises, and their adroit performances with the Thunderbirds, and the Blue Angels, and the testing of aircraft. Those kinds of things are important in the public's perception of whether the armed forces are any good.

I think that we're getting better. Personally, I've been involved in unpopular causes for 34 years. But I think we are intelligent enough now to take those unpopular causes and the lessons that we have learned and start moving toward a better joint position. Theoretically, everybody believes that we will not commit individually, but that we will commit with our allies in a coalition and with each service. That's a tough nut to crack electronically.

**McLaughlin:** Let me pursue that. The last time that American armies were deployed in a serious effort was Grenada. That was a bloody communications disaster, judging by every indication, whether it's the Joint Special Operations Command soldier calling back to Ft. Bragg with his AT&T credit card to call in air support, or the fact that the Marines and the airborne forces couldn't communicate. Most of what comes out, at least, is that it was a disaster — and I think Don Latham confirmed it last year under

questioning.\* But who got hung? Who got their heads knocked together? And can you afford to operate that way? The strength of the opposition that we encountered is not what one would expect if one were dealing with real professionals.

**Student:** Isn't it very easy to use incompatibility of equipment as the scapegoat when in fact doctrine itself is the more fundamental issue? The fact that the Air Force couldn't talk to the Army, or whatever, may be due to not using the same frequencies or what have you. But, in fact, why is it that they were not using the same frequencies? Not because of the equipment per se, but because of the lack of common doctrine.

**McLaughlin:** That's the question that a critical public asks. They don't care about frequencies. Why is it that the Marine Corps and the Army and the Air Force can't get their act together?

**Oettinger:** That's a very sophisticated question that you will not find in the daily newspaper.

**Student:** I found it in *Newsweek*.

**McLaughlin:** More and more of your Senators and Congressmen recognize the question as well today, which I don't think was true five or ten years ago.

**McKnight:** I think they recognize it very much. Again and again, I have stressed that there are those doctrinal differences, but I believe that we are moving closer together, particularly the Army and the Air Force, in resolving certain ways of operating together. There were 30-odd initiatives fostered between the Army and the Air Force, although some of those have had to be retrenched. But each service is coming from a different doctrinal base with its own C<sup>3</sup> drivers, which produces systems that are very hard to cap in the joint perspective to make them totally compatible with war fighting. The CINCs are in great positions to force the services to move closer together from a standpoint of practicing likely contingencies; they can force the system to produce more harmonious techniques (even though the doctrine may be a little different) and to have exercises that will make the discrepancies come to the surface, so that we can correct them.

\*See Donald P. Latham, Assistant Secretary of Defense for C<sup>3</sup>I, "A View from Inside OSD," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1985*, Program on Information Resources Policy, Harvard University, Cambridge, MA, March 1986, pp. 103-124.

Since Grenada, we have looked at the joint planning cycles in much greater depth. We have increased the educational process of trying to get people to do realistic planning that can be evolved in a compressed time frame but still cover the key points of coordination between the services. You will still come up with some incompatibilities in equipment because there are blocks of equipment that get out of phase over the long haul. One combat element may have a piece of crypto equipment that is not compatible with another one, and suddenly in a contingency they may be mixed together. It may be within the same service or it may be between the Army and the Marines, and so forth. But what we are trying to do at the C<sup>3</sup> level at the top now is to make a more harmonious orchestration of these kinds of planning documents such as master plans, and to work with the J-3 to do the exercises and the evaluation.

One of the things that I did not cover with you is the program that Bob Herres\* started and that has been carried on and finished since he left. We have a C<sup>3</sup> evaluation and connectivity element within J-C<sup>3</sup>S, headed right now by a brigadier general from the Air Force. He looks at the results of the exercises and tries to put a dipstick into the quality of connectivity, because if you don't have connectivity you can't execute. He takes the model that addresses how we monitor, decide, execute, and retarget or reconstitute — those kinds of functions — and makes subjective and expertise evaluations of that model in terms of C<sup>3</sup>, to see whether we are spending the right kinds of dollars in these phases of the architecture that we are producing. We are modeling those functions across the board for every CINC. Because really, you could put all your resources and effort into warning and do everything with warning, and not have anything left for the other functions.

In the "excuse" category, for instance, adding TACAMO\*\* would give you an enhanced capability in the decision dissemination process or in the execution of a particular force. So what we're trying to do is get a better standard of measurement, and one of the evaluation processes in this organization (which is a subcomponent of my organization) is to look at the results of the exercises, not just to critique them

\*General Robert T. Herres, USAF, former Director, J-C<sup>3</sup>S, now U.S. CINCSPACE and Commander in Chief, North American Aerospace Defense Command (CINCNORAD).

\*\*Code name for Take Charge and Move Out, Navy Communications A/C, Lockheed C-130.

and throw them in the basket, but to find the reason for any problems — was it the equipment, was it training, was it doctrine? — and follow up on those questions. This involves working very closely not just with the J-3, but with the J-4 and the J-5, because it may be operations, it may be logistics, or it may even be policy that causes a disconnect. I think this can be a very valuable part of the institutional assessment of what we're doing. Because all those things that we're trying to synchronize and synergize — the warning systems and the sensors, the command systems, and so on — all that has to play together to be able to execute. And if you over balance the thing, pretty soon you can see everything that's going on but you can't respond because you don't have any tail structure to do that.

**Oettinger:** In regard to your comment about balancing, let me ask you about something you said earlier. If I understood correctly, I heard it as a call for better technical competence at top levels. Now I don't think you meant having a Signal Corps officer for President instead of an actor, so at what level did you mean? CINC, or battalion, or what?

**McKnight:** Why did they create West Point? Because the country needed more civil engineers. When I went to West Point I learned a lot of engineering, but I was certainly not equipped to become what I am today, the senior person in the Signal Corps. I had to go back to the University of Michigan and take a degree in electrical engineering and, through experience and OJT (on-the-job training) and everyday reading about these things, try to learn more and more about command and control. We do not teach enough about command and control as a generic discipline.

**Oettinger:** You're talking about it in that sense as a piece of the normal equipment of any officer along with Army or Air Force training.

**McKnight:** Right. I think it's much tougher in the Army than it is in the Navy and the Air Force today because the Navy and the Air Force are constantly working with mobile platforms that they command. Those mobile platforms are very technologically advanced, so that personnel are forced, if they're going to be commanders in one of those technological fields, to upgrade themselves. Frankly, even though I think the Navy is the least cooperative in joint ventures, I would give them the star in their ability to be command and control people, because they are constantly integrating their resources, be they subsur-

face, surface, or air. Being a good command and control person, I think, means having the ability to integrate a lot of subsystems and come up with a macro evaluation.

**Oettinger:** So you're saying that this is more of an Army problem than it might be an Air Force or a Navy one?

**McKnight:** I think so. No, let me restate that. It's a national defense problem. Although the problem may be more acute in one service, you still need to be able to take the best of all the services and make the joint system, because the system that the President and the Secretary of Defense are going to execute is the joint system.

**Oettinger:** Putting all of these things together — and you may want to decline to comment on this — I was thinking about your opening comments about having served under the previous Chairman, General Vessey, and now under Admiral Crowe. On the one hand, Admiral Crowe comes out of the Navy, and we know the Navy has been the least cooperative; on the other hand, his last assignment was as CINCPAC (Commander in Chief, Pacific) and CINCPAC has many multiservice assets, particularly in Korea and so on. One would think that CINCPAC would have a somewhat different viewpoint of the world. Do you care to comment on whether or how that background makes a difference in terms of your job?

**McKnight:** I think it's good. I think it's advantageous to put a CINC in as Chairman. I believe he's the first joint CINC, if I'm not mistaken, to become Chairman. I think it's a very valuable asset. Now I deeply admire General Vessey and his ability to take a tough system and make it work. He did it with subtle persuasion and with political adroitness. But he had a very tough system to work against. I believe that it's moving in the right direction to take a CINC who is actually the executor of the war-fighting assets and put him in as the senior military man.

**McLaughlin:** Going back again to Don Latham's talk last year, before Admiral Crowe was nominated but when it was speculated that he would be the new Chairman, Latham mentioned the fact that CINCPAC had lodged something like 12 ROCs (required operational capabilities) that had not been approved yet. Latham was wondering what the opinion of the new Chairman of the JCS would be when he came in and saw all those special exceptions sought by CINCPAC still sitting there. Any movement on that front?

**McKnight:** I haven't noticed any particular leverage

being applied, because I think that he came in with his PACOM (Pacific Command) experience balanced by his stint in the Mediterranean. One of the things that you notice is that every Chairman is very quickly subsumed with the crisis around the world and with the budgetary process. Of course, all of them complain that they don't have enough "think time" because they are in the middle of an environment with a very compressed time frame.

**McLaughlin:** On the training side, I've been trying for some time to track in various industries, as well as in the national security world, the professional expertise of the management level people in terms of whether we're seeing different generations in different industries. We can tell, for example, in commercial banking, that the three or four people who have gotten to the top of the major banks in the last few years are for the first time from the data processing side. At one time they were considered "techies," and the operating ethic of the bank was that the commercial lending officers and the like were the people who always used to become president, while the communications and data processing people were well down in the ranks.

General Jack Cushman\* and I have been having a debate about the proper placement of the C<sup>3</sup> function in military organizations in terms of how much is staff and how much is technical specialty. It seems to me that things like logistics, or civil engineering, at one point, were sort of considered basic tools of the trade. Perhaps there was a point in history where one could say, "We'll leave logistics to the specialist." But basically, all the great commanders have been very good at that themselves, and have frequently taken over from people who have screwed up that side of the job before. I'm responding to your observation that more of the people at the top have to have more C<sup>3</sup> in their background, which runs contrary to the operating ethic of all the services. The people from intelligence, people from special operations, people from communications, data processing and other technical phases are seldom the ones who ever get four stars. I think Bob Inman\*\* is perhaps the exception.

\*Lt. General John H. Cushman, U.S. Army, retired, author of *Command and Control of Theater Forces: Adequacy*, Washington, D.C.: AFCEA International Press, 1985.

\*\*Admiral Bobby R. Inman, former Director, National Security Agency, and former Deputy Director of Central Intelligence.

**Oettinger:** The fact that your predecessor became CINCNORAD seemed like a startling exception to this rule, and the question is whether there is or is not movement in the services. Certainly in the Navy, until fairly recently, it has been the kiss of death to be an intelligence or command and control specialist; you were quite unlikely to become CNO (Chief of Naval Operations).

**McKnight:** I think it's going to require a cultural change. It's strange, because other countries seem not to have that ingrained bias. The Chiefs of Staff of both the Japanese and Portuguese armies are signal officers. I'm not saying that a signal officer should be the Chief of Staff of the Army. That's not the point I'm making. I think that many of the signal people, like the automated data processing (ADP) people, become more ingrained with the technological side of the business rather than with the broader general side of the business.

I'd like to think that I am a balanced person. I went into the Signal Corps because they said it needed leadership, that there were too many people who were technologically oriented and more interested in one small phase than they were in the total big picture. My entire career has been spent trying to look at the big picture, and I'm as interested in the logistician's world and the procurement world as I am in the technical side of things. I've been blessed to have commanded two major installations in the United States and a theater element overseas. So I've had the opportunity as well as the inclination to broaden somewhat; but the person who wants to stay extremely narrow, while he can become a total professional, is not likely to reach the top and be placed in the overall category because the charters are much broader at the top. If he doesn't want to take on those responsibilities, he's not going to be given those responsibilities.

The point I'm trying to make is that we have tended to push aside people like the logisticians and the ADP specialists. But you need to know a little bit about everything if you're going to be the leader, and we need to inject more command and control into our leadership. Not the circuit diagrams necessarily; but it's a fact that today we have many, many more electronic systems out there. The wise commander needs to know what they can and can't do and what they will cost him, and we're not telling him, not sufficiently. That's the point.

**Student:** A lot of time and energy and talk in C<sup>3</sup> has

been focused on fighting the next war and managing SDI and cataclysmic events. How much energy do you spend in your organization worrying about the day-to-day business of how the United States and NATO deal with minor problems with the Russians, say, in Europe, or in managing assets and incidents at that level? Particularly from my experience in Germany, when you have incidents like Major Nicholson being shot in East Germany or, in another case, Soviet helicopters flying over Bitburg Air Base on their way to the Paris Air Show, those were real incidents in which we, the armed forces from the two countries, were right next to one another, and which will continue to occur in the future and will be managed by Caspar Weinberger and Ronald Reagan directly. How much time do you spend worrying about how that kind of thing operates and how the command in Heidelberg deals with the State Department and the White House on that kind of issue?

**McKnight:** I don't get into the inner workings of the day-to-day exchanges as much as I worry about making the systems more responsive so that the interfaces between the key decision makers can be made. As I pointed out in one of the charts (figure 4), each one of those incidents spurs a new sensitivity to command and control functions, and a lot of "what ifting" goes on. We're certainly involved with those. But we are working daily with the CINCs to try to improve their systems across the board so that they will have more responsive secure voice systems. The diffusion of any crisis, in my opinion, very much relates to the responsiveness of the systems to exchange information between the leaders.

**Oettinger:** Let me interject a comment to tie this discussion to what General McKnight said earlier about objectives and strategies in command and control that might persist through several administrations. You put your finger on a very difficult problem that underscores the earlier point that installing these things and providing for some measure of follow-through require some continuity and stability over the years; that's one element. At the same time, you have just observed that the personality of Ronald Reagan or Caspar Weinberger is very different from that of the last administration and probably very different from the next. So the question is if what several generations of architects, if you will, have put in place happens to fit the needs, personality, and modus operandi of the current Commander in

Chief or CINC or SECDEF and so on. As we wander through this year, some guests who come from the civilian industrial world will also address this whole question of what kind of system you put in place and how it relates to the personality of the commander. It's a very critical set of questions we need to explore some more.

That's why I find General McKnight's comment about training so important. One way of addressing that, which helps bridge the gap, is if your general manager or your operational commander has as part of his kit and tools some understanding of this realm, in the same way that he understands public affairs or anything else, you may have less of this crazy lurching than if you have a commander, at any level, who doesn't understand an important piece. It's just as in Hannibal's era, when a guy who couldn't understand a mule train wouldn't have gotten anything over the Alps. That's why I think that the comment about the need for folks to have C<sup>3</sup> as part of their training may be more important than you think.

**Student:** It's been my perception since Vietnam that we have a tremendous communications capability that gives Presidents and White House staffs — or "Washington," if you will — the capability of micromanaging. People now know that. People know that banks can micromanage their accounts. Having gotten that capability, then, the President has a responsibility, in the public eye, to micromanage. We know that Ronald Reagan could know what's happening in Grenada every step of the way, and we expect him to be on top of that. We expect him to be awakened at four o'clock. When he's not awakened at four o'clock because he should get his sleep, you have a major crisis in confidence.

**Oettinger:** You need to look at Leo Cherne's\* comments last year about the theatrical elements of news, going back to the role of the networks. That's one kind of thing. There's also a measures and counter-measures aspect, and the accounts of the handling of the tree-cutting incident in Korea by Dick Stilwell and Jack Cushman that show a greater level of sophistication about keeping the guys in the Pentagon and the White House basement the hell out of this, regardless of what the theatrical aspect might be.\*\* So the institutional reactions to that capability as it

\*See Leo Cherne, "Television and the National Interest," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1984*, Program on Information Resources Policy, Harvard University, Cambridge, MA, February 1985, pp. 35-48.

became widely available are what we really should watch.

**McKnight:** I think we did some very bad things by being able to pipe all that information back during the Vietnam crisis, because it was against a very benign theater, and it set the pattern for that micro-management that provides a hell of a challenge today. I just believe that a crisis can be managed much better closer to the source, and, as Dr. Beal said, possibly the President shouldn't have been awakened.

**McLaughlin:** It is your decision whether to bring the President into this, and once you do, then he's really responsible.

**McKnight:** He's really committed.

**McLaughlin:** Right. It's fascinating to watch the contrast between this and the previous administration in that Reagan has been very successful in fashioning for the public this idea that, no, the President isn't going to be involved in everything, whereas Jimmy Carter set the model that he was watching who dotted which "i's" and crossed which "t's," for which he paid a terrible price.

**McKnight:** As far as a commander is concerned, a senior commander like Stilwell recognizes, as does anyone who has commanded troops or been in combat over a sustained period of time, that your effectiveness lies in responding to the most critical needs as opposed to responding to every need. Because you can run yourself ragged with these "Henny Penny the sky is falling" kinds of things. That's why I defy anybody to crunch 600 messages into a meaningful two minutes — well, there are probably people who, if they were the subject matter experts in that little area, might be able to do it. But you're putting an awful lot of people in brain overload by just bringing in superfluous information and hoping that by pouring it on top of them they're going to absorb the most critical, necessary pieces.

**Student:** The real problem, though, is the 7 degrees on the shuttle booster, and that such small problems

\*\*See Lt. General Richard G. Stilwell, "Policy and National Command," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1982*, Program on Information Resources Policy, Harvard University, Cambridge, MA, December 1982, pp. 115-146; and Lt. General John H. Cushman, "C<sup>3</sup> and the Commander: Responsibility and Accountability," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1981*, Program on Information Resources Policy, Harvard University, Cambridge, MA, December 1981, pp. 95-118.

can be catastrophic, whereas in days gone by they were not.

**Oettinger:** Come on, "For want of a nail..." — that's an old story.

**Student:** Well, things can go wrong, and yes, now you can find a nail, quickly. But back then you could find another horse or another nail and on another day you could still fight the war. But today, you have a compression in time that means your period for decision making is much more compressed.

**McLaughlin:** It was very compressed for Richard III at Bosworth Field. He died. The Tudors took over.

**Student:** Besides, it doesn't take a President or an administrator to find a nail. It can still be delegated down to the appropriate level.

**Oettinger:** You see, we don't know what kind of court of inquiry was set up to find that nail and find out who the guy was who lost track of it. But we really shouldn't detain General McKnight on this, although it's an important point for us to take up again because I would differ with you on the notion that there has been a serious compression of time. The finding of a NASA scapegoat now by our competing commissions is very different from what might have happened in an earlier era.

**McKnight:** There was a very interesting editorial in the Washington Post recently, called the "Pain of Arrogance."\* How could anything go wrong with

the shuttle? Maybe our nation has gotten to the point that we expect absolute perfection of everything up until the point of detection. There are human errors that I'm sure will be detected, but I work with people who are technologically oriented all the time, and I think there is a technological arrogance that we can sense everything and we can process everything. It's going to take centuries before we reach that level of perfection, if we ever reach it. We're going to have disruptions all along the line.

**Student:** Don't misunderstand me. I recognize that and I recognize that rocketry is a difficult process that will have problems...

**McKnight:** The reason I'm sensitive to it is because, when I was a staff officer, I had so many commanders ask, "How could this happen? How could those electrons not go through the air and come out on the other end"?

**Student:** My point is that, from a systems approach, we have to realize that we've got a tremendously complex program, and that being able to keep track of a lot more things on an instantaneous basis is critical to the whole operation.

**McKnight:** Absolutely. We've moving in that direction now with SDI.

**Oettinger:** But it also means that as that complexity increases, the number of vulnerabilities also increases. What is not clear is at what pace you can keep these things in balance.

\*David S. Broder, "The Pain of Arrogance," *The Washington Post*, February 2, 1986.