

***INCIDENTAL PAPER***

---

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

**Information Warfare: Hierarchies or Networks?  
Kenneth Allard**

**Guest Presentations, Fall 1997**

Philip B. Heymann; Kenneth Allard; Denis Clift; Douglas D.  
Bucholz; Arnold E. Donahue; Charles A. Briggs; Anita K. Jones;  
David S. Alberts; Gregory J. Rattray

**April 1998**

# *Program on Information Resources Policy*



***Center for Information Policy Research***



***Harvard University***

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

*Chairman*  
Anthony G. Oettinger

*Managing Director*  
John C. B. LeGates

Copyright © 1999 by the President and Fellows of Harvard College. Not to be  
reproduced in any form without written consent from the Program on  
Information Resources Policy, Harvard University, Maxwell Dworkin 125,  
33 Oxford Street, Cambridge MA 02138. (617) 495-4114

E-mail: [pirp@deas.harvard.edu](mailto:pirp@deas.harvard.edu) URL: <http://www.pirp.harvard.edu>  
ISBN 1-879716-47-X I-98-2

## Information Warfare: Hierarchies or Networks?

C. Kenneth Allard

---

*Dr. C. Kenneth Allard, formerly a colonel in the U.S. Army, is the chief executive officer of Cyber Strategies, Inc., a technology consulting firm in Alexandria, VA. He is also a senior associate in political-military studies at the Center for Strategic and International Studies, Georgetown University, and an Adjunct Professor in Georgetown's National Security Studies Program. The highlights of his military career include serving as a faculty member at West Point, as special assistant to the Army Chief of Staff, and as Dean of Students at the National War College. He also played key roles in crafting two major Pentagon reforms: the Goldwater-Nichols Act of 1986 and the Federal Acquisition Streamlining Act of 1994. A command and control expert, he served in 1996 on special assignment in Bosnia with the U.S. 1<sup>st</sup> Armored Division. His numerous publications include two books: Somalia Operations: Lessons Learned (Washington, DC: National Defense University Press, 1995), and Command, Control and the Common Defense (New Haven, CT: Yale University Press, 1990), winner of the 1991 National Security Book Award. Dr. Allard holds a Ph.D. from the Fletcher School of Law and Diplomacy, Tufts University, and an M.P.A. from Harvard University's Kennedy School of Government.*

---

**Oettinger:** As usual, I will not give a detailed introduction to the speaker, since you've all had an opportunity to read his biography. What I will say, which does not appear in his biography, is that he is an alumnus of the first session of this seminar (1980), and so it really is an unusual, rare, and unique pleasure to introduce him.

**Allard:** Thank you. It is always a pleasure to return to whence I came. And let me apologize to you, because I understand that my "command and control" book is now on your assigned reading list.

What I will try to do today as well is to give you a preview of that book, the better to ease your burden in wading through all this. If you share my Harvard experience, you will find an unending series of progressively newer applications for some of the lessons learned here. I would just urge you to pay some attention to the various themes that are part of this course, because I have found them to be timeless.

That said, let me tell you a little bit about what I want to talk about today, and that is something that I hope in some way reflects the readings that you've been given. I'm fascinated not so much by technology, but by how people utilize it. As I

remind my own students at Georgetown, this business of strategy is something that involves an enemy who also has the capacity to learn lessons. It is not merely an arrangement of technologies and organizations for their own sake. It also suggests that we ask certain basic questions, which was one of the skills that I learned in this course.

You can make the basic issues of command and control about as complicated as you want to. You really can. But I would suggest to you, that if you get down to these four basic questions throughout the work that you're going to do in this course, you will not go very far wrong (figure 1). The answers provide some interesting threads of continuity to follow through in

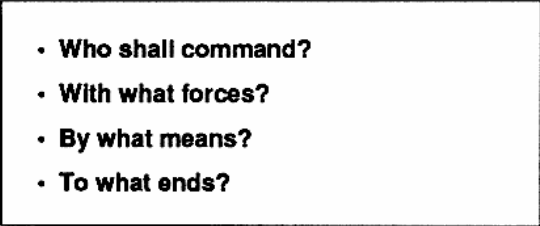
- 
- Who shall command?
  - With what forces?
  - By what means?
  - To what ends?

Figure 1

C<sup>2</sup>: The Basic Questions

your analyses, whether you're talking about the civil sector, government, or defense.

Having said that, let me try, in my own halting way, to define some terms (figure 2). The Revolution in Military Affairs has now been accorded the ultimate Pentagon honor: it has its own acronym, the RMA.



**Figure 2**  
**Defining Our Terms**

What is intriguing to me about this is that you will hear various discussions of the RMA as if people really understood what its end state is going to be. It reminds me of a bunch of fifteenth-century cardinals of the Roman Catholic Church wondering what the advantage to the church would be of this wonderful new invention by Herr Gutenberg called the printing press. They absolutely could not have predicted what would happen by looking at this machine, which would place a printed New Testament in the hands of the peasant. Could you really have predicted the rise of bureaucracies, the solidification of hierarchies, the growth of organized military establishments, the Reformation, the Counter-Reformation, or the Thirty Years' War? Probably not. So, when I hear various people in the Pentagon say that they're in control of RMA, I am somewhat inclined towards skepticism. I think where we are right now is a military technical revolution. It is the overlay of the computer chip on top of an existing series of institutions, organizations, and procedures.

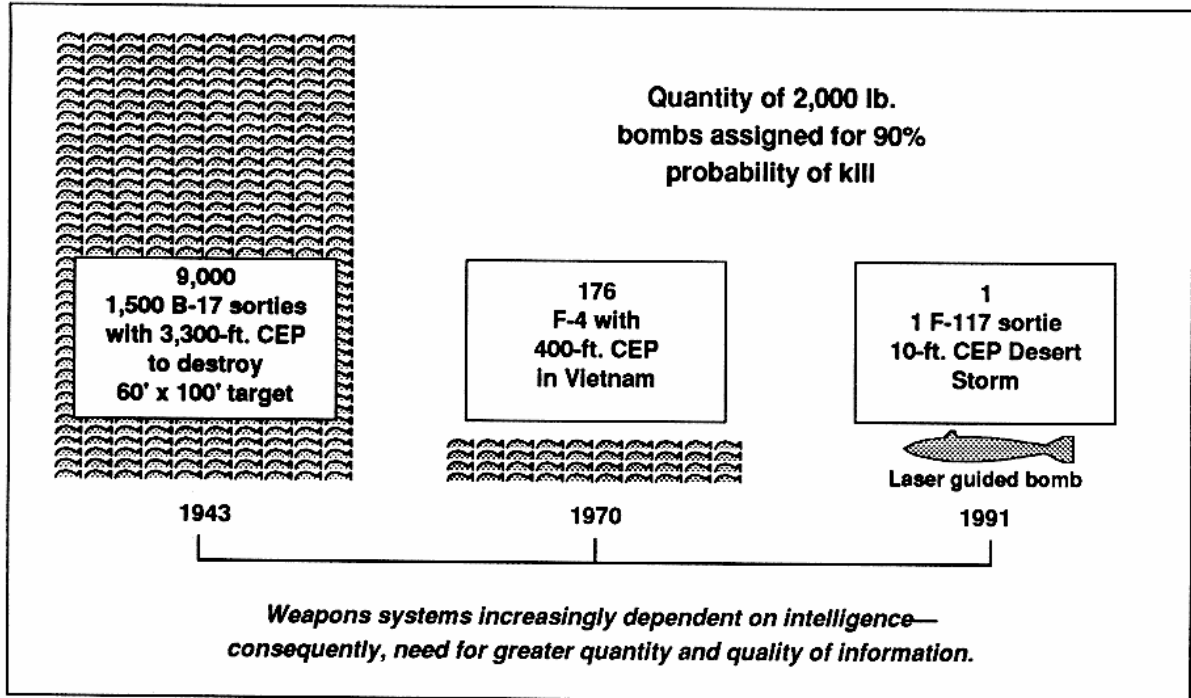
**Oettinger:** A small break, if I may. We were going to have more about that at the end of the semester with Admiral Owens, one of the architects at least of the coinage of the "Revolution in Military Affairs," possibly also of the substance. Unfortunately, as of a couple of days ago, he got promoted in his company and is unable to come. Instead, we shall have Dr. David Alberts who is himself a scholar of the RMA.

**Allard:** At the risk of striking a deterministic note, let me say that the computer, the microchip, is revolutionizing almost every aspect of human society. That also, of course, includes the way societies conduct conflict, armed and otherwise.

It was most graphically shown for me by this chart (figure 3), which General Clapper, the former the head of the Defense Intelligence Agency, used in his briefings. There is a great reduction from the number of sorties it took a B-17 to take out a target in World War II compared with the F-117 in the Gulf War. While this is not the totality of war, it suggests two key ideas. One is that there is more and more information distributed across comparatively fewer numbers of platforms that utilize it; so the quantity of the weapons has gone down, but their quality has gone up. There is also more and more information at lower and lower levels, suffusing and changing armed conflict. This is not because we just like information, but because we can kill targets better with better information, just as you saw in the Gulf War. Information gives us the edge.

Figure 4 suggests that a fundamental transformation is going on. What does it affect? Practically everything. It affects the way that we fight right now. It affects the way that we think about doing warfare in the future, and, as you'll see later in this presentation, it affects new classes of missions.

This should sound a little airy-fairy to you, as it does to me. Why? Because we're in the midst of a military technical revolution. We see "through the looking glass darkly" now, even as this process of experimentation goes on.



CEP = circular error probable

Figure 3

**Increasing Precision/Effectiveness of Weapons**

**Transformation of war in the information age. Consisting of:**

- Protection of friendly information and decision making assets
- Attack of adversary information and decision making assets
- Leveraging information technologies

**Leveraging Information technologies includes:**

- Traditional war (e.g. MRC)
- Nontraditional missions
- New concepts of "warfare"
- Information warfare is part of every mission capability package

**Information warfare is more than a DOD concern**

MRC = major regional conflict

Figure 4

**Information Warfare**

**Student:** Excuse me, sir. MRC being major regional conflict?

**Allard:** Yes. So, when you see definitions such as this (figure 5)—and this, I think, is the currently agreed-upon one—you should not take them with a great grain of seriousness, because we tend to look on these as

*Actions taken to achieve information superiority by affecting adversary information, information-based processes, and information systems while defending one's own information, information-based processes, and information systems.*

CJCSI 3210, "Joint Information Warfare Policy"  
DOD Dir 3600.1 Information Warfare

Figure 5

**Information Warfare**

being exclusionary. What I'm here to suggest is that these new forms of information-based competition are very rapidly creating their own definitions. We get all hung up over such terms as "command and control," "command and control warfare," "information warfare," "warfare in the information age," "cyberwar," ad infinitum (figure 6). But the reality is that these distinctions are less important than the over-arching reality of information-based conflict.

**Oettinger:** If you are interested in the history of this, there's a marvelous presentation in one of the earlier seminars by Dr. Ruth Davis on the birth of the term C<sup>3</sup>I—command, control, communications and intelligence.<sup>1</sup> What puts it in perspective and gives some justification to it is that this is not about logic. This is not about intellectual cleanliness. It's about turf, and it's about money. Since this story has yet to play itself out, it's not as clean-cut as Ruth Davis's retrospective on how the C<sup>3</sup>I empires arose, and even that story is not dead. At this very moment the new Secretary of Defense, Bill Cohen, is said to be pondering the question of whether he takes the Assistant Secretary of Defense for C<sup>3</sup>I and splits him into two: an "I" and a "C<sup>3</sup>." The shotgun marriage that put those two together in the first place, and the reasons for it, are part of what Ruth Davis tells you about. We don't have a definitive record yet of this, but this particular one, of course, is turf of the folks who own the computers and stuff and don't own weapons like tanks or airplanes or ships. They're trying to define themselves now as an area worthy of their own budget and their own structure, et cetera. I'm not saying that's bad. I'm not saying it's good, either.

**Allard:** I agree, and would suggest that the hackers and phreakers don't care about the definitions. There is a wonderful piece in

---

<sup>1</sup> Ruth M. Davis, "Putting C<sup>3</sup>I Development in a Strategic and Operational Context," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1988*. Cambridge, MA: Program on Information Resources Policy, Harvard University, March 1989.

today's *Washington Post* on an Internet porno scam in which downloaded software concealed a Trojan Horse. Without the user's knowledge, his computer was plugged into a phone line going to Moldova at some horrendous international rate. Even after leaving the Web site, it kept on charging until the computer was turned off. That's the kind of thing I'm talking about. Hackers and cyber criminals don't care about the definitions, the tactful arrangement of organizational priorities, or agendas, at the corporate level. They simply want to do you in.

That point also puts into perspective the way we think about things at the tactical, the operational, and the strategic levels (figure 6). Forget the narrower definition: *This is my system against yours*. What can I do to protect mine? What are you going to do to protect yours? What am I going to do to mess with you? That's the key. So it is a ferociously interactive and highly competitive world we're heading into. It is not merely the weaponry, it is all that other stuff. I'm using some of Tom Rona's<sup>2</sup> methodology here, what he calls "the extended weapon system." So it's my system against yours, and it is not clear that we approach this with some of the advantages that we tend to assume.

If you want to get a new idea in here for all of these term papers you're writing, then do what I did: read an old book. One of the best ones I've ever read is by Elting Morison, *Men, Machines and Modern Times*.<sup>3</sup> In 1949, he wrote this magnificent book about what organizations did in this case, the U.S. Navy at the turn of the century (figure 7), typically in technological revolutions. It's not just one technology by itself: it is the combination of the technologies that enables something really exciting to happen. With nineteenth century naval

---

<sup>2</sup> Dr. Thomas P. Rona, consultant. Formerly Deputy Director, Office of Science and Technology Policy, Executive Office of the President.

<sup>3</sup> Elting E. Morison, *Men, Machines and Modern Times*. Cambridge, MA: MIT Press, 1966. In particular, see Chapter 2: "Gunfire at Sea: A Case Study of Innovation."

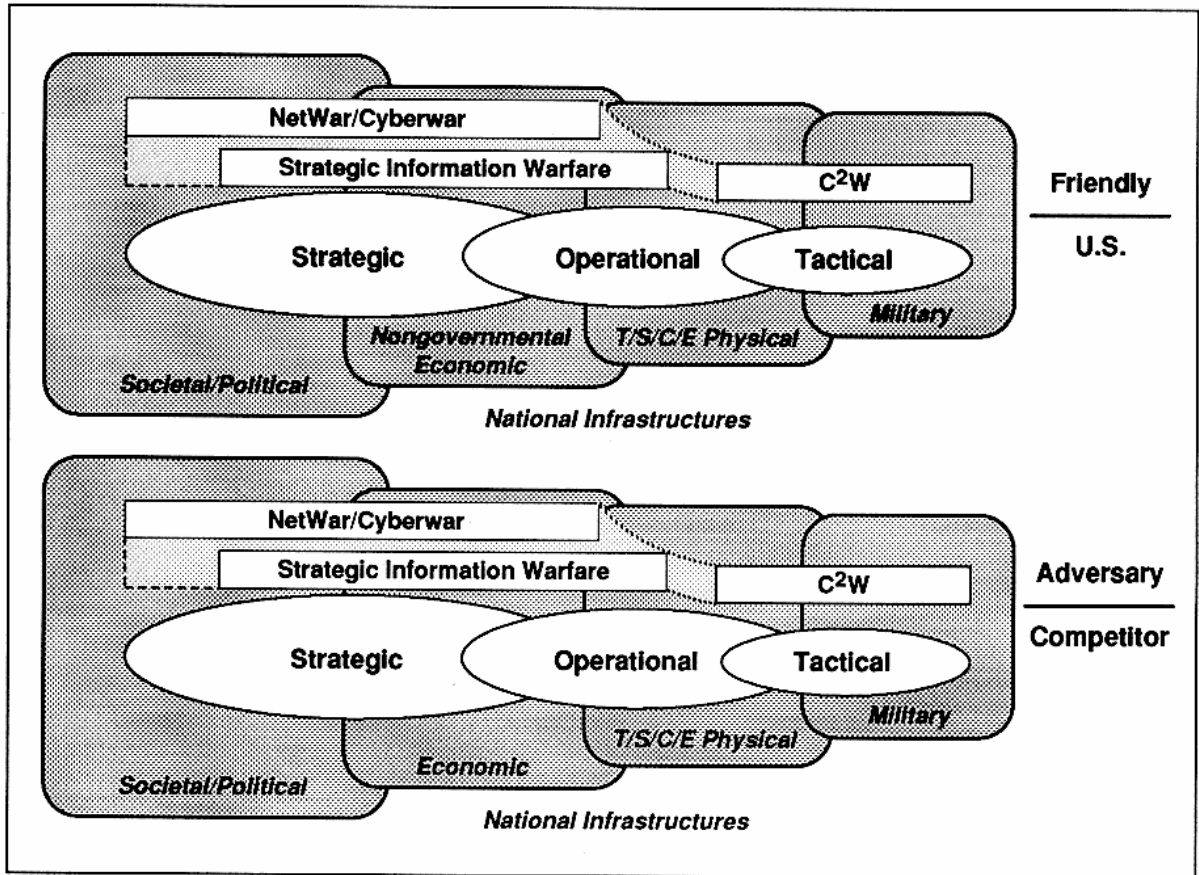


Figure 6  
Competing National Systems

gunfire, Morison pointed out, advances in metallurgy allowed much bigger gun tubes than ever before. Improved sighting mechanisms gave a better target picture. But there was a problem—the guidance mechanism, which wasn't as responsive as it had to be. When a ship fired on a target, there were only two points, given the roll of the ship, when the guns bore precisely on the target—on the way up and on the way down. So, the gunner was almost an artisan, a craftsman, because he had to be terribly precise. He had to know how long it took him to sight, to calibrate, to pull the lanyard, and still get out of the way. That was the most important part, because they originally had welded the telescope directly onto the gun. If the gunner wanted to keep his eye, he had to move out of the way just before firing—a process that guaranteed more misses than hits.

This is where Admiral Sir Percy Scott entered the picture: a true, authentic, original kind of guy. He saw that what was needed was to combine the gear with the telescope with the gun in a way that allowed it to be aimed continuously. Now if you're a hunter, a marksman, you must continuously aim at what you're shooting at because that's the only way you hit the target. This was the application of a very old principle, but now to the new technology that was available. Before 1899, five ships at 1,600 yards fired 25 minutes and got two hits on the sails. But the combination of these new technologies by 1906 meant that at the same range one gunner firing for one minute made 15 hits on the target, fully half of them in the bullseye. That was a 3,000 percent improvement in six years. Fantastic! And, of course, it was fought every inch of the way by the U.S. Navy.

**Turn of the century naval gunfire revolution**

- **Tools:** 12–14 inch guns; sighting telescopes; gears
- **Leaders:** Admiral Sir Percy Scott; Lt. William Sims
- **Principle:** continuous aim firing

**Before the revolution: 1899**

- **Range:** 1,600 yards
- **5 ships firing for 25 minutes**
- **2 hits (sails)**

**After the revolution: 1905**

- **Range:** 1,600 yards
- **1 gunner firing for 1 minute**
- **15 hits on target—half in bullseye**

**Bottom line: 3,000% improvement in 6 years!**

**Figure 7**

**A Cautionary Tale About Change – 1**

**Oettinger:** Are you going to tell how they tested it?

**Allard:** Go ahead! You can tell this better than I can.

**Oettinger:** You guys have got to read this story. It's one of the best stories ever, because, as Ken has pointed out, the whole thing works, and its merit comes out of enabling you to shoot a gun on this rolling, pitching platform. The Navy old guard wanted to demonstrate that it was worthless, so they tested it on land, where it didn't perform any better than the old guns. The person who ultimately got it on board the Navy ships was Theodore Roosevelt. It took the President of the United States to say to the Navy, "Up yours! This is going on the ships." The Navy would never have done it. As Morison tells this, it's a beautiful story.

**Allard:** A great story. The Navy did three things actually. The first thing they did was

to ignore the suggestions of Scott's American colleague, William S. Sims. Then they disputed the findings on this spurious basis, and the third thing was that they attacked him personally.

What's changed? Very little. As Morison says, those were all smart people here, all devoted to national defense. The tragedy is that because they got really fixated on their tiny parts of the process, they crossed the line from being contributors to being detractors. What I find so powerful about that thought is that Morison identifies the three constituent parts of this equation, all of which were essential (figure 8). There were the technicians, the Gyro Gearlooses in the laboratory, without whom nothing ever happens. You had guys like Sims and Admiral Sir Percy Scott—public sector entrepreneurs, to use the Kennedy School terminology for it. They were great people, but Morison says they had an attitude of "perpetual insurgency," the ever-present chip on their shoulder, which made their ideas harder, not easier, to implement. Morison says (the writing is brilliant), "It was said of Admiral Sir Percy Scott that he

**Inventors**

- **Contribution:** "things," i.e., their creations
- **Inhibition:** fixation on single concept

**Insurgents:**

- **Contribution:** organization and promotion
- **Inhibition:** attitude of "perpetual insurgency"

**Establishment:**

- **Contribution:** continuity to winnow changes
- **Inhibition:** status quo of "dominant weapon system"

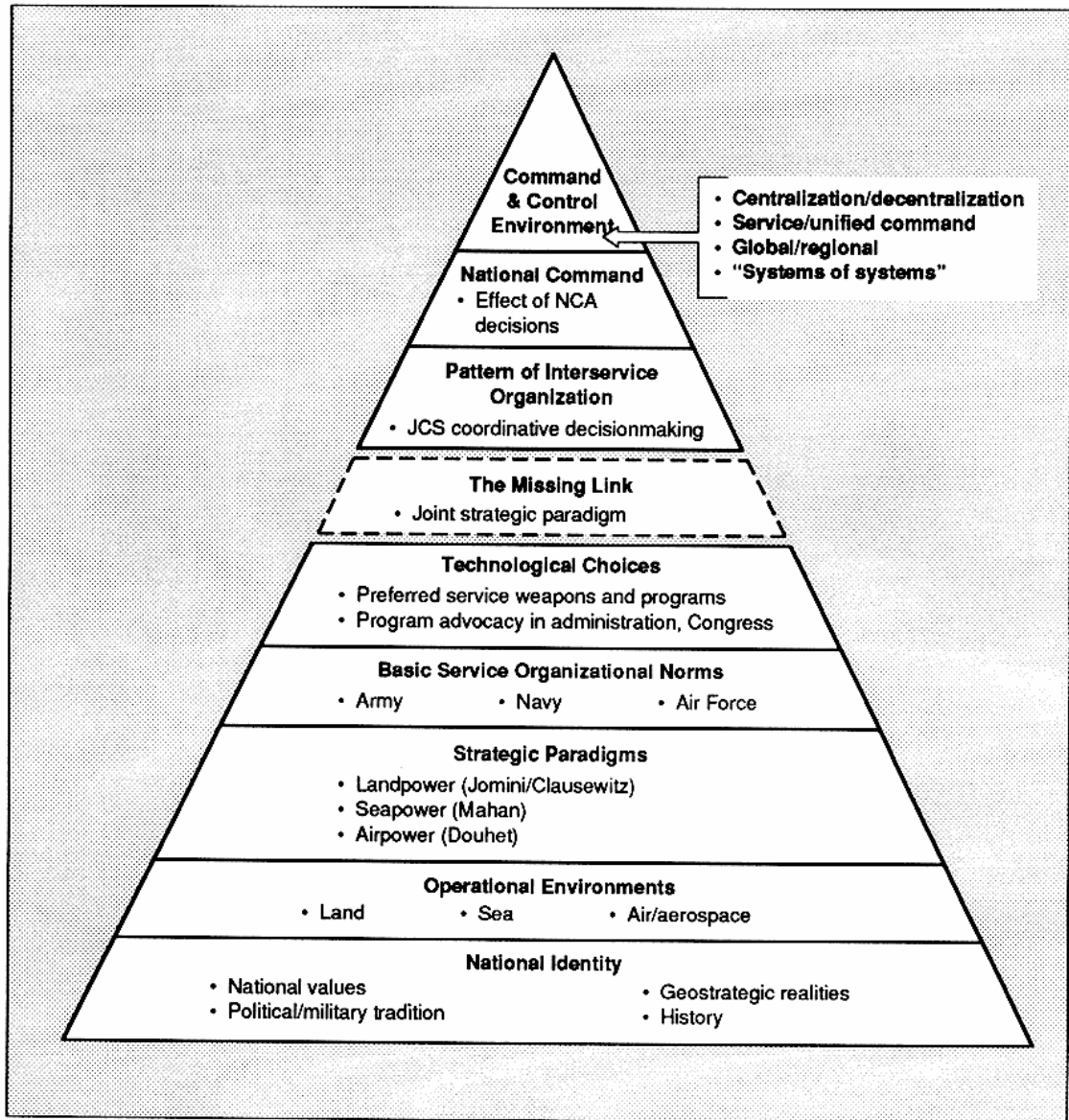
**Bottom line: fixations with narrow concepts, attitudes or conventions are barriers to progress!**

**Figure 8**

**A Cautionary Tale About Change – 2**

lived his entire life in a state of perpetual outrage against every form of duly constituted authority, usually including the British Admiralty.” Since that sounds a lot like my own officer efficiency reports, I have some sympathy with the good Admiral.

But the idea here is that you cross the line when you get fixated on the narrow parts of the process. You’re going to see how important that is for the subject matter that you’re dealing with in this course. Figure 9 comes from my book.<sup>4</sup>



**Figure 9**  
**Key Determinants of Command and Control**

<sup>4</sup> C. Kenneth Allard, *Command, Control, and the Common Defense*. New Haven, CT: Yale University Press, Revised Edition, October 1996.



I was trying to examine the problem of why, if the military services are all on the same side, couldn't they "talk to each other?" What I finally had to do was to go all the way back to the beginning and realize that you've got differences that are built into the services in terms of who they are: constitutionally, legally, and organizationally. In the *Federalist Papers*, the Army and the Navy are defended on different constitutional, legal, and practical grounds. You're dealing with a political system in the United States that doesn't like to concentrate power; hence, the balance of power runs throughout our entire system. We don't like general staffs, so we don't have one. We do not have a commanding general of the national general staff, we have a Chairman of the Joint Chiefs of Staff: a subtle but terribly important distinction.

The argument here, very simply, is that the military services are empowered to make basic, technological choices. The services, for reasons that Morison talks about as well, are built around dominant weapon systems. Don't tell the Air Force that manned aircraft are a thing of the past. Do not tell the U.S. Navy that ships, particularly things that are on the surface of the ocean, are a bad idea. Don't tell the U.S. Army that tanks can be more vulnerable in this new modern era than they've ever been before. They don't want to hear it. Why? The services are built around dominant weapons systems that are linked indissolubly to the careers and the agendas of the people who are the leaders of those organizations. So, don't be surprised when that organizational culture tends to fixate on narrow parts of the process.

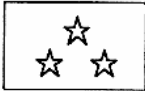
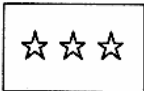
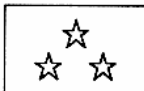
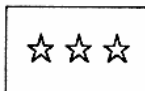
What in the world does this chart (figure 10) have to do with command and control? We tend, in the military, to forget about the tyranny of numbers, although we have different weapons systems and different organizations that deploy them. If I have a Navy admiral, I'll give him two carriers. He gives the order to turn left. He's got anywhere between 10 and 100 things that he must persuade to turn left: things below the surface, on the surface, above the surface. He's got relatively high-ranking officers (commanders or lieutenant colonel equivalents) who are in command

of these things, and he's got excellent communications with them.

But if an Army Corps commander gives the order to turn left, it's not 10 to 100 things, it's now at least  $10^4$ ,  $10^5$ , possibly with coefficients thrown in. He doesn't have to persuade the O-5, a lieutenant colonel, but ultimately all the E-5s who are driving the Humvees or the guys down in the foxholes. Because of our fixation in the Army with line-of-sight communications, we have also gotten used to the fact that communications will certainly fail. So we decentralize authority all the way down to the lowest possible level. The Navy doesn't do that. The Navy centralizes at the level of the ship's quarterdeck, and God forbid that you should do anything that interferes with the authority of that captain in command afloat. As an Army second lieutenant, by contrast, I was taught that at any moment I could expect to have the commanding general in the foxhole next to me. Why? Because that was how he made his command presence felt. He was leading from the front. That's the way it works. That is not necessarily true in naval engagements.

How does that complicate your problem of command and control? One size rarely, if ever, fits all. So, I've got organizational schisms. I've got differing ideas about what is important. I've not talked to you about the strategic paradigms of those services, although the book does at some length. The idea is that you've got different belief systems, and they have their ultimate effect in different command and control systems. And both history and practice have been sanctified into tradition.

**Oettinger:** In his book, admirable as it is, and much as you'll enjoy reading it, Ken Allard stops short because he deals with the United States only. Read the headline in today's *Defense News*, courtesy of Colonel Besson: "International: Allies Aim to Share Reconnaissance. After the year 2000, we expect a ship to be able to take control of a ground-launched drone and, if necessary, land it on its deck where it would be refueling and independently retasked," signed "NATO official." Now, he's going to do that in French, German, Serbo-Croatian, or whatever; we don't know yet.

|   | USN<br> | USAF<br> | USMC<br> | USA<br> |
|---|--|---|---|--|
| <b>Movable Subordinate Entities</b>     | $10^1-10^2$  | $10^2-10^3$   | $10^3-10^4$   | $10^4-10^5$  |
| <b>Rank of Subordinate Leaders</b>      | HIGHEST → LOWEST   |   |   |  |
| <b>Communications with Subordinates</b> | BEST → WORST   |   |   |  |
| <b>Information re: Subordinates</b>     | PRECISE → VAGUE  |   |   |  |
| <b>Tactical Flexibility</b>             | GREATEST → LEAST   |   |   |  |
| <b>Command Principle</b>                | CENTRALIZE → DECENTRALIZE  |   |   |  |

**Figure 10**  
**Service Organizational Differences:**  
**Relevance to Command and Control**

**Student:** Did you see how small the price tag was? It's only \$4 million.

**Oettinger:** Only \$4 million?

**Allard:** Only \$4 million, depending on how you do the accounting.

**Oettinger:** But you take everything that he said and ...

**Allard:** Square it, literally. I will simply point out to you that this is the Kennedy School, and Graham Allison was the dean when I was here, so I was sensitive to the "levels of analysis" problem. If interoperability were my unit of analysis, I could

have done it at the intraservice level. I actually pitched it at the interservice level, but I could have squared the problem and gone from 4 to 16 with the NATO alliance. The book is already 300 pages, long enough as it is. God only knows how long it would have been if I'd done NATO.

Now, all this (figure 11) is great stuff. Because, indeed, as we saw, these extended weapons systems do work. The great thing about Desert Storm was that it proved that if you've got a quiescent adversary who lets you do it, he'd better have his ass nailed down because we're going to blow it away. We proved that these things actually do work in combat.

**Linkage of PGM, EW and C<sup>3</sup>I**

- What can be seen can be hit

**Great capabilities but...**

- Fragile (if opposed)
- High infrastructure costs
- Time to deploy

**Backward glance at the procurement process**

**Interoperability: stovepipes and bandaids**

EW = electronic warfare  
PGM = precision guided munitions

**Figure 11**

**Desert Storm: Net Assessment**

**Student:** What's PGM?

**Allard:** Precision guided munitions—all those wonderful things you saw in the Gulf War. You saw the Air Force pictures, of course, because the rubble hadn't finished falling before the Air Force had released the combat footage of it. Now, the U.S. Army, because we're deeply schizophrenic as a force, fought the biggest tank engagement since Kursk, but we kept it to ourselves. God forbid that we get any publicity out of this thing!

The Marines, I think, had given a video camera to every third corporal, so that every time you see pictures of a ground assault, you see Marines. But here is my point: More and more information, at lower and lower levels, and being used to devastating effect (figure 12). In a lot of cases, the first the Iraqis knew that our tanks were upon them was when their tanks started to blow up. One of the other alums of this course, Colonel Tom Leney, commanded a cavalry squadron of the 24th Mechanized Infantry Division in the Gulf War. He's got some great stories about precisely how that occurred, and that GPS gave his unit a great advantage in going to the Euphrates Valley before the Iraqis even knew they were in the country (figure 13).

- **Vision:** By 2005, 90% coverage of 200 nmi x 200 nmi area
- **Dominant:** location of forces, activities and context
- **Battlespace:** all-weather, 24-hour, coverage of land, sea, air, space
- **Awareness:** understanding forces well enough to predict actions

nmi = nautical miles

**Figure 12**

**Information Warfare**

- **Vision:** 10,000 x increase in joint force information flows
- **Digitization:** mathematical manipulation, compression, enhancement
- **Computer processing:** manipulation/display of digitized data
- **Global positioning:** precise, real-time location of tangible objects
- **Direct broadcasting:** receiver-oriented communications

**Figure 13**

**Advanced C<sup>4</sup>I: The Next Revolution**

Now, that's the good part. The downside is that if your opponent gives you six months to get there, to get ready, and doesn't actually oppose you, you have the best of all possible worlds. But all of our systems in the Gulf War represented a backward glance at procurement processes and our continuing interoperability problem was still in evidence. For example, in the world's most technologically advanced country, you had to have the air tasking orders (ATO)—things about the size of phone books—physically flown out to the aircraft carriers. Why? We had this interoperability problem.

The same things showed up in Somalia,<sup>5</sup> where even after Goldwater-Nichols, we ran three separate chains of command (figure 14). But the most revealing single detail that I can come up with is this one.

- **Unity of command: Murphy's Law**
- **Small details: administrative channels**
- **Officeware: bringing your own...**
- **Comms: no Grenada fiascoes but...**

**Figure 14**  
**Somalia: Lessons Learned**

You had the U.S. Marine Corps, which was essentially responsible for running the biggest part of that operation, when we had about 26,000 troops in Somalia. Central Command, which was the responsible command, had WordPerfect for Windows, while the Marines had a system called Enable OA—a word processing system that, insofar as I can tell, was last used during the Carter Administration. Were there workarounds? Yes, there were. But it took time, effort, and lots of dedicated people to achieve them.

**Oettinger: OA?**

**Allard:** Enable OA. Don't ask me what the "OA" stands for. I have no idea. I assume it was some weird, primitive, DOS-based thing. It's hard to say, but there it was.

Stovepiped systems were also a part of the problem, especially for administration, logistics, finance, and medical data. But in a country that didn't even have a functioning phone system, we had 10 different data stovepipes going up on INMARSAT at \$6 a minute. That's a problem demonstrating our redundant systems.

In Somalia we also failed to understand that the critical center of gravity was CNN

<sup>5</sup> C. Kenneth Allard, *Somalia Operations: Lessons Learned*. Washington, DC: National Defense University Press, 1995.

and world opinion. Do you know who understood that very well? Mohammed Aidid—and he used that as a weapon.

The biggest single bogey facing us in the future of the RMA is the budget. I hear an awful lot of untoward optimism in Washington, D.C., that we're going to continue to have the money to pay for all this stuff. We need to pay more attention to Senator Strom Thurmond, who says his favorite definition of futility is people who continue to do the same thing time after time—and expect different results. What we're doing right now is expecting to enter into this brave new world of information-based warfare while doing the same things. Remember what I said earlier about the military technical revolution. If for no other reason than budget, while the technology has never been more promising, its likelihood of fielding has never been less (figure 15). Why? Because you've got less and less money to go around.

- **Paradox: technical promise vs. likelihood**
- **Existing institutional overhead**
- **Dependence on commercial technology**
- **Tied to progress of acquisition reform**

**Figure 15**  
**Information War: Some Constraints**

Why? Part of the reason is that second bullet, the existing institutional overhead. It is estimated that there are somewhere between 5,000 and 9,000 command and control systems operative in the Department of Defense today. Now, it's tough to do the accounting, and it's even tougher to figure out which ones we really need for the future. But these are "legacy systems" left over from the Cold War, all with their own families, support structures, friends, relatives, careers, and agendas. Secretary Perry told the Department three years ago to start reducing that overhead. Does anybody want to take a guess on how many of those systems have actually been taken down?

One: WWMCCS (Worldwide Military Command and Control System), and it was renamed GCCS, Global Command and Control System. (Of course, the acronym for it is “geeks.”)

Two other problems are closely related: commercial technology and acquisition reform. To illustrate their relationships, there was a piece in the September 10, 1996, *Washington Post*, that I’ll tell you about. The U.S. Navy had a system called the Maritime Telecommunications Network, and what they wanted to have it do was to simply be able to lock onto a satellite from a ship, primarily for purposes of communication. The company that won the contract to do this said, “Hey, the technology is so good that what we will actually do is we’ll give it to you for free.” Why? Because it did everything the Navy wanted it to do for operational reasons, and there was still enough bandwidth left over that they were able to have morale calls going out at a dollar a minute. So the sailors who wanted to call back home were essentially paying for the system. The *George Washington* sold \$700,000 worth of personal calls on its first deployment and ran out of phone cards.

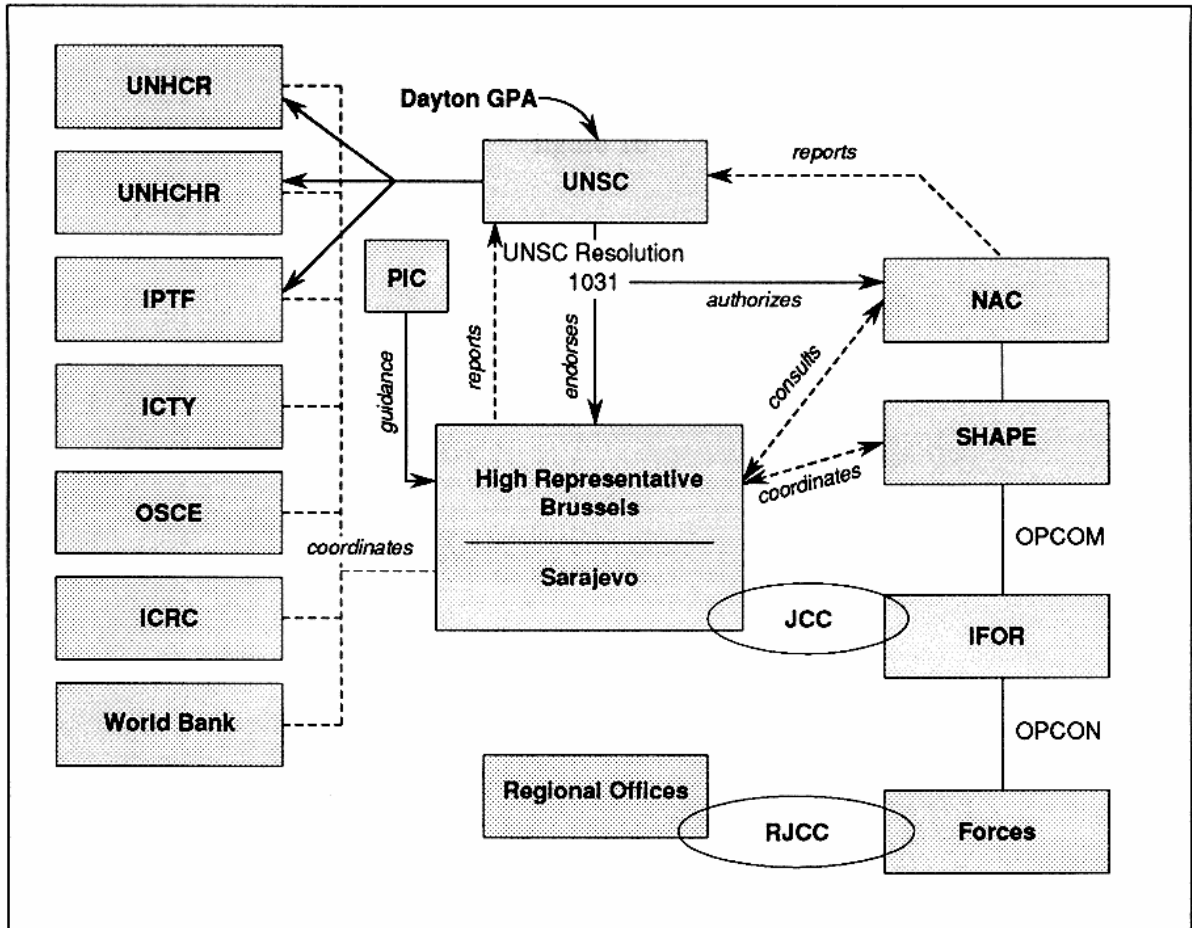
So they said, “Navy, this is commercial technology, we’ll give it to you for free.” The U.S. Navy, of course, replied, as Morison would have told you, “Hell, no.” More specifically, its spokesman said, “The system is not hardened or ruggedized so as to meet Navy standards.” Now if you believe that, you’ll almost certainly be in trouble with Professor Oettinger, because he would encourage you to be more cynical in your beliefs. What you’re dealing with here is an institution that produces its own systems for its own agendas, its own families of contractors, mindsets, et cetera.

**Oettinger:** And lest you think that the business of testing on land what should work at sea is dead, consider this point that Ken is making about “ruggedized and hardened”—compared to what? A naval officer enrolled in last year’s seminar spoke of naval communications during the Gulf War, which were excellent while the ships were docked. But once a ship went 100 yards off

shore, there were essentially no communications with anybody else. As a consequence, it’s so rugged, yes, because it’s the whole damn ship, but the bandwidth was essentially the bandwidth of a broken phone at Logan Airport on a socked-in day, and so there’s a certain disingenuousness about this comparison.

**Allard:** Let me now turn to Bosnia, where it was my privilege to serve in a special assignment last summer. Do you remember what I said at the beginning: Who’s in charge? The figure shown here basically the system that came out of the Dayton Accords (figure 16). I’m not making this up, as Dave Barry, one of my favorite columnists, would say. These command arrangements were set up to implement the Dayton Accords. What was the problem here? You notice it’s actually a fairly straight NATO chain of command, but there is a stark contrast with the convoluted political and diplomatic sides. So I keep returning to certain fundamental questions: Who shall command, with what forces, by what means, to what ends?

Do you remember what I said about services being built around dominant weapons systems? This tends, in addition, to be reflected in existing structures (figure 17). The structures we have today are essentially dominated by headquarters, and those headquarters tend to be avid consumers of information; hence the phrase “headquarters as data dumps.” The Revolution in Military Affairs essentially stops at the headquarters itself. The military technical revolution (our current state of affairs) merely reflects automation laid on top of an existing series of procedures. In Bosnia, most of the data was being used for the production of PowerPoint slides for what we called the daily battle update briefings. Similarly, a lot of the bandwidth was being consumed precisely in providing closed-circuit television back to higher headquarters. This led to my observation that effective bandwidth equals total bandwidth minus the square of the number of flag officers downrange.



GPA = General Peace Accords  
 ICRC = International Committee of the Red Cross  
 ICTY = International Criminal Tribunal for Yugoslavia  
 IFOR = Implementation Force  
 IPTF = International Policy Task Force

JCC = Joint Civil Commission  
 NAC = North Atlantic Council  
 OPCOM = Operational communications  
 OPCON = Operational control  
 OSCE = Organization for Security and Cooperation in Europe

PIC = Peace Implications Council  
 RJCC = Regional Joint Civil Commission  
 SHAPE = Supreme Headquarters Allied Powers Europe  
 UNSC = U.N. Security Council

**Figure 16**  
**Who is in Charge?**

**Oettinger:** Before you go on, Ken, this notion that it's the new technology overlaid on old ways of doing business is not necessarily an indictment of the U.S. military or of the folks in Bosnia or of NATO. It's, by and large, the way it is. The history of technology suggests that's the way most technologies begin, because that's the only way anybody is smart enough to figure out. So when you make jokes about buggy whip manufacturers, they had a good thing going because a lot of the early cars were made with buggy whip holders and buggy whips because that's the way you do it.

That's the way we use our computers. Let's think about what you do with your PCs. You do things on screen, and then you print it out, and you hand it in in class, et cetera. Paper manufacturing has gone up along with computing, not down. It will be a long time, if ever, before folks realize what the new technology can do and so on. So, you're looking at a historical fact of life, and it would take some very strong innovation, foresight, or whatever, to alter that. It's not stupidity. It's one of those things that you need to take into account: that technological innovation and brand new effectiveness in actual use have his-

torically been separated by at least a generation or two. I know of no way of getting around that. If any of you do, you'll make millions and gazillions of dollars.

**Allard:** In Bosnia, I was fascinated by the extent to which you could see that a whole

- Data stratification:**
- **Headquarters as "data dumps"**
  - **RMA stops at division level**
  - **Automation overlaid on existing structures and processes**
  - **Deployment not timely enough for integration of Trojan Spirit and GBS**
  - **Staffing/training: Inadequate for effective use**

GBS = global broadcasting system

**Figure 17**  
**Support to the Warfighter**

data system designed primarily for use by a combat division had been brought to Bosnia for a very different mission. The pressures to adapt were enormous, and the adaptations were accomplished by some really bright junior people. For example, sensors were being used in very much the same way as during Desert Storm (figure 18).

- Sensors**
- **UAVs: Hunter, Predator and ATO**
  - **Importance of advanced attack helicopter**
  - **No unitary control of battlespace**
- Data integration**
- **Standalone, single application databases**
  - **Standalone sensors**
  - **Adaptation from Cold War to operations other than war**

ATO = Air tasking order  
UAV = unmanned aerial vehicles

**Figure 18**  
**Support to the Warfighter**

But the problem now was, very simply, how do you take all of the feeds from these sensors, integrate them, and develop useful intelligence for an entirely different mission? And how do you do that in a way that's going to give that information to the warfighter in time to make a difference?

Modern conflict at any level is very much the war of the databases. I was fascinated by the number of times I heard that first bullet (figure 19): "Sir, the system was never designed for work like this." It was designed to help us fight the Russians.

- **Inflexible: "Sir, the system was never designed for this..."**
- **Standalone: unique to sensor, comms and reporting system**
- **Proprietary: "Your problem, our opportunity"**
- **Not state-of-the-art: "not ever!"**

**Figure 19**  
**Database Communications and Obstacles**

Well, guess what? The Russians are here, but now they're on our side! How do you deal with that? How do you adapt information systems built to track moving target indicators and use them to monitor weapons cantonment areas, in fine-grained detail? And details are vital, because one of the important factors is where have the former warring factions stored arms, and where do they store ammunition? How close are they, because they had to be kept separately at the Dayton Accords.

So, how do you adapt all of your systems to deal with a new series of missions? There's more information than ever before, wholly new missions, wholly new requirements for how you integrate the data, and how you use that information in a new way. It is not that the technology is not there. It is. But how are you going to organize, and how are you going to use it? That becomes the problem!

**Oettinger:** Again, a footnote. This is endemic. It comes with the territory. Your organizations, your tools, your homes, everything, are designed around the way you normally do things. It is axiomatic that when a new and unforeseen situation arises, you've got to make do with stuff that was designed to do something else. So what can one do to be more effective with that situation? You can't just deplore it, because you're stuck with it.

**Allard:** Absolutely. We had a lot of really bright people, particularly at the E-4 and the O-3 levels, the corporals, the captains; and a lot of them were reservists. "Sir, I'd like you to meet Staff Sergeant so-and-so. He's here with us on reserve duty for 179 days. And in real life, he runs a local Circuit City electronics store." These smart folks understood the equipment and how it was designed. They managed somehow to make it work.

**Oettinger:** There is a deep implication of what he's just said. Because if you regard that situation as normal rather than aberrant, one of the things that it tells you is how you train your people. You train and you manage them not to be robots doing the accepted things only by rote, but doing them with at least one part of their brain alive (and I'll leave as an exercise to you how much, because if you screw up the rote, then you have people who are ineffective in everything they do.) You've got to have people who do what they were doing yesterday and today and do it right, but who with some portion of their brain are alive enough to adapt to tomorrow. That is a personnel selection and training, et cetera, problem, which is quite different from the static backward-looking practice. So the remarks he just made I think are enormously significant in terms of the implications for staffing and training and so on.

**Allard:** But again, it takes you right back to Morison, because you've got to have those three communities there. The establishment has got to be paying attention. You've got to have the innovative thought, and yes, you've got to have Gyro Gearloose out

there in the laboratory to make all that stuff work. I've got to tell you, I was enormously impressed in Bosnia at just exactly how good the American soldier really and truly was. In some cases it was despite the whole system. We somehow managed to do very, very well. It is the genius of the people, essentially, that you're dealing with, at the very lowest level.

Probably the dominant impression I had of our deployment in Bosnia was that these people were essential in overcoming the many difficulties created by both the mission and the environment. The reason why they are so important is that an Army division in the field today is very much a mixed bag, from a technology standpoint. There are any number of high technology systems, to be sure. But the division does most of its business based on written SOPs (standard operating procedures). This is not a paperless environment in any sense at all. It exemplifies this military technical revolution, the microchip overlaid on existing procedures, organizations, institutions.

The final point I'll make to you is that some of this high technology does work very well. We had spent a great deal of money over the years to get some effective systems. One example of innovation is the Apache attack helicopter, a deadly, combat-proven system. With it, you can really get somebody's attention. With the Hellfire missile and chain guns, it is a devastating piece of machinery that can intimidate and compel compliance.

But Apache has also got a pretty good sensor package. What they were able to do was use the raw data off the sensors. Some bright young soldiers—for less than \$1,000 worth of software—figured out how to freeze-frame those gun-camera tapes off the computer. (I think it's called PhotoGrabber.) They did photo-recce kinds of things right there on the screen, printed them out, and handed the photos to the former warring factions. The general would say: "Okay, look, these are your tanks. There is a T-34 or T-54. Here's where it was. Here's when it was there. Don't tell us now that you don't know what we're talking about. You need to move these weapons because they are in violation of the Dayton Accords. Oh, by the way, in the



middle of the photo there is a crosshair, because this is gun-camera footage. You'll probably want to move 'em right now."

Do you know what was best about this? It's unclassified imagery. You could use it. You could hand it to them and say, "Here it is. Move it or lose it."

**Oettinger:** The technology is reminiscent of something that some of you may have noted in the papers the other day. Several kids in the richest western suburb of Boston were caught using their daddies' scanners to make \$20 bills that passed rather widely before anybody caught onto it. So what Ken has been describing is sort of the military version of a technology that the kids are using well before their adult counterparts in either the civilian or the military sphere are able to field stuff designed to do the job.

**Allard:** I didn't set him up for that. I swear.

Information warfare essentially means that you've got to get to a wholly new level in terms of interoperability (figure 20). If you cannot share information effectively, you will fail. And the generational paradigm here is at least as important as anything else. It really outrages my senior audiences when I say, "Gentlemen, rank and age are in inverse proportion to competence when it comes to information warfare."

- **Paradigmatic:** IW = I/O
- **Generational:** time on our side?
- **Organizational/legal:** Title 10
- **Budgetary:** Lord Rutherford was right!

I/O = interoperability  
IW = information warfare

**Figure 20**  
**Nontechnical Solutions**

**Oettinger:** One of my teachers put it, "Where there's death, there's hope."

**Allard:** I've thought about this for an awfully long time, and have finally come to the conclusion that one of the things that we're going to have to do is to readjust this delicate balance between service procurement of these separate command and control systems, and where we need to be. What I'm suggesting there is the fact that we've got a perfectly good general staff, and it's called the Joint Staff. I want the services continuing to develop these things, and to think about how to use them.

But we need to build a new incentive into the system, and that is to say, "Who else has this problem?" Why? Because it's all coming out of the commercial world. So I don't want the Air Force and Army to build two separate tactical operations centers dealing with theater missile defense, as I saw them do at Hanscom Air Force Base two years ago, and then say, "Gee, they ought to be interoperable." No, one of these systems should be terminated. We should not be in the business of developing separate systems, and then saying, "How do we make them work together?" Instead, think about how to build systems that feature commonality that is built in, not added on.

I'm not saying one size fits all, not at all, rather that we need a wholly new system of choices here to evaluate what ought to be service specific, and what ought to be joint. Some of that gets done now. I'm suggesting to you that one of the things we're going to have to look at is how well that system serves us for the future, if for no other reason than budgetary.

A final point here. You all know what Lord Rutherford said: "We've run out of money. We need to think more clearly." Title 10 now requires the services to put their own interests first. But, if you want to get to this next level, Strom Thurmond was right: you can't expect different results from doing the same things. What I'm suggesting here is that it is time to recalibrate that equation; not totally upset it, just recalibrate it. And if I am likely to be pilloried for that idea, my response is simply that I came by this degree of cynicism and anarchy honestly, as a graduate of Tony Oettinger's course.

**Oettinger:** Any comments, discussion, et cetera?

**Student:** I noticed that “paradigmatic” form of the word “paradigm” in the slide (figure 20). This is my soapbox. I was in Bosnia when it was still UNPROFOR (U.N. Protection Force) and then I came here and took this class and read about the RMA and about information warfare. It was all about getting inside the other guy’s decision loop, and that was the paradigm, and that’s the ultimate point of this. I want to know if that paradigm existed in the field in Bosnia and how appropriate you thought that paradigm, that way of looking at things, is to the peacekeeping mission?

**Allard:** That is a great question. Let me answer it at two levels. Number one, when I talked about this paradigm shift in my *Command, Control and the Common Defense*, I talked about the fact that we had paradigms of air, land, and sea, but noted that we had yet to figure out the joint paradigm. I think that paradigm is emerging from this level of information operations/information warfare (whatever you want to call it). You can now start to think about the military as kind of a global combined arms team for which the coin of the realm is this information flow. So, guess what? You can’t afford interoperability problems anymore. There are clearly costs, and benefits, but this seems to be an evolving pattern.

Now, let me answer it at the second level. When I was in Bosnia, I heard many of my Army counterparts talk about how we need to think inside the adversary’s decision loop and all the rest. I’m here to tell you that if you think for a second that we were capable of getting inside the decision loop of the former warring factions, think again. The NATO alliance is not equipped in this day and age to do that. It takes too long.

But keep in mind that in a peacekeeping operation, time is not an adversary. Time, if you use it right, is an ally. In Desert Storm you had a very, very short period of time, a matter of months really, to get there, to concentrate your forces, and to get the

thing done because you could not have 500,000 guys over there indefinitely. You have to achieve decisive results in a short period of time. But not in peacekeeping. We just extended the American commitment over there for another 18 months to give tempers time to cool, give the diplomats the time to get in there, and, by all means, to give the people who are doing the reconstruction time to get their job done.

Military forces are there primarily to do two things. One is that we occasionally achieve decisive results. I am from the State of Virginia. There is a reason why Virginia is still in the United States of America, namely because we achieved decisive results in a place called Gettysburg. The other main thing that military forces do for you is to buy time, and a peacekeeping operation is a perfect example of that fact. So you are right. It requires time to get it right.

**Student:** Secretary Albright is trying to define a role for Russia in the NATO alliance. I wonder what your observations are on the effectiveness of their troops and coordination with U.S. troops: negative or positive?

**Allard:** It was my privilege when I was there to be on operations in four of the five maneuver brigade areas. What impressed me about the Russian brigade was that they were an extremely professional group of people, hand picked for that job. I found that we had more in common with them than one might have predicted.

For one thing, we knew each other’s equipment and procedures quite well. For another, personal relationships helped smooth over the potential rough spots in command relationships. And to me, there were two things that were fundamental about Bosnia. One was the survival and success of NATO, and second only to that was the relationship with the Russians. Anything that deepens that partnership by definition is good, in my view.

**Oettinger:** By the way, you’re making it sound a little bit stark. It’s not an on-and-off thing. First of all, taking you back to World War II, they were our allies; it was a

touchy thing and so on. But even at the height of the Cold War, there was an interesting account in this seminar by Admiral Hilton of the "Incidents at Sea" arrangement,<sup>6</sup> which was an informal agreement between Admiral Gorshkov, the head of the Russian Navy, and the Chief of Naval Operations of the United States. It was not a treaty or anything, just a memorandum of understanding between two admirals trying to arrange things so that in the Mediterranean, in particular, where the navies occasionally got mixed up together, there would be no ill consequences. Especially when the Arabs and the Israelis were at it, and issued a general "Get the hell out of the Eastern Med and get into the Western Med," the Russians and the American navies were finding themselves sort of clogged up together. So they said, "Well, you know, we may be at war one of these days, but in the meanwhile, we're all sailors and we don't want to drown like rats, so how about we arrange things ...." So they developed this Incidents at Sea agreement, which literally kept them from doing stupid things in the dark and in the fog.

Now, that became an instrument for another strange, minor chapter—a later thing. Some of you may recall that there was an incident during the Cold War when an American officer who was going to East Germany as part of the normal interallied group got shot (it turned out to be an accident) by an East German or a Russian, and the question was how to retaliate for that in a measured way. It was clearly not meant to be provocative. This guy, just like anybody else, happened to go berserk. There was an Incidents at Sea meeting due in San Diego where the Russian navy guys and the American navy guys would get together to exchange views, so they decided to hold that meeting in New Jersey instead. It was a punishment to the Russians. It's kind of the equivalent of having that Serbia-Bosnia

---

<sup>6</sup> Robert Hilton, "Roles of the Joint Chiefs of Staff in Crisis Management," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1985*. Cambridge, MA: Program on Information Resources Policy, Harvard University, April 1986.

meeting in Dayton, Ohio. So that was one modulation of the relationship.

There's a whole book on U.S.-Soviet cooperation and competition in space by a guy named Matthew Bencke,<sup>7</sup> who has just come out of Harvard and now works for Boeing. He did it as his thesis here showing the history of cooperation and competition between the United States and the Soviet Union in space, military and civilian, from the period sort of pre-1957 and the U-2 overflight on through today. We have it also with respect to the relationships with Iraq, to which we gave some of our military gear and information when they were our friends fighting the Iranians. So it seems that the question of who is on what side, and who knows what about whom and at what point, has gotten even more tangled than before... not that it hasn't been kind of tangled up to now.

**Allard:** Exactly. There's one thing, though, that I think was kind of interesting. Let me just respond in this way to that. I've talked in some of the pieces that I've written<sup>8</sup> on Bosnia about how I thought that we had it not exactly wrong, but fundamentally incorrect in some respects, in putting the weight that we do on the use of information primarily to help people at the headquarters level. There is a staff mentality there that I find very worrying.

There is the promiscuous use of information for its own sake, including the production of PowerPoint slides. At those briefings held there at the American headquarters in Tuzla promptly at six o'clock every evening, it was not at all unusual for 125 PowerPoint slides to be put on that screen in the course of about a 1-hour-20-minute briefing. It literally encapsulated every conceivable piece of information about that division. That's fine as long as you can do it, but maybe not!

---

<sup>7</sup> Matthew J. von Bencke, *The Politics of Space: A History of U.S.-Soviet/Russian Competition and Cooperation in Space*. Boulder, CO: Westview Press, 1997.

<sup>8</sup> See, for example, Kenneth Allard, "Information Operations in Bosnia: A Preliminary Assessment," *INSS Strategic Forum*, No. 91, November 1996.

My point, very simply, is that the way the United States utilizes information differs radically from some of our coalition partners. There was one officer of a different nationality who told me that he found it rather remarkable that the United States required such an extreme amount of reporting on the part of its soldiers. He contrasted that to the practice in his army, in which, as he explained, they told people what to do but not really how to do it as much as the United States did. They certainly didn't require their officers and soldiers to report in with anything like the degree of frequency that the United States did. That would probably not have been as startling as it was to me had that observation not been made to me by a member of the Russian brigade.

**Oettinger:** Howsoever, going back to something you said earlier about general staffs and so forth, I think it reflects a fundamental difference in political systems.

**Allard:** No question. We went in there with a different set of agendas and pressures, so it's not surprising.

**Student:** This may be more of a comment than a question, but I'd be anxious for your response and opinion. There are two myths that, when presented to American audiences, always play well when any kind of military briefing is being made. The first is that the military does not handle new equipment, especially high-tech equipment, well. You've provided some disclaimers to that, Professor Oettinger, and that is a myth. It's damaging in the sense that it perpetuates the feeling that there is some sort of institutional barrier in the men and women who use the equipment that prevents it from being used well. That's not true, and we pointed out some of the reasons why.

The other myth is that the only reason any missions ever succeed is that the resourceful, Daniel Boone-like soldiers whom we put in the field somehow salvage chaos. That is equally false and equally damaging, in that it's the direct result of training and equipment and the leadership

provided from the day they enter the armed forces until the day they meet that situation that allows the soldiers to salvage the situation. So, to say that the command and control structure is somehow flawed and that soldiers have to make those kinds of decisions is to miss the larger point.

**Allard:** I'll respond in this way to both those points. I think the first one is absolutely correct. In fact, I have founded a business on the idea that there are some very important lessons to be learned from military experience in the use of information, both its defense and its exploitation. Those lessons are that this is information warfare of a rather high order, which is now becoming increasingly apparent to businesses that find that they are in the information warfare business whether they realize it or not. One of my colleagues is now in the packaging business, dealing with almost 140 separate locations, and the integrity of his LAN/WAN (local area network/wide area network) is what drives his whole operation and determines profit or loss. Does he have to be concerned about various forms of information warfare from the outside? Yes, he does. Does he have to worry about the integrity of his system from insiders—about degrees of access? Yes, he does. Does he have to worry about viruses? No question. These are things that the military has gotten used to thinking about, and I think that they relate directly to what is becoming increasingly prevalent in the commercial world.

On the second point, though, I would perhaps disagree with you. I think it is precisely the genius of the American system that, in the case of the U.S. Army, we went from a draftee army to a volunteer army, and then only by degrees did that become a professional army. It is now a very professional army, but one that is running very close to the red line. I talked to soldiers over there who in six years of military service had been on four deployments, of which Bosnia was merely the latest. So we are asking a great deal of them.

I think that we have got to be extremely careful of the way that we assign information priorities because, to me, production of

PowerPoint slides and the provision for closed-circuit television linking various headquarters together is a lot less important than providing information to the war-fighter in time to make a difference. This is a very old problem in the military, one that I dealt with the entire 25 years that I served.

**Student:** I certainly wouldn't take issue with the importance of battlefield intelligence taking precedence over slides; that's clear. But my point is simply that there is a lot that's working in the command and control structure, and it's not simply that there are smart guys who are drafted out of high school and just instinctively know how to do something. That is absolutely false.

**Allard:** No question. I'll always be very proud of the fact that I had the great privilege of serving with the 1st Armored Division. If you take a look at what that division did, it is remarkable. No one expected them to be able to do what they did in crossing the Sava River, during the 100-year flood, in the dead of winter, to come down from Germany to seize control of Bosnia, to lock it up quickly in the way that they did, all under extraordinarily tough weather conditions. A good friend of mine commands the aviation brigade, and they have set all kinds of aviation operational, maintenance, and even safety records in the course of one of the most demanding aviation operations that the Army has ever done. To me it was the rebirth and careful shaping of the post-Vietnam Army that allowed all those things to happen. So, I think we're in absolute agreement on that.

My concern about the future is that we will continue to make the same assumptions about information as we have in the past. We have utilized information in the past very much as the adjunct of what generals do in headquarters. Increasingly, we have got to be concerned with how soldiers use it at the pointy end of the spear. As I said in one of those initial slides, we need more and more information at lower and lower levels. Increasingly, tactical, operational, and even strategic victories are going to turn on how well we do that. Colonel Greg

Fontenot, who was the 1st Brigade commander, said (and I will never forget it): "In this business, in peacekeeping, the private is the policymaker." That is absolutely true.

**Oettinger:** Before we go on and we open up some nuances, I'd like to stick to this point for a moment, because we're still at a time of choice of term paper topics. What this raises is a whole bunch of very, very important questions, which I would epitomize in the following way: that the technology enables us to centralize or decentralize, or make information available or not available, with a degree of breadth and coverage and so on that was hitherto economically, technologically, et cetera, impossible. So now you can do it. The question is: Do you want to? Again, the seminar record has in it some raw materials for thoughtful analysis. We have the history of use and abuse of information higher echelons, such as the famous Lyndon Johnson 8,000-mile screwdriver: high-level mucking around at the very tactical end of things.<sup>9</sup> We also have the countermeasures to that, starting with General MacArthur chopping off the wires to his teletype in order not to listen to Harry Truman, who eventually won the argument because he was President of the United States and Commander in Chief. We've got several participants in the famous Korean tree-cutting incident relating how, in engineering that, they were mindful of wanting local autonomy in maintaining some cutout with headquarters because they didn't want to have folks messing around.<sup>10</sup> Then there's some of the stuff in Vietnam, et cetera. Over the last 50 years, the technology

---

<sup>9</sup> John Grimes, "Information Technology and Multinational Corporations," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1986*. Cambridge, MA: Program on Information Resources Policy, Harvard University, February 1987; John H. Cushman, "C<sup>3</sup>I and the Commander: Responsibility and Accountability," in *Seminar on Command, Control, Communications and Intelligence, Guest Presentations, Spring 1981*. Cambridge, MA: Program on Information Resources Policy, Harvard University, December 1981.

<sup>10</sup>See note 9.

has gotten good enough so that you could keep tabs on the commander in the field from higher headquarters. So that issue has a longer history of "Now that you can do it, how much of it should you be doing?"

The other side of the story is that now you can, in principle and in practice, reach anybody anyplace in terms of civilian means with local telephone systems or with drop-in satellite and cellular systems and so on, so that the question that Ken is raising of making everything available in principle to every grunt in the field is now a real question. But you're raising it only partially, and you say, "It would be good if they had more." The other side of that coin is if they got too damn much, they would spend all of their time reading reports and never shooting or doing anything else.

Then the question arises, "Under whose control is that?" There's an ongoing controversy over whether you flood everybody with stuff and people tap in as they want to, or you have the spigot turned on and off for higher authority before it reaches everybody. That's a very live debate these days on the question of how networks of networks are used in that respect. So maybe you could say a little bit more about the trade-offs, the balances, in that area before we go on to some other questions.

**Allard:** I would think that the one book that ought to be assigned for everybody coming out of this school, and certainly this course, is Aristotle's *The Politics*. I find so many people in Washington apparently have not read it, because it's terribly important to understand that there are always trade-offs, always balancing acts to be done. It's very clear that you've got this question right here (figure 21), the higher to lower. You've clearly got service versus joint. You have U.S. services versus allied. Commercial versus military. In that Bosnia paper that you may have read,<sup>11</sup> I talked about how when I got over there, the first thing I was told was that, "Colonel, you get a free morale call home once a week." I said, "Great, what will I use to do that?" and he said,

|            |   |          |
|------------|---|----------|
| Higher     | – | Lower    |
| Service    | – | Joint    |
| U.S.       | – | Allied   |
| Commercial | – | Military |

**Figure 21**  
**Balances**

"That thing right there," and he showed me the MSE (mobile subscriber equipment), which is somewhat erroneously described as the military version of the cell phone. Actually, it's sort of like a cell phone on Prozac. What happened was that when it came time to do my morale call, it took two hours to get through. When I finally reached Mrs. Allard down in Virginia, it was like screaming down a 100-foot drain-pipe. Feeling like a fool, I went down to our little local PX, got in line behind the Russians and the French and everybody else who was there, and eventually plunked down \$50 for my AT&T prepaid calling card. I then went back, got on the AT&T line, was through in about 20 seconds, and it was as clear as we're talking right now.

To run that military line-of-sight system required us to defend a lot of hilltops in Bosnia, because that's how you get line-of-sight. If you put the transmitter and the antenna up there, you've got to defend them. What does that mean? In Bosnia, it means that you've got a four-vehicle convoy going up there twice a day to relieve the troops and bring them back. We had 1,400 people in the Signal Brigade, and we had 7 to 8 percent of our combat manpower engaged in that task. I know it's not a direct comparison, and maybe even apples and oranges in some sense, but AT&T ran the entire satellite-based system for the 20,000 troops doing morale calls, and they did it with 24 employees in the country.

What's my point? That part of this balance for the future is not merely the substitution of commercial products for military ones, but commercial services and maybe even support structures. Is that extraordinarily difficult for the military to sign up to? Yes, it is. But it's this fundamental idea of

<sup>11</sup> See note 3.

balancing. It is this idea of strategic choice that you've got to make. I understand that you can overload people with information, but I've also been in those brigade TOCs (Tactical Operations Centers) at 3 o'clock in the morning when the only sensors that we had were the human eyeball and those assets organic to that brigade. I have been there doing those operations in which we had to rely on months-old information. What I'm suggesting to you is that I do believe fundamentally in this balance. In fact, I'm a fanatic about balance.

**Student:** I was just saying anecdotally, concerning the flow of information down, I think it's academic considering the operator or the guy with the rifle getting too much information. In 1991, we were flying out of Oman, and we would go through the United Arab Emirates (UAE) because they had free gas, so we went to this international airport in UAE, right at the Gulf of Oman side of the Straits of Hormuz. We landed there, we gassed up and while we were waiting, we went inside the terminal and watched CNN to get our daily intel ...

**Allard:** Yes. It's an old story.

**Student:** ... while all of the staff guys were having the PowerPoint presentations with all the information we needed. It was completely unavailable to us. When we went to Bosnia in 1994 and 1995, Aviano, which was the keeper of information at that time, was doing no better. I don't know how they were doing it when you were there, but the dearth of information to the operator really has not improved.

**Allard:** This is again hierarchies versus networks. Now, in the business world, they haven't done away with hierarchies entirely, but they have realized the fact that you can do an awful lot more with networks, and a lot less with hierarchies (figure 22). In the military, we are not allowed to be in business for ourselves. The military leaders need to be able to get political guidance and to turn that into mission-type orders. All I'm suggesting to you is that the communications and the command structures used to be overlays of each other. But, what's begun to happen? These command and information loops have begun to come apart because information is much more efficiently handled by networks

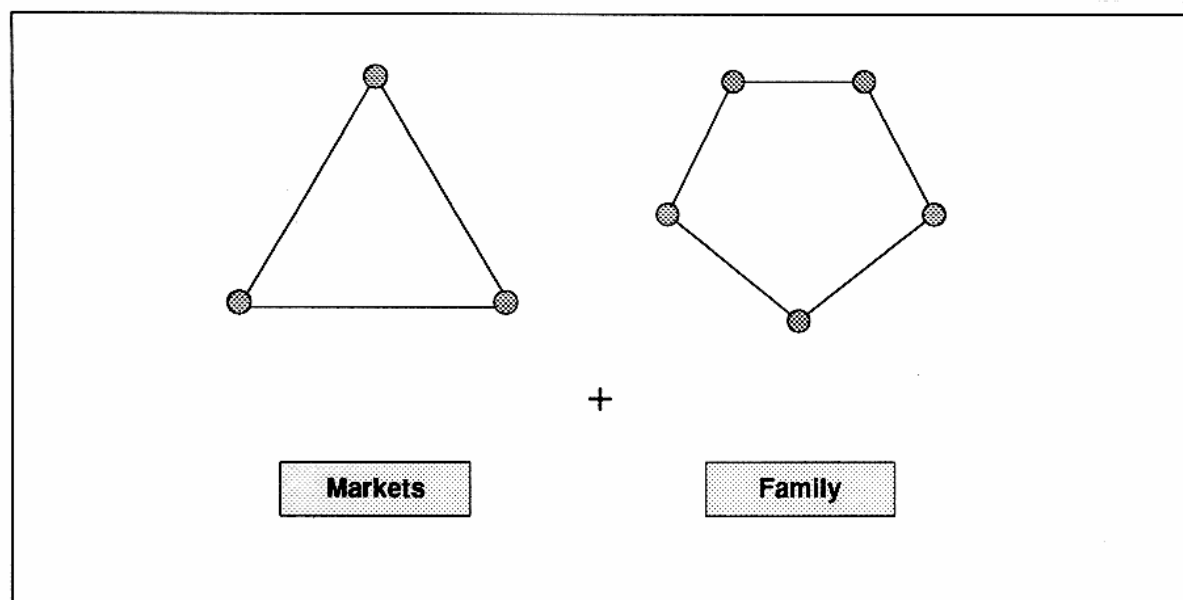


Figure 22  
Hierarchy vs. Networks

than hierarchies. Your example is perfect because the ultimate receiver-oriented communication system is television, and within that it is CNN. At the National Military Command Center at the Pentagon, they actually now get CNN, and they sit there watching it. Why? Because it's really good.

If you ever go down to CNN headquarters in Atlanta, you see that they get 120 satellite channels coming in there 365 days a year, and being edited by 22-year-olds. When you're dealing with this kind of world, which is characterized by much more rapid flows of information, networks are what works, not hierarchies.

What's tough is saying, "Gee, how do we accommodate ourselves to that?" My friends at RAND, John Arquilla and David Ronfeldt, who had done some extremely interesting work, are suggesting that the four basic forms of organizations, from the year dot to now, are hierarchies, networks, free markets, and families (figure 22).

**Oettinger:** There is a book by them on this.<sup>12</sup>

**Allard:** What's interesting about hierarchies is that they are very, very good at transmitting accountability. Networks are very, very good at transmitting information. Free markets are the best thing that we have found so far at allocating goods, and families are optimized towards survival. On a battlefield, all four of these functions are present. You've got hierarchies; that's what we're about. Networking is what the intelligence officer does. The Gus Pagonis<sup>13</sup> of the world have got to get you the where-withal—the bullets, the beans, and black oil—to get the job done, or else it's not going to happen. And I don't know any better definition of an infantry squad than a family. So, again, this is part of your balance.

In making these balances, remember that the electron really doesn't care. You can use it any way you want to. You can

misuse it. It wears no uniform. It respects no boundaries. But those technological and organizational choices may well determine who is going to win and who is going to lose in future wars.

**Student:** One of the dynamic balances that has intrigued me during the development of addressing these issues in this course is the one between political control over military strategy and also over the military goals, and the pure technical capability to achieve various goals or to perform certain tasks. I think it's an old story about raw military capability being constrained by political will or political purposes over generations or much, much longer than that.

**Allard:** Clausewitz would agree completely!

**Student:** I wonder if you could apply that sort of thinking to your perspective on development of information warfare. Surely there must be political factors that constrain the sheer technical capabilities or development of technical capabilities to maximize abilities in information warfare.

**Allard:** Again, the thing I find fascinating about this is what I said about definitions: that if you believe them, you probably don't understand the situation. This very quickly gets beyond the Department of Defense, beyond the U.S. government, beyond the United States, and there's a fairly lively academic debate about what this does to the whole idea of the nation state. So, when one sits there and says, "Gee, how do we make strategy in that kind of environment?" that is a very, very tough question. Probably we ought to go over to the medical school and say, "First, do no harm." That's probably rule number one. And then, let's apply a little bit of Murphy's Law, "Don't start something that you can't finish." And law number three is, "Don't do anything that is likely to hurt you more than it does the other guy," because there is no power on the face of this earth that is any more dependent on computer technology than the United States, especially its economy and its military estab-

<sup>12</sup> John Arquilla and David Ronfeldt, *The Advent of Netwar*. Santa Monica, CA: RAND, 1996.

<sup>13</sup> Lt. Gen. William G. (Gus) Pagonis, U.S. CENTCOM's top logistician during the Gulf War.



ishment. This is precisely why, over the last two-and-a-half years, the first blush from the Gulf War was that, “My God, we can do these things!” and the second thing was the shocking realization that, “My God, someone else can do them too!”

**Oettinger:** That’s absolutely right. It’s an accurate portrait. It’s again, though, an area where there’s a lot of extremism. Notions like “Nation states disappear as a result of electronics” are cute, but nation states aren’t helpless, and if you look at the beginnings of modulation of these things, Singapore and the People’s Republic of China have very different access policies from those of Western democracies. Now, how long they can be enforced and in what ways can’t be predicted, but ...

**Allard:** Singapore’s tougher!

**Oettinger:** Yes, but it’s also got a smaller territory, et cetera. The United States has phobias about pornography and one thing or another. So the modulation of this free-flowing electron by political systems is the beginning of asking questions, and the extreme statements again just tend to cut off debate and any serious consideration of the real problem.

There’s another issue that Ken raised in response to you, which is, “first do no harm” and so on, but we don’t even know what the nature of harm is. He’s given some examples, all of them true enough. Somebody gets robbed by Moldavian entrepreneurs, or people masquerading as Moldavian entrepreneurs, or one thing or another. The one and only time, thank God, that I got mugged was on the streets of Atlanta, Georgia. Two guys came up to me and they took my money. But that’s not the same thing as the United States having been invaded and taken over by intergalactic aliens. The question then arises, at what stage is it a threat to the national security, to the existence of the state and the economy, versus an annoyance, versus major robbery, versus gang warfare? So we don’t understand yet at what point a hacker threat becomes a strategic threat.

We ought to import Greg Rattray. He is an Air Force officer who is working on a Ph.D. under Bob Pfaltzgraff, your former mentor, and me, addressing this question of hacker or information warfare. In fact, he made very similar arrangements to yours, and we hope it will turn into a book.<sup>14</sup> How does one calibrate a threat as somewhere between being a nuisance, a crime, and a threat to national security? It could be any of them. We don’t know quite how to differentiate that. So Greg is looking at that. It’s too early to have the conclusions. So, take what Ken is saying as raising a lot of questions for which there are no good answers. There’s a lot of strident rhetoric, but no answers, and often not even good questions yet.

**Allard:** As I said, we’re in exactly the analogous position to those Vatican cardinals back in the year 1500, sitting around asking initial questions about, “Printing press? What does that mean? Does that mean we fire all those guys doing illuminated manuscripts?” That literally is the kind of question we’re asking right now.

**Student:** Could I take you back to maybe trying to find a practical way of solving some of the technical interoperability issues of each service having their own systems? You mentioned the idea in your book about a super agency, which would have the primary responsibility, authority, and funding to procure all C<sup>4</sup> systems for DOD. Would that be a way of going around some of these Title 10 organizational service-level issues?

**Allard:** Good question, and one that I have been wrestling with for some time as well, beginning with my time in this course. Back then, there was a classic bureaucratic solution being proposed for the interoperability problem, namely the idea that there should be a single super command and control agency that would produce a kind of Sears Roebuck catalog from which the services would be forced to choose in building their systems. The agency of

---

<sup>14</sup> See Major Rattray’s presentation in this volume.

choice at that time was the Defense Communications Agency, now the Defense Information Systems Agency. More recently, one occasionally hears the Defense Advanced Research Projects Agency touted in somewhat similar terms.

Such a “solution,” however, raises at least two other issues: should we create another bureaucracy to solve an ongoing problem that results as much from culture and process as from organization? And how could such an agency avoid being even further removed from the warfighter than our service bureaucracies are already? I come back to a point made in *Command, Control and the Common Defense*: the services are very effective at transmitting warfighting skills from one generation to the next, but somewhat less so when it comes to working together, either as joint warfighters or as the architects and builders of common command and control systems.

So my idea is a very simple one: create a new system of incentives. The Joint Staff is probably more responsible than anybody else in dealing with interoperability at the operational level because they represent the warfighting CINCs, whose job it is to take those systems and fight wars with them. If you stay focused on what it is that our armed forces are expected to do, a command and control system is a weapon of war. It is not something that can be thought of, much less developed, in isolation from its true purpose. Increasingly, that purpose is to provide the information differential over any adversary. The way we are procuring those systems right now seems to me to be less than productive.

So, I’m simply saying: have the services keep on doing what they do, but if you’ve got a candidate capability, bring it in to the Joint Staff and say, “Look, we think that our system is going to do X. It uses commercial technology, and it will not only do our job, but it can also solve a common joint problem. With a slight modular change, we know that it synchs with the other services as well. Here’s the way it works.” I want our national general staff, that Joint Staff, to sit there and say, “Yes, that’s the way we’re going to do it. Here’s the money.”

**Student:** But you shot down GCCS, and the best-of-breed concept of GCCS is that ...

**Allard:** They say that’s what that is, but I would differentiate what they say from what they actually do. The GCCS is not something by which we are making unambiguous strategic choices. It’s a building code and nothing more than that. I’m simply saying we need to choose “System X over System Y.” Note that everything being said about GCCS right now was also being said about WWMCCS back in the 1970s: “Yes, we’ll gradually get to better interoperability. We will evolve over several years.” Now they’re talking in similar terms about the “common operating environment of GCCS.” My cynicism, again carefully imbued in me right here, simply suggests that what’s really going on here is the perpetuation of the same old game using slightly different terms.

There’s one other issue, and that is the fact that when you’ve got information technology that is now beginning to turn over every 12 to 18 months, I don’t have time to go through the lengthy, bureaucratic, inter-service machinations that have been the case up until now. My drill sergeant back in 1969 at Fort Dix told me about tracer rounds. He said “The good news is you can see where it went. The bad news is they can see where it came from.” That’s also one of Murphy’s Laws of Combat, by the way.

So, if it is commercial technology, not only can I use it, but so can Saddam! And if he can procure it faster than I can, that’s even worse. I will simply repeat a comment made to me by one of the Army brigade commanders in Bosnia, who said, “The former warring factions have better communications than I do because they get cell phones, and I don’t.” Again, I simply find that startling. But I come right back and say that what you’ve got to do is to make some carefully balanced choices, but they have to be made on a strategic basis. Right now we are making them primarily based on service-driven agendas. In spite of what we say, that’s what we do.

**Student:** Where does the consideration of this second balance fall into play for the continued existence of the Marine Corps? The Marines seem to be one of the more traditional paradigms of use of force, and yet at the same time seem to be a little better at the combined-arms approach than some of the others. So they have a paradox of the old way of thinking and the new at the same time.

**Allard:** I take my hat off to the Marine Corps. I really do. I think they have done an absolutely superb job of thinking through their function. They have now chosen to advertise themselves as the Presence 911 Force. It's a bumper sticker, but I've got to tell you something. It's a real good one, and a well-chosen bumper sticker in Washington, D.C., is nothing to be sneezed at.

**Oettinger:** It's more than that. I will bring to class next time the Marine Corps Doctrine Manual, *Warfighting (FMFM-1)*, which I will urge all of you to read. It won't be an assignment.

**Allard:** Is it the new one?

**Oettinger:** No, it's the old one. I won't say I have the new one, but the old one is still valid. It was Al Gray's version. It addresses this question of being superb at yesterday's, and this morning's, and tomorrow morning's work, while at the same time being ready to do damn near anything else and thinking about it better than anything I've read coming out of any business school, or any other military service, or any corporate entity. Whether they live up to it or not is a whole other question, but it's an eloquent statement of how to live in a rapidly changing world without losing your bearings in the present, but at the same time being open to the future. I think you'll all enjoy it. I urge you to read it even though I won't ask for your responses. They're alive and well, at least in the head.

**Allard:** What I also like about the Marines is that they have really always thought of themselves as the original combined arms

team, precisely because they are a ground force, they are a naval force, they are an air force. That orientation, I think, has now got to be fundamental to all of the armed services.

**Student:** Sir, is that the weapon that they're built around?

**Allard:** Yes, pretty much. They're always built around the individual Marine. I applaud their purpose in that regard. We could all learn something from them because they all say, "Hey, look, no matter what, I don't care what else you do, by God you're a rifleman." I've got to tell you, I think that is absolutely right on the money! I've always thought of myself fundamentally as an infantryman, even though I was wearing intelligence brass for most of my career. Because if push comes to shove, you're going to lock and load, and you'd better know what you're doing if you're a ground-pounder. I think that constancy of purpose is one of the great things they've got going for them.

The other thing is something I once had a Marine tell me. I've never forgotten it. He said, "We've never underestimated the advantages of being small." It's a key point.

**Oettinger:** I cannot resist a small anecdote. We happened to have General Gray at the seminar at the time of the Gulf War. We don't have the record. He is the only one whom we never published because he wouldn't release his comments. It was somewhat a time of bitterness because you're saying the CINCs were effective. They were effective, among other things, at keeping the service chiefs' noses out of the business of Schwarzkopf, who was the CINC, and as a consequence, here was poor Al Gray sitting here in this classroom while things were going on in the Gulf. It was kind of bitter.

He wrote me a letter as we were trading correspondence about the invitation, which he signed "Semper fidelis, Al Gray." I couldn't resist, so I wrote him a thank-you note saying "Veritas, Tony Oettinger."<sup>15</sup>

---

<sup>15</sup> In case anyone in the world does not know this,

**Student:** It seems to me here at the end, in what has appeared to me to be a very large digression from your original point, that we've worked more into the area of theology than into the practical application we were discussing earlier. I think it's good that we are now discussing the Marine Corps, because actually everything in the Marine Corps is not all peaches and cream. There are two philosophies in the Marine Corps that are constantly at battle with each other, and they are played out in your thoughts here. They are that you're either a combined arms team where you represent one unique way of warfare, or you are a combined arms team where you have three separate sets of expertise that combine into being one way of fighting, but could individually provide support elsewhere. That's the problem, I think, you might be hinting at, but I would argue it is more of a strength than a weakness of where we're at. If you take the point of view where joint warfighting is a unique way of fighting, then what happens is you bring people together. You get their individual expertise, but not necessarily their service expertise, and you put something out on the end that's a theological oneness, whereas if you get people who bring their individual service skills to the table, you're going to get a completely different animal.

**Allard:** You're precisely correct. It is always that balance that is the key. And that is the thing that we've been trying to strive for ever since Goldwater-Nichols got passed in 1986. You want somebody who is very, very good in his individual warfighting specialty, but understands where that capability fits into the larger picture. That is the essence of joint warfare.

Now, let me take it to the next level, i.e., combined warfare. I've talked a little bit about NATO interoperability and all of those problems. I was on a night exercise in Bosnia, northwest of the city of Doboj, which used to be a majority Moslem town, but now is majority Serb, and heavily fought over. The exercise was a close air-support mission flown by British Harrier pilots who had taken off from a U.S. carrier in the Aegean and were then vectored onto our location by a NATO AWACS aircraft. I was there with a Swedish brigadier general who was the commander of the Nordpol Brigade, with forward air control being handled by a Norwegian contingent.

This was like interfaith night in Bosnia! The NATO interoperability standards, of course, did not occur by accident. It was achieved through the painful grunt work of NATO standardization, interoperability, and interminable meetings. Enough got done that NATO could get air support where and when it was needed. This application of force could not have been achieved had those efforts not been part and parcel of what NATO had been about for over 40 years. They provided an interoperability baseline that was fundamental for what we were able to do as NATO forces in Bosnia.

**Oettinger:** Sir, on that note, we thank you once again, and offer you a small, literally but not figuratively, token of our appreciation.

**Allard:** The ethics requirements now allow me to accept these. Great! Thank you. And good luck on these term papers. Don't be surprised if he writes more on them than you do.

---

"Semper fidelis" is the motto of the United States Marine Corps, and "Veritas" is the motto of Harvard University.



INCSEMINARS1997



ISBN-1-879716-47-X