

24 February 1994

COMMAND AND CONTROL



A U.S. Marine Corps Concept Paper

C4I Division, Headquarters U.S. Marine Corps

(Draft)

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Foreword

This manual describes the theory and guiding principles of command and control as practiced by the U.S. Marine Corps. *Put very simply, the intent is to describe how we can reach and execute effective military decisions faster than an adversary, in any conflict setting on any scale.* In so doing, this manual provides a conceptual framework for all Marines for the development and exercise of effective command and control in peace, in crisis, or in war. This manual represents a firm commitment by the Marine Corps to a bold, even fundamental shift in the way we view and will deal with the dynamic challenges of command and control in the Information Age.

The Marine Corps view of command and control is based on our common understanding of the true nature of war and on our warfighting philosophy of maneuver warfare as described in Fleet Marine Force Manual 1, *Warfighting*. This view takes into account both the timeless verities of war as we understand them and the peculiarities of the information explosion that is a consequence of modern technology. Because we understand that war is fundamentally a clash between independent, hostile wills, our doctrine for command and control accounts for an animate enemy who will actively interfere with our plans and actions in order to further his own aims. Because we recognize the nature of war, our doctrine for command and control provides for fast, flexible and decisive action in an environment characterized by friction, uncertainty, fluidity and rapid change. Because we know that equipment is but a means to an end and not the end itself, our doctrine for command and control is not associated with any particular technology. Rather, it takes a broader view of the issue and accounts first for the human factors that are central in war. In so doing, this doctrine provides a proper framework within which different kinds of hardware, and other components of command and control support, can be judged.

Our doctrine applies across the full spectrum of conflict, from peacekeeping operations on one extreme to general war on the other. It applies equally to small-unit leaders and senior commanders. Moreover, since any activity not directly a part of warfighting is part of the preparation for war, our doctrine must also apply to the conduct of peacetime activities, in garrison as well as in the field.

This manual provides the authoritative basis for the subsequent development of command and control doctrine, education, training, equipment, facilities, procedures and organization. This manual provides no specific techniques or procedures for command and control; rather, it provides broad guidance in the form of theory and concept. It requires judgment in application.

"Operation VERBAL IMAGE," the short story which leads off the manual, is intended to paint a word picture of command and control in action (done well and done poorly), as well as to illustrate various key points which will appear in the text. It can be read separately, or in conjunction with the rest of the text. Chapter 1 works from the assumption that, in order to develop an effective philosophy of command and control, we must first come to a realistic appreciation for the nature of the problem. Based on this understanding, Chapter 2 discusses theories of command and control, looking at the subject from various aspects, such as leadership, information management and decision making. Based on the conclusions of the preceding chapters, Chapter 3 describes the basic features of the Marine Corps' approach to command and control.

One of the main points of this manual is that command and control is not the exclusive province of senior commanders and staffs: effective command and control is the responsibility of all Marines. And so this manual is meant to guide Marines of all grades.

OPERATION VERBAL IMAGE

Scene: A troubled corner of the globe, sometime in the near future. The Marine Expeditionary Force makes preparations for an upcoming offensive.

2248 Monday: Maj. John Gustafson had taken over as the regimental intelligence officer just in time for Operation VERBAL IMAGE. *Who thinks up the names for these operations anyway?* he wondered. This would be his first command briefing and he wanted to make a good impression. The colonel had a reputation for being a tough, no-nonsense boss—and the best regimental commander in the division. Gustafson would be thorough and by-the-numbers. He would have all the pertinent reports on hand, pages of printouts containing any piece of data the regimental commander could possibly want. He went over his briefing in his mind as he walked with his stack of reports through the driving rain to the command tent.

The colonel arrived, just back from the front and soaking wet, and said, "All right, let's get started. S-2, you're up."

Gustafson cleared his throat and began. He had barely gotten through the expected precipitation when the colonel held up his hand as a signal to stop. Gustafson noticed the other staff officers smiling knowingly.

"Listen, S-2," the colonel said, "I don't care about how many inches of rainfall to expect. I don't care about the percentage of lunar illumination. I don't want lots of facts and figures. Number one, I don't have time, and number two, they don't do me any good. What I need is to know what it all *means*. Can the Cobras fly in this stuff or

not? Will my tanks get bogged down in this mud? Don't read me lists of enemy spottings; tell me what the enemy's up to. Get inside his head. You don't have to impress me with how much data you can collect; I know you're a smart guy, S-2. But I don't deal in data; I deal in pictures. Paint me a picture, got it?"

"Don't worry about it, major," the regimental executive officer had said later, clapping a hand on Gustafson's shoulder. "We've all been through it."

0615 Tuesday: The operation was getting underway. In his battalion command post LtCol. Dan Hewson observed with satisfaction as his units moved out toward their appointed objectives. He watched the progress on the computer screen before him. On the 19-inch flat screen was depicted a color map of the battalion zone of action. The map was covered with luminous-green unit symbols, each representing a rifle platoon or smaller unit. If a unit was stationary the symbol remained illuminated; when the unit changed location by a hundred meters, the symbol flashed momentarily.

Hewson tapped on a unit symbol on the touch screen with his finger, and the unit designator and latest strength report came up on the screen. Alpha Company; they should be moving by now.

"Get on the hook and find out what Alpha's problem is," Hewson barked. "Tell them to get moving."

With rapid ease he "zoomed" down in scale from 1:100,000 to 1:25,000 and centered the screen on Bravo Company's zone. Hewson prided himself on his computer literacy; no lance corporal computer operator necessary for this old battalion commander, he mused. Hewson was always amazed at the quality of detail on the map at that scale; it was practically as if he were there. That was the old squad leader in him coming out. He clicked on the symbol of Bravo's second platoon as it inched north on the screen.

No, they should turn right at that draw, he said to himself. That draw's a perfect avenue of approach. Where the hell are they going?

Don't they teach terrain appreciation anymore at The Basic School?

"Get Bravo on the line," he barked. "Tell them I want second platoon to turn right and head northeast up that draw. *Now*. And tell them first platoon needs to move up about 200 yards; they're out of alignment."

Satisfied that everything was under control in Bravo's zone, Hewson scrolled over to check on Charlie Company. Back when he was a young corporal, some twenty-two years ago, this technology didn't exist. It was amazing how much easier command and control was today compared to in his old squad leader days, how much more control there was now. He wondered if the junior Marines realized just how lucky they were.

0622 Tuesday: 2ndLt. Rick Connors was feeling anything but lucky. Just past the mouth of a draw, he angrily signalled for second platoon to halt. Company was on the radio, barking about something. He was wet, he was cold; his rain top had somehow sprung a leak and a stream of icy water poured down his spine. And on top of everything else, now this.

"Come again?" he said to his radio operator.

"Sir, Hotel-3-Mike says we're supposed to turn right and head up this draw," LCpl. Baker repeated.

Damn PLRS, Connors cursed to himself. He had never actually ever seen a PLRS, that venerable piece of equipment having been replaced by a newer, lighter generation of position-locating system which attached to any field radio and sent an updated position report every time the transmit button was cued. But like all the more experienced Marines he insisted on calling the new equipment by the old name.

"Up that draw," Connors repeated, as if to convince himself he had heard correctly.

"Hotel-3-Mike says it's an excellent avenue of approach, sir," Baker reported dutifully.

Connors studied the impenetrable web of thorny, interlocking undergrowth in the draw, and snorted scornfully. *Maybe on somebody's computer screen it is, he thought. But not on the ground it's not. Somebody at battalion must have his map on 1:25,000 again. So much for the decentralized mission control they told us about at TBS. What do they even need lieutenants for if they're going to try to control us like puppets?* He despised the prospect of hacking his way through the thick brush of the draw, especially when first squad had spotted what looked like an excellent concealed avenue of approach not two hundred yards ahead. Of course, if he followed instructions higher headquarters would be squawking about his slow rate of advance—there were no thickets of prickly bushes on a computer map. He could just imagine the radio message: *"What's taking you so long, 3-Mike-2? It's only an inch on the map."* And if he chose the other route they'd be on him in no time about disobeying orders. He cursed the PLRS again. But then he decided it wasn't the PLRS that was the problem; it was the jerk using it.

1118 Tuesday: A section of SuperCobra IIIs churned through the driving rain on its way back to the abandoned high school campus that served as an expeditionary air field, returning from an uneventful scouting mission.

"I'll tell you what, skipper," 1stLt. Howard Coble said from the front seat of the lead helicopter, "this soup isn't getting any better."

In fact, it was getting considerably worse, Capt. Jim Knutsen decided as he piloted the buffeting attack helicopter. A squall was moving back in. Goo at 500 feet, visibility down inside a mile and worsening.

"I'm glad I'm not those poor bastards," Coble said, indicating a mechanized column on the muddy trail below them to starboard.

"You got that right," Knutsen said, not paying much attention.

Until Coble cursed sharply.

"Those aren't ours," Coble said. "Take a look, skipper. BMPs, T-

80s."

Coble was dead right. What they were looking at was an enemy mechanized column, Knutsen guessed, of at least battalion strength. Probably more. His first instinct was to make a run at the column, but his intuition told him otherwise. Something was not right. Knutsen banked the Cobra away sharply to avoid detection, and his wingman followed.

What's wrong with this picture? Knutsen said to himself. The mission briefing had said nothing about enemy mechanized forces anywhere near this vicinity. The enemy had apparently used the cover of the bad weather to move a sizable force undetected through a supposed "no-go" area into the division's zone. Knutsen was familiar enough with the ground scheme of maneuver to know instantly that this unexpected presence posed a serious threat to the upcoming operation. *We got ourselves a major problem. These guys are not supposed to be here.*

His wingman's voice crackled over the radio: "Pikeman, did you see what I just saw at two o'clock?"

"Roger, Sylvester."

"We need to let DASC know about this," Coble said on the intercom.

Knutsen considered the problem. Reporting the sighting to the Direct Air Support Center would, of course, be the standard course. But because of the weather they'd had trouble talking to the DASC all day; they couldn't get high enough to get a straight shot. In these conditions, he figured they were nearly a half hour from the field. And when he finally got the message through, he could imagine the path the information would take from the DASC before it reached the units at the front—and that was provided they even believed such an unlikely report. *DASC hell, we need to tell the guys on the ground,* he thought. *They might like to know about an enemy mech column driving straight through the middle of the MEF's zone. Forget normal channels.* Unfortunately he had no call signs or frequencies for any of the local

ground units.

"Howie, find me some friendlies on the ground," he said. He radioed his wingman with his plan.

"Got somebody, skipper," Coble said shortly. "AAV in the treeline at nine o'clock. Got it?"

"Roger, I'm setting down."

1132 Tuesday: *You got to be crazy to be flying in this weather*, Capt. Ed Takashima said to himself when he heard the sound of approaching helicopter rotors. He was twice amazed to see the Cobra appear low over the trees and settle into the clearing not a hundred yards away while its partner circled overhead. He hopped down from his AAV and jogged out into the clearing to meet the Marine emerging from the cockpit, and was three-times astonished to recognize him as an old Amphibious Warfare School classmate.

"Knut-case," he said, pumping his friend's hand enthusiastically. "I should have known nobody else would be crazy enough to fly in this stuff. What the hell are you doing here?"

Knutsen quickly explained the situation and, when he was finished and saw Takashima's expression, said: "Don't look at me like I'm crazy, Tak."

Anybody else Takashima would have thought *was* crazy—or else completely lost—but not Knutsen. He had known Knutsen too long for that. Knutsen was too squared away.

"Give me your map, I'll show you," Knutsen said. "We're right here, right? And the enemy is right *there*, heading in this direction"—jabbing the map and tracing the enemy movement.

As Knutsen had begun to diagram the enemy move, Takashima was already considering the situation. *With all the sensors and satellites and reconnaissance assets that support a MEF, Takashima wondered, how does an enemy mechanized battalion drive through the middle of our sector without being detected?* He remembered reading something somewhere about uncertainty being a pervasive attribute of

war. He recalled a little white book that he'd found in the Rare Book room of the Marine Corps University library in Quantico. *Chalk one up to Clausewitz's "fog of war,"* Takashima decided. Of course, Takashima knew, since it was a "no-go" area—meaning that somebody up the chain had looked at the terrain and decided it was impassable—it would remain relatively unobserved. But how it had happened didn't matter: it had happened. What to do about it?—that was the problem. *Six or seven clicks tops,* he thought, looking at the map. Not much time. This changed everything. The original battalion plan would have to be scrapped; it was as simple as that. Takashima decided that his original mission, no matter how adamant the colonel had been, was obsolete. He made his decision. The situation called for quick thinking, and quicker action. The objectives might change, but the overall aim remained the same. The ultimate object, Takashima knew, was to locate the main enemy force and attack to destroy it. That could still be the object; it would just have to happen a lot further south than had been planned. If the battalion could make a ninety-degree left turn in time, they might just pull it off. Now if he could just get battalion to go along with it ... The S-3 wouldn't be very receptive to the idea; he needed to talk to the battalion commander.

Knutsen had finished tracing the enemy movement and his finger rested on the map, pointing at a small town called Culverin Crossroads.

"That's it then," Takashima said. "Culverin Crossroads."

"I hear you, Tak," Knutsen said. "You're thinking of that West Africa map ex we did last year at AWS, aren't you? The one where we wheeled the whole regiment and took the red force in the flank."

"Yeah, that's the one," Takashima said.

"What the hell; let's do it. I got enough fuel for maybe one pass. You want me to work them over, or don't you want them to know that we're on to them?"

"Let's wait and surprise them. Can you bring back some friends?"

What a kick, Knutsen thought. *A couple of captains standing in the middle of a muddy field in a downpour working out the beginnings*

of a major operation. It reminded him of playing pick-up football as a kid and drawing improvised plays in the dirt.

"We'll be here," he said with a grin. "You'll recognize me—I'll be the one in front."

"See you then, Knut-case," Takashima said.

They shook hands and Knutsen climbed back into the cockpit.

"Olsen!" Takashima bellowed at his radioman. "Get me battalion. I need to talk to the colonel direct."

1310 Tuesday: "General, the latest weather pictures are coming in," the lance corporal reported, the note of anxiousness unmistakable in his voice.

MajGen. Harry Vanderwood doubted if there was a single Marine anywhere in the wing who did not recognize the significance that attached to the latest forecasts.

"I'll be right there, Marine," he replied.

No sooner had Vanderwood arrived in the Tactical Air Command Center than the MEF commander bustled in unannounced, as he had a disconcerting habit of doing. You never knew when he was going to show up, or where, Vanderwood mused. Wing commander or mechanic on the flight line, you were never safe.

"Have you gotten the latest on the situation, Harry?" the MEF commander asked.

"As of the last fifteen minutes, general," Vanderwood replied. "Not that I'm any smarter than I was before. I'd still like to know what the hell is going on."

"That makes two of us. I'd like to talk to those Cobra pilots myself."

"It's being arranged, general. They managed to take off on another sortie before we could grab them. Under terrible conditions, I might add. When they get back I'm either going to give them a court martial or a medal; I haven't decided which yet."

The MEF commander grunted. "How's the weather looking?" he

asked.

"We're just in the process of pulling down the latest pictures from the weather satellite," Vanderwood said.

A large-scale map of the area of operations appeared on the large screen, color-coded to illustrate the precipitation forecast.

"No good news there," Vanderwood said. "Let's take a look at the incoming weather."

A broader map, much like a weather map on a television newscast, appeared on the screen. Heavy white blotches swept sputtering across the screen from left to right.

"Freeze it right there," Vanderwood said, and the image stopped moving. "Good. That could be the break we're looking for. I figure in about ninety minutes we'll be able to get something going. If this pattern holds, I plan to blot out the sun—what little sun there might be—with aircraft by 1500. Now all we need is to know what we're going to be attacking."

"How about cuing up the MEF situation package and we'll see if we can't make some sense of this," the MEF commander said. "And see if we can get General Bishop on teleconference."

"Somebody ask the Top to come over here," Vanderwood said, meaning the intelligence chief.

"General, the division commander's away from the CP, but we're setting up video with the chief of staff," a Marine reported.

"Very well," the MEF commander said. He fully expected Bishop to be away from the command post; in fact, the division command post was the last place he'd expect to find the division commander in the middle of a battle.

The computer operator, Cpl. Beale Davis, tapped quickly on his keyboard and the wall-sized screen blinked, the weather map replaced by a situation map of the MEF's area of operations. From the menu across the top of the screen he opened a "conference" window and the division chief of staff appeared in a live video feed.

"How are you, Tom?" the MEF commander said.

"Hanging in, general," Col. Tom Hester replied. "Sir, General Bishop has gone forward. Do you want him paged? If he's at one of the regimental CPs we can get him on video too."

"No, that's all right. We're just going to try to piece this picture together and I want everybody to share the same image. Are you looking at the same thing we are?"

"Yessir, he is," Davis said, meaning that the screen in the division command post would depict the same information and images that were being called up on the wing situation map.

Davis had logged into the theater data base and could "pull down" almost instantaneously any individual piece of data, or complete or partial package of information, that had been entered into the system anytime, anywhere, by any means. He had access to text, imagery, and live or pre-recorded video and audio, which he could call up by opening additional windows on the screen. Through the theater data base he had access to State Department reports, Defense Intelligence Agency summaries, Central Intelligence Agency accounts, and Defense Mapping Agency charts. Likewise, he could call up the latest tactical reports and analysis by a variety of categories—time, unit, contents, location, reliability—and could specify the level of information resolution—"granularity," they called it. Any time he asked for tactical reports over a period of time, the software would automatically "crunch out" a trend analysis, both in picture and bullet form. With a little manipulation he could get direct feeds from satellites or aerial reconnaissance drones. (This procedure was not taught in the classroom; it was an unauthorized "back door" gateway, but nobody complained when Davis pulled it off.) Perhaps most important of all, he could access the Cable News Network for the latest breaking developments. There was no lack of information out there, Davis knew. You were being bombarded by it. The trick was sifting through it all to find the right information, and figuring out what it meant.

In an effort to try to make some sense of the enemy situation they pulled down various "packages" of information, mostly in picture form,

which promptly appeared and disappeared on the screen at Davis' command. Enemy armor spottings within the last 48, 24 and twelve hours. All ground contacts reported in the last 48 and 24 hours. All enemy artillery units spotted and fire missions reported in the last 48 hours. Road and rail usage in the last 72 hours. Sightings of enemy mobile air defense equipment, usually a good indicator of the disposition of the main body, in the last 48 and 24 hours. Enemy radio traffic in the last week. Enemy aviation activity in the last two days. Every once in a while the MEF commander would ask for a "template," a computer-generated estimate of possible enemy dispositions and movements based on the partial information that was available. Each template automatically came with a reliability estimate—"resolution," they called it—calculated as a percentage of complete reliability. The best resolution they had gotten for any one template was 45 percent; most were in the twenties and thirties. Not very good—but hardly abnormal.

Another set of red enemy symbols flashed on the screen.

"What the hell," the MEF commander said, looking at the screen, which indicated a heavy flow of enemy helicopter traffic along a single route. *A major heliborne operation? In this weather? As if things aren't sticky enough. And why is this the first I'm hearing of it?* "You're telling me the enemy's been flying fleets of helicopters continuously the last six hours?"

Vanderwood looked to MSgt. Edgar Tomlinson, the intelligence chief.

"No, general," Tomlinson said. "He's not flying anything. What you're seeing on the screen, believe it or not, is actually a row of power lines. We checked it out. Radiating and blowing in this wind, our sensors picked them up as helicopters."

"You're kidding me, Top," the MEF commander said skeptically. "Our sensors think a set of power lines is a bunch of helicopters?"

"I guarantee it, general," Tomlinson said. "If you want to call up an aerial photo, I can show you the powerlines."

"No, I believe you, Top."

"I've seen it happen before," Tomlinson said. "This gear is great, as long as you don't trick yourself into thinking that it's actually smart."

Despite an aggregate resolution of under 25 percent, Vanderwood sensed that a possible pattern had slowly begun to develop, but hardly anything conclusive. A possibility. A hunch. A little better than a wild guess. Despite the admittedly amazing technology you could never be certain of anything, Vanderwood knew. Despite the artificial intelligence, the decision aids, the computer analysis. As long as war remained a clash of human wills, Vanderwood mused, no matter how much technology you had, it still boiled down in the end to intuition and judgment.

"General, the division commander's coming in on video link," a Marine interrupted.

A window opened on the wall screen and MajGen. Miles Bishop appeared, apparently from inside a command AAV somewhere on the battlefield, the trademark cigar stub clamped in his teeth.

"Hey, can anybody hear me?" he was saying gruffly over the background noise in the AAV. "Is this blasted thing on?"

"Bish, this is Vanderwood with the MEF commander," the wing commander said. "You're coming in fine on this end."

"The video whatzit thing is on the blink on this end, but I can hear you okay," Bishop replied.

"Glad you could spare a few minutes out of your busy schedule," the MEF commander said. "We've been trying to figure out what the hell's been going on. We've been running some software for the last half hour and we think we might have something."

"You want to know what the hell's going on, general?" Bishop said. "Hell, I can tell you what's going on."

"Okay, let us have it," the MEF commander said, and Bishop proceeded to describe in his own colorful but accurate way the same situation that had begun to take shape, with much less clarity, on the

wall screen of the TACC. Vanderwood and the MEF commander exchanged glances. *Bishop*, Vanderwood mused, shaking his head. *What a piece of work. Glad he's on my team.*

"How did you come by that, Bish?" the MEF commander asked.

"Me and a couple of the boys sitting around a heat tab making some coffee just swagged it," Bishop said with a lopsided grin. "Ever-lovin' coop da oil—isn't that what you're always calling it, Harry?"

"*Coup d'oeil*, Bish," Vanderwood pronounced—referring to the French term which described the ability of gifted commanders to peer through the "fog of war" and intuitively grasp what was happening on the battlefield.

"Yeah, whatever," Bishop snorted.

Vanderwood grinned at Bishop's famous good-old-boy routine. Outside the circle of general officers, few Marines knew that French was one of the four foreign languages that Bishop spoke like a native.

"As long as he's got it," the MEF commander said, "let him pronounce it however he likes."

1428 Tuesday: He heard the unmistakable sound of the ATGMs firing off in unison like a naval broadside. The doctrinal manuals called it "massed, surprise fires." *Damn if those bastards didn't walk right into it*, thought Capt. Takashima as he scampered forward to get a better look at the situation at the crossroads, where first platoon had just sprung an ambush on the leading elements of the enemy column. *I owe Knutsen a beer when this is all over.* He couldn't explain how he knew, but just from the sound of things he could tell that first platoon had caught them pretty good. Amazing how you learned to sense these things. The ground nearby erupted in a massive explosion, and he hit the deck—or rather, the six inches of water that covered the deck.

"Olsen, you all right?" he yelled after checking to make sure he was still in one piece.

"Yessir," his radioman replied. "Captain, third platoon wants to talk to you."

2ndLt. Tim Dandridge, Golf Company's least experienced platoon commander, was several hundred yards off to the right. Takashima had originally put third platoon where he could keep his eye on Dandridge, but when he'd spun the company it had left third platoon off on the right flank by itself. Takashima switched on his headset.

"Oscar-3, this is Romeo-2-Oscar, go."

"Romeo-2-Oscar, I've got mechanized activity to my front and more activity moving through the woods around my right flank, over," Dandridge reported.

Even over the radio Takashima could sense the nervousness in the lieutenant's voice. *And the tech weenies want to do away with voice communications*, he said to himself.

"Echo's on your right flank," Takashima said.

"Roger, Romeo-2-Oscar, I don't think it's Echo," came the reply. "I'm not picking them up on PLRS."

Takashima checked his electronic map board, networked to Olsen's radio, which in addition to his own eight-digit location could show the location of friendly transmitters. He called up the location of all transmitters of platoon level or higher. Dandridge was right: no Echo Company units. Which meant one of two things: either Echo was badly lost or somebody had keyed the wrong code into all of Echo's transmitters.

"Have you made contact with Echo?" Takashima asked.

"Negative. Can't raise them."

"Any visual with the enemy?"

"Negative, but they're definitely out there," Dandridge said. "Estimate at least a company."

"Roger, are you in position yet?" Third platoon should have been well set in by now, ready to ambush the advancing enemy forces.

There was a pause. "Er, roger ... pretty much, Romeo-2-Oscar," came the halting reply.

Which meant "No," Takashima knew. Good news got passed without hesitation; bad news always seemed to move more reluctantly.

Not a good sign. For a second, he considered heading over to third platoon's position to check things out, but he quickly dismissed the idea. His intuition still told him the critical action was taking place in front of him at first platoon's position. Events were still unfolding as expected, thanks to Knut-case. This was where he needed to be. Chances were that the young lieutenant was exaggerating; but yet, if Dandridge was right then Takashima had read things wrong and the enemy had other ideas in mind. You could never count on the bastards doing what they were supposed to.

"Gunny!" Takashima bellowed over the sound of the shelling.

A moment later GySgt. Roberto Hernandez splashed down beside him.

"Gunny, third platoon is reporting enemy activity to their front and flank," Takashima began.

"Roger that, skipper," Hernandez said. "I was listening in."

Naturally, Takashima thought. Nothing the gunny did surprised him anymore.

"I'm concerned about what's going on over there," Takashima said. "But I don't have time to check it out myself. That activity they reported might or might not be Echo Company. Gunny, I want you to hustle over there, have a look around and report back to me what you see. Use an alternate net. If it's real trouble I need to know in a hurry. Don't step on any toes, but you might want make a few tactful suggestions if it's appropriate."

"You want me to be, sir, what is sometimes referred to in the literature as a 'directed telescope,'" Hernandez said.

"Directed tele-what? Get outta here, gunny," Takashima said with a grin.

Sometimes it was a pain having the best-read staff NCO in the Marine Corps as a company gunny, he decided as he watched Hernandez charge away. But not usually.

1505 Tuesday: If 2ndLt. Connors had been unhappy before, he was

positively miserable now. He decided he felt about as useful as a mindless pawn in some giant chess game, being moved around one square at a time. *Certainly don't want to get too far ahead of ourselves, do we?* The analogy was pretty appropriate, he thought. Too bad the chess player who was ordering him around showed every sign of being an indecisive beginner who seemed to be taking an awful lot of time between moves.

What made things worse was that, from the distant shelling and the radio traffic, he could tell that there was one heck of a battle going on. And he was missing it. Every time he radioed for instructions he'd get the same reply—"Wait out"—and when the orders eventually arrived it seemed that he was always one step too late. Usually, he'd arrive just in time to have to duck the tail end of somebody else's fire mission. He might just as well have been wandering around the pine forests of beloved Camp Lejeune for all the action he was getting. Was that a Red-Cockaded Woodpecker he just saw?

He crawled to the edge of the vegetation and peered across the clearing. That was the objective, all right, some 300 yards away. Hill 124, now known as Objective Rose after the company commander's newborn daughter. He checked his watch; the prep fires were scheduled to commence at half past. He searched the hilltop carefully through his opto-thermal binoculars and saw no sign whatsoever of enemy activity.

Of course, he didn't know what he had expected to see. He'd been given no information on the enemy situation on the objective and he had no idea why he was attacking this hill in the first place. He certainly had no idea what made Hill 124 so important—other than that it was a convenient place to draw a goose egg on some higher-up's map. He was expected to attack and seize Objective Rose, commencing at 1530, and that was that.

With his squad leaders, Connors crawled back to rejoin the platoon.

"Lieutenant, company wants to talk to you," his radioman reported.

Connors switched on his headset.

"Hotel-3-Mike, this is 3-Mike-2," he said.

"3-Mike-2, are you ready yet?"

For about the tenth time, Connors said to himself. Keep your shorts on; the attack doesn't go for another twenty minutes.

"Roger that," he replied out loud. "The objective is deserted."

"Roger. The prep fires commence at 1530, as scheduled, and last for five mikes."

"I say again, the objective is deserted, Hotel-3-Mike," Connors said. "We don't need the prep fires; we can just walk up on the objective."

There was a pause. Connors could imagine the captain wrestling with that one. He couldn't blame the captain, really. Battalion wanted things done a certain way. To change things now, Connors knew, would throw off the timetable and would mean shutting off the scheduled fires—in short, it would disrupt the plan. And you certainly didn't want to interfere with the plan, he knew—not in this battalion anyway. The plan was everything. All the elements of the battalion were supposed to attack in close synchronization, Connors knew—"synchronization" was LtCol. Hewson's favorite buzzword. Of course, when Connors thought of synchronization he invariably thought of synchronized swimming, and he smiled at the ridiculous image of a couple of swimmers pirouetting in graceful unison in a pool. He couldn't imagine anything less like combat than that. *I might not have a world of experience, he thought, but how could anybody in his right mind think you could synchronize the confusion and mayhem of any military operation?* It boggled the mind.

"Listen, the prep starts at 1530," came the eventual reply over the radio, somewhat testily. "Just do it."

"Roger, out," Connors said resignedly. *Three bags full.*

Setting in the base of fire and getting the other two squads in position for the assault was the work of only a few minutes. Connors checked his watch: still only a quarter past. *Hope nobody falls asleep waiting,* he thought, abundantly aware of Marines' remarkable ability to doze off on a moment's notice anytime, anyplace, in any conditions.

Fifteen minutes later, exactly on schedule, the preparation fires commenced. Battalion would be pleased: the attack went flawlessly; there was no enemy resistance to screw it up. His two squads swept through the tall guinea grass toward the hill and within minutes were consolidating on the objective. There was no sign that the enemy had ever occupied the hill. Whether the enemy was anywhere in the vicinity he couldn't tell: because of the tall grass, visibility was about ten yards in any direction. No matter; they had accomplished the assigned task.

"Lieutenant, company gunny wants our ammo and casualty report," his radioman said.

Connors chuckled scornfully. *Seeing as there was nobody to shoot at us and nobody for us to shoot at ... Now, Connors, you're being a malcontent again. Just go through the motions and don't make waves.*

"I'll take it," he said, switching on his headset. "Hotel-3-Mike, this is 3-Mike-2. No casualties; no ammo expended. Mission accomplished. What next, over?"

There was pause, then finally the reply came: "Wait out."

1635 Tuesday: "Romeo-2-Oscar, this is 2-Oscar-3."

Capt. Takashima recognized the gunny's voice on the command alternate net. He had been hearing the firefight coming from that direction for some time now—he didn't know how long: it could be twenty minutes, it could be two hours—but he didn't have time to think about it. He'd feel a lot better once he got the gunny's opinion of the situation.

"This is 2-Oscar, go," Takashima said.

"Confirm situation as described earlier by 2-Oscar-3," Hernandez reported. "Engaged, situation well in hand. Echo was a little slow getting their act together, but Oscar-3 saved their butts. Caught the enemy pretty good."

"Have you made contact with Echo?"

"Roger," Hernandez said. "Have been attached."

"Say again," Takashima said, confused.

"2-Oscar-3 has been attached to Alpha-7-Hotel."

What the hell? Who the hell does Schuler think he is taking it on himself to attach one of my platoons to his company? Takashima was about to cut loose with some choice words, but he thought better of it. He knew that he was in no position to try to control what third platoon was doing; he was too busy dealing with the situation at the crossroads. Sometimes the enemy didn't use the same boundaries that we did, Takashima realized: third platoon was really part of Echo's fight. That being the case, Takashima knew that for the purposes of unity of command third platoon ought to be answering to Schuler and not to him. It was hardly conventional, Takashima decided—certainly not the sort of solution they'd teach at AWS—but under the circumstances it was the right thing to do. *I guess that's what gunny would call a "self-organizing, adaptive system,"* Takashima mused. He'd just have to remember to give Schuler a hard time about needing four platoons to do what he could do with only two.

0255 Wednesday: The MEF commander shed his dripping poncho as he stepped out of the rain into the MEF command post. The military policeman snapped to attention and saluted.

"Carry on, Sgt. McDavid. Cpl. Cooper, get some sleep," he said to his soaked driver. "It's been a long day."

He made his way into the operations center and dropped wearily into his chair, where he'd started the operation some 24 hours before. In the last 24 hours he'd been all over the MEF area of operations. He'd been to the division forward command post to talk to the division commander face to face about how to deal with the unexpected developments. He'd insisted on a face-to-face because he wanted to make sure they understood each other. He'd been to the wing headquarters twice to try to get a handle on the overall situation and to see what could be done about air support. He'd personally debriefed the Cobra pilots who'd first spotted the enemy column. He'd videotaped a

new intent statement—an “intent-o-mmercial,” as the Marines jokingly referred to it—to be broadcast to the entire MEF (at least down to battalion and squadron level, the lowest level that had video capability). He and the wing commander had taken a terrifying V-22 flight over the battlefield (and unfortunately gotten precious little out of it). He’d been back to the MEF command post once during the day, to see if the situation had gotten any clearer since he’d left: it hadn’t. He’d visited the division’s main-effort regiment and that regiment’s main-effort battalion near Culverin Crossroads (it hadn’t been until he’d met that CO from Golf Company, Capt. Taka-something, and seen the indomitable fighting spirit of his Marines that he’d realized that the MEF would carry the day—“Just get me some air, general,” the captain had said). He’d visited the engineers to make sure that the roads were going to hold up for at least the next 72 hours in this rain. He’d even spent fifteen minutes directing traffic at a jammed road intersection, until the MPs arrived, during the critical early stages of the pursuit. And he’d met up with the FSSG commander at a maintenance contact point, of all places, where he’d watched an M1A3 main battle tank repaired and put back into action; they’d discussed the logistics needed to support the upcoming exploitation.

It seemed like days since he’d been at the command post. On the wall screen before him the amorphous wave of flashing green unit symbols had crept considerably farther north since the last time he had looked at the map. There were far more red enemy symbols now as well, most of them encircled in the lower left-hand part of the screen, an indication that the intelligence effort had managed to locate many of the enemy forces which had been unknown at the beginning of the operation. He knew that many of those units, although still reflected on the map and still present on the ground, had ceased to be effective fighting forces by now. He also knew that the clean image portrayed on the screen could not begin to capture the brutal fighting and the destruction that he had witnessed during the day. That was the great danger of being stuck in a command post, he knew; you began to

confuse what was on a map with reality.

Based on the tempo of activity in the operations center, he wondered if the staff knew the battle was all but won. He knew that in the next room the major and the two staff sergeants who made up the future plans cell would be working feverishly on the plans for the next week to exploit the advantage the MEF had won today. *The responsibility of command is never finished*, he decided; *always something else to be done*. Curiously, he thought, he found himself thinking back to his days as a brand-new lieutenant at The Basic School, remembering the adage that had been drilled into them: "Camouflage is continuous." *Command is continuous*, he found himself thinking. He'd have to remember that one, he decided, for the next time he was invited to speak at a TBS mess night.

He thought of stopping in to see how things were going in the future plans cell, but he knew his chief of staff would have things moving along briskly and he would just be getting in the way. Even when the issue had still hung in the balance, Col. Dick Westerby had been pushing the future ops guys to develop a plan for exploiting the outcome. Around the MEF command element Westerby was known with a certain grudging admiration as "Yesterday," because that was when he seemed to want everything done. "If it's not done fast," Westerby was fond of saying, "it's not done right."

As if by cue, the small, balding colonel appeared, bearing a cup of steaming coffee.

"You look like you could use this, general," he said.

"Thanks, Dick," the MEF commander said.

A staff sergeant appeared. "Here's the new MEF op order, colonel," he said, handing a flimsy document to Westerby.

Westerby perused the two-page order, which consisted of a page of text and a diagram, nodding as he read.

"General, do you want to have a look at this?" he asked.

"Hell, no. I couldn't even focus my eyes on it. That's what I've got you for. You know my intent."

"Looks good, Staff Sergeant Walters," Westerby said, initialing the document and returning it to the staff sergeant. "Let's get it out ten minutes ago."

"Aye aye, sir; it'll go straight out on the secure fax," Walters said, and quickly departed.

The MEF commander sipped his coffee and gazed at the large situation screen.

"Well, what do you think, Dick?" he asked.

"What do I think?" Westerby said. "I think we went in with an unclear picture of the situation and it only got worse. I think the enemy showed up where we least expected him and caught us with our shorts down. I think our planes were stuck on the ground and our vehicles were bogged down in the mud. I think our comm went to hell and you were *incomunicado* for six hours at a time. I think all our best-laid plans went down the tubes and we had to improvise and turn the whole thing over to the junior commanders. If not for a Cobra pilot with a good pair of eyes and a company commander with a penchant for ignoring his orders ..."

"Yes," the general said with obvious satisfaction, "don't you love it when the system works to perfection?"

Chapter 1

The Nature of Command & Control

From Plato to NATO, the history of command in war consists essentially of an endless quest for certainty—certainty about the state and intentions of the enemy's forces; certainty about the manifold factors that together constitute the environment in which war is fought ...; and, last but definitely not least, certainty about the state, intentions, and activities of one's own forces.

—Martin Van Creveld, *Command in War*

The necessary first step in putting effective command and control into practice is to come to an understanding of the fundamental nature of command and control—its purpose, characteristics, environment and basic functioning. This understanding will become the basis for developing a theory of and for devising a practical philosophy of command and control.

HOW IMPORTANT IS COMMAND & CONTROL?

No single activity in war is more important than command and control. Command and control by itself will not drive home a single attack against an enemy force. It will not destroy a single enemy target. It will not effect a single emergency resupply. Yet, none of these essential warfighting activities, or any others, would be possible without effective command and control. Without command and control,

campaigns, battles and organized engagements are impossible, military units degenerate into mobs, and the subordination of military force to policy is replaced by random violence. In short, command and control is essential to all military operations and activities.

With command and control, the countless activities a military force must perform gain purpose and direction. Command and control means "putting the pieces together." Done well, command and control can bring success against otherwise superior forces. Done poorly, it invites disaster, even against a weaker enemy. Though no substitute for adequate resources, effective command and control is a force multiplier. It allows the commander to make the most of what he has—people, information, material and, perhaps most important of all, time.

Command and control's importance extends far beyond military forces and military operations. Any system comprising multiple elements which must cooperate or compete in an interactive environment needs some form of command and control: sports teams, musical groups, economies, flocks of geese, colonies of ants, societies, communities, families, food chains, communications networks, city streets, stock exchanges, ecosystems, businesses, any living organism. The human body, for example, needs command and control, from the central nervous system but also, and equally importantly, from the various involuntary systems which sustain life and growth—the respiratory system which regulates breathing, the circulatory system which controls the flow of blood, the immune system which fights off infection, and so on. Simply put, command and control in some form or another is essential to survival and success in any competitive or cooperative enterprise. Command and control is a fundamental requirement for life and growth, survival and success for any system.

WHAT IS COMMAND & CONTROL?

We tend to think of command and control as a distinct and specialized function—like logistics, intelligence, electronic warfare or administration—with its own peculiar methods and considerations and occurring independently of other functions. But in fact, command and control cuts across all military functions and operations, giving them meaning and tying them together into a meaningful whole. None of these functions, or any others, would be possible without effective command and control. It is not the business of specialists—unless we consider the commander a specialist—because command and control is fundamentally the business of the commander.

Command and control is the means by which a commander recognizes what needs to be done and sees to it that appropriate actions are taken. Sometimes this recognition takes the form of a conscious command decision, whether arrived at intuitively or analytically—as in deciding on a concept of operations. Sometimes it takes the form of a preconditioned or automatic reaction—as in immediate-action drills, practiced in advance so that they can be implemented instinctively in a moment of crisis. Sometimes it takes the form of a rules-based process—as in the guiding of an aircraft on final approach. Some types of command and control must occur so quickly and precisely that they can be accomplished only by computers—such as the command and control of a guided missile in flight. Other types require such a degree of judgment and intuition that they can be performed only by skilled, experienced people—as in devising tactics, operations and strategies. Likewise, some types are primarily procedural or technical in nature—such as the control of air traffic and air space, the control of a fire mission, or the fire control of a weapons system. Others are tactical or operational—that is, they are concerned with the overall conduct of military actions, whether on a large or small scale, and involve formulating concepts, deploying forces, allocating resources,

and so on. It is with this form of command and control, the overall conduct of military actions, that we are primarily interested and on which we will focus.

We typically think of command and control as occurring concurrently with the action initiated, but it may also occur beforehand or after. For example, a well conceived plan based on a true awareness of the situation, which clearly indicates what needs to be done and why, provides command and control. Effective training and education, which make it more likely that subordinates will take the proper action in combat, provide command and control before the fact. The immediate action drill mentioned earlier, practiced until it becomes automatic, provides command and control. A commander's intent, expressed clearly before the operation begins, is an essential part of effective command and control. Likewise, command and control may occur after the fact—in the form of feedback which ascertains the results of the action and so informs the next decision.

Since war is a conflict, we can measure the effectiveness of command and control only in relation to the enemy. As a practical matter, therefore, effective command and control involves protecting our own command and control activities against enemy interference and actively disrupting the enemy's command and control activities.

WHAT IS THE BASIS OF COMMAND & CONTROL?

The basis for all command and control is a pair of key complementary concepts: authority and responsibility. Command and control is based on the authority vested in an individual in the military for deciding what needs to be done and making it happen. Authority derives from two sources. Official authority is a function of rank and position and is bestowed by organization and by law. Personal authority is a function

of personal influence and derives from factors such as experience, reputation, skill, character and personal example. Official authority is not enough; to be effective, a commander must also possess a high degree of personal authority. Responsibility, or accountability for results, is a natural corollary of authority. Where there is authority there must also be responsibility in like measure. Conversely, where an individual has responsibility for achieving results, he must also have the authority to initiate the necessary actions.

HOW DOES THE COMMANDER COMMAND?

The commander may exercise this authority by a variety of means. First, he may command by direction—that is, by direct personal instruction, supervision and example. The direction commander “calls all the shots.” His ability to command is limited to those within the range of his personal direction. Historically unable to command the entire force by this method, commanders have resorted to trying to anticipate the critical location and positioning themselves there or to moving from place to place providing direction as they go. The result is a dynamic command capability, by which the commander can command part of his force all the time or all of his force part of the time, but which falls short of the ideal—to command all of the force all of the time.

Second, the commander may command by planning—by trying to plan every move and anticipate every contingency in advance, relying on disciplined forces to carry out the plan as ordered. Instead of the commander’s personal presence and direction, the plan becomes the means of ensuring proper execution. It becomes a prescriptive, regulatory device. The basic object of command by planning is to impose order on the battlefield, and in so doing to exercise command over the entire force—although at the expense of flexibility. Command

by planning is the predominant method of command for most military forces today.

These first two methods tend to centralize authority. They are counterbalanced by the third method, command by influence, which tends to decentralize authority. Using this method, the commander commands not by personally directing the execution of each move or by planning the execution of every move in advance, but by exerting a more general influence over the conduct of operations. The influence commander provides guidance to subordinates but allows them to work out the details of execution and coordination. In effect he establishes broad control limits, which he uses to steer his subordinates, and continuously adjusts those limits as needed, but he leaves his subordinates free to operate within those limits. In this manner, the commander influences all of his forces all the time.

It is important to recognize that the methods are not necessarily mutually exclusive. Within limits, they can be employed effectively in combination, although they can also be used at cross purposes—for example, the use of broad mission guidance in conjunction with detailed, restrictive coordinating instructions. In general, however, one method or another tends to dominate.

WHAT IS THE RELATIONSHIP BETWEEN “COMMAND” AND “CONTROL”?

There are a couple of traditional views of command and control. The first sees command as the authority vested in a commander and control as the means by which he exercises that authority. The second sees command as the act of decision and control as the means of ensuring its implementation. The views are compatible in that they both view “command” and “control” as operating in the same direction: from the

top of the organization toward the bottom. The top of the organization imposes command and control on the bottom, without any reciprocal influence. The commander is outside the system, imposing control from above. Commanders impose control on those under their command; commanders are "in control" of their subordinates, and subordinates are "under the control" of their seniors.

We suggest another, radically different view of command and control. Think of command not just as the authority and responsibility vested in a commander but as the exercise of that authority and responsibility. ("Command" is a verb as well as a noun.) The commander commands by deciding what needs to be done and by directing, planning or influencing the conduct of others.

Then think of control as feedback—continuous information about the unfolding situation returning to the commander—which allows the commander to adjust and modify his command. Feedback may be "positive," meaning that it reinforces what is happening and has an amplifying effect, or it may be "negative," in which case it has a corrective effect on the actions taking place. In either case, feedback indicates the difference between the desired outcome and the situation as it exists. Feedback may come from any direction and in any form: intelligence about how the enemy is reacting, information about the status of subordinate or adjacent units, revised guidance from above based on developments. Feedback is the mechanism which allows the commander to adapt to changing circumstances—to exploit fleeting opportunities, respond to developing problems, modify his scheme, redirect his efforts. In this way, feedback "controls" subsequent command action. Control is thus not something which seniors impose on subordinates; the entire system gains control—comes "under control"—based on the changing situation.

Command and control is thus an interactive process involving all

the parts of the system and working in all directions. What is command for one commander is control for another. For example, a commander monitors a developing situation. Based on feedback he receives, he issues new instructions to his forces, exerting command. Those command instructions perform a control function for a subordinate who receives them. The subordinate takes appropriate action, exerting his own command. The results of those actions in turn provide fresh feedback for the senior commander, who has continued to monitor the situation, providing the control which allows him to modify his command action. The result is a mutually supporting system of give and take, in which commanding and controlling forces operate in all directions to ensure that the force as a whole can adapt continuously to changing requirements.

This view of command and control has four important characteristics which distinguish it from the traditional views and which will become central to our approach to command and control. First, it recognizes that effective command and control must be sensitive to changes in the situation. This view sees the military organization as an "open" system, interacting with its environment, rather than as a "closed" system focused on internal efficiency. An effective command and control system provides the means to adapt to changing conditions. We can thus look at command and control as a form of continuous adaptation. We can liken the military organization to a living organism—coping, learning and information seeking in its quest for survival and success. And we can say that a military organization, like a living organism, is never in a state of stable equilibrium, but is continuously adapting and adjusting to its surroundings. Second, the complementary actions of "command" and "control" make command and control a continuous, cyclic process, and not a sequence of discrete actions—as we will discuss in greater detail later. Third, this view describes command and control as a dynamic process of cooperation. Command and control is not a matter of one part of the organization

“getting control over” another. All parts of the organization provide action and feedback—“command” and “control”—in overall cooperation. Command and control is fundamentally an activity of *reciprocal influence*—give and take among all parts, from top to bottom and side to side. And finally, as a result, this view does not see the commander as being above the system, exerting command and control from the outside, but as being an integral part of this dynamic system of reciprocal influence.

AN EXAMPLE OF COMMAND & CONTROL

We can liken command and control to the play of a basketball team. The team has a general style of play based on the abilities of the players and the philosophy of the coach. The team may play a fast-breaking, up-tempo game or a conservative, half-court game. It may play an aggressive, trapping defense or a disciplined zone. It may rely on perimeter shooting or on strong inside play. The team may change its style of play somewhat, based on what players are on the court and the strengths and weaknesses of the opponent. This general approach to the game does not dictate each action, but it definitely influences how the players perform on the court—provides an underlying layer of command and control.

The team will go into each contest with a game plan—trying to get the ball to a particular player to exploit a mismatch, trying to deny the ball to a particular opponent, or trying to get a particular opponent in foul trouble—and will likely adjust that game plan during the course of the game in response to how things develop. Although only a broad strategy, the game plan will guide decisions the players make and so provides another layer of command and control.

The five players on the court have assigned responsibilities—a

point guard who handles the ball, a power forward who "attacks the boards," and so on. These responsibilities do not restrict the players—they do not prevent a center from running a fast break or a guard from fighting for a rebound—but they provide yet another layer of command and control in the form of discipline and structure.

The coach has a limited influence on the course of the game. He motivates and instructs his players as the game progresses. He calls timeouts to refocus his players when he feels the momentum slipping away. He adjusts the game plan based on what has worked and what has not. He reorganizes, by making substitutions, to get the best match-up against the opposing team. But the game must ultimately be won or lost by the players on the court. The coach's contribution may in fact be significant, but most of it actually occurs during the preparation *before* the game. His greatest contribution is in providing his players with the necessary individual and team skills.

The team also has a captain. He is usually an experienced player but he is chosen primarily because of demonstrated skills which give him personal authority with the other players. The captain leads by example. He constantly instructs, corrects, encourages and cajoles the other players as needed to get their best performance. He may be the heart and soul of the team, and he makes things happen. When the situation is critical, he is the one the other players look to. He has a lot of influence, but he cannot play the game by himself and, like the coach, he cannot directly control what the other players do on the floor.

The captain and coach rarely try to move the other players around during the course of play. Players react individually to the ball and move in relation to the teammates or opponents nearest them—not based on instructions from the bench. The team has some set plays, but rarely executes them exactly as designed. Instead, the plays merely provide a common point of departure, as players adjust to what is

happening on the court. The players make the most of their individual creative skills to create and exploit opportunities—for themselves and their teammates. The players make countless split-second “decisions” in the course of play—usually without even thinking about them. They act instinctively. They make these “decisions” as individuals, but always in context of the team’s success, and this individual action in a team context provides an essential layer of command and control.

The coach may call timeout to diagram a special inbounds play—this equates to what we would call a deliberate operation. But most of basketball, and most of war, consists of what we would call hasty operations and requires the players to improvise continuously. Most often, the players rely on mutually understood tactics and techniques—a screen-and-roll, a give-and-go—executed intuitively during the flow of play. For example, the point guard uses his individual talent to beat his defender off the dribble, penetrate the defense and then pass the ball out to a teammate who, anticipating the developing pattern, has already used a screen set by a third teammate to move into an open space in the collapsing defense to receive the pass for an easy jump shot. Meanwhile, the center, anticipating the shot, “crashes the boards,” looking for a possible rebound. It is not a set play: it is not diagrammed in any playbook and it has never been rehearsed in practice. Yet it is a form of command and control—in fact, it is probably the most common and direct form of command and control the team uses. It is command and control in the form of spontaneous cooperation, and it is possible because the players understand the game and each other, and they are committed to a common goal: winning. This knowledge of the “logic” of the game, coupled with these basic tactics and techniques, allows the players to execute an infinite variety of improvised combinations, much like the rules of grammar allow us to construct an infinite variety of sentences.

| The game unfolds fluidly—not as distinct “plays”—as the teams |

fight for possession and the ball changes hands frequently from turnovers or missed shots. The team transitions automatically from offense to defense, without any instructions from the coach. These established schemes and patterns, even though they are not designed plays and even though they are executed intuitively and in an fluid setting, provide another essential layer of command and control.

The team practices to improve both individual skills and teamwork. The desired result is that even though the players react individually to the ball, they somehow work together as a single unit. The "logic" of the team's play is innate in each player and not imparted by a coach maneuvering players from the sideline. The players develop an implicit understanding of teammates so that they can cooperate intuitively—they can automatically switch assignments on defense, make a blind pass, or break for the basket at precisely the right moment. Individual players may cooperate quite closely—as in demonstrating pinpoint passing and timing in breaking down the opponent's defense for an easy basket. But it is important to recognize that the cooperation is improvised and "local"—it occurs spontaneously between the players involved and is not the result of directions from the captain or coach. This ability to understand and cooperate implicitly, born of familiarity resulting from long hours of practice together, provides the final layer of command and control.

The end result is a command and control system with multiple complementary and reinforcing layers: five different players moving individually with or without the ball, making countless individual decisions, relying on their individual creativity and demonstrating their individual skills, yet at the same time forming a dynamic, cohesive and flexible team which thinks, acts and reacts like a single unit. The result may appear free-wheeling, flowing and even chaotic, but the layers provide an underlying structure which allows for both the group cooperation and the individual initiative that are essential for success.

This is what we mean by effective command and control.

WHAT DOES IT MEAN TO BE "IN CONTROL"?

In order to be effective, any philosophy of command and control must be compatible with the true nature of war. We recognize that war is characterized by friction, disorder and uncertainty and that as a result nothing ever happens exactly as expected or as intended. Subordinates will get lost, orders will be misunderstood, the enemy will do something unexpected, almost every action will take longer than anticipated and operations will fall short of the desired effect. Any effective approach to command and control must recognize all of this and be able to deal with it.

Our traditional understanding of effective command and control is that if we are "in command," then we should also be "in control." Typically we think of a strong, coercive type of command and control—a sort of push-button control—by which those "in control" dictate the actions of others, and those "under control" respond promptly, precisely and blindly. In this way a chess player controls the movements of his chess pieces. But given the nature of war, is it realistic to believe that a commander can control his forces with anything even resembling the certainty and precision with which the chess player controls his pieces? Or can he only exert indirect influence? We might say that a gunner is "in control" of his weapon system or that a pilot is "in control" of his aircraft. But is a flight leader really directly "in control" of how the other pilots fly their aircraft? Is a senior commander really "in control" of the squads of Marines actually engaging the enemy, especially on a modern battlefield commonly described as "empty," on which units or even individuals are dispersed to the point of isolation?

We are also fond of saying that the commander should be "in control" of the situation, or that the situation is "under control." The worst thing that can happen to a commander is to "lose" control of the situation. But are the terrain and weather "under" the commander's control? Is the commander even remotely "in control" of what the enemy does? A good commander may sometimes anticipate the enemy's actions, and he may even influence the enemy's actions by seizing the initiative and forcing the enemy to react to him. But it is a delusion to believe that we can be "in control" of the enemy or the situation. Is a kayaker paddling his way down a raging river really "in control" of the situation? Does he control the river? Is he even really "in control" of his own course? Or does he merely try to steer his way between and around the rock formations which spell disaster as the rapids carry him along? The rocks define the parameters of control: if he stays between the rocks he is "under control"; if not he has "lost" control. For the kayaker, success—navigating his way safely down the river—is not a matter of push-button precision. For the kayaker, it is a matter of coping with a changing, turbulent situation—continuous adjustment to maintain himself between certain limits.

The truth is that, given the nature of war, it is a delusion to think that we can be "in control" with any sort of certitude or precision. And the further removed a commander is from the Marines actually engaging the enemy, the less direct control he has over their actions. We must keep in mind that war is at base a human endeavor. In war, like in basketball but unlike in chess, each "piece" consists of human beings, each reacting to the situation as it pertains to him, each trying to survive, each prone to making mistakes and each subject to the vagaries of human nature. We could not get people to act like mindless robots, even if we wanted to.

Is the basketball coach mentioned earlier "in control" of his players, much less the other team's players? He cannot move his

players around the court like the chess player moving his chess pieces. No amount of technology, no matter how advanced, will give him that ability. Nor would we want him to have that ability, because it would eliminate the individual player creativity and skills that are essential to the game. But the coach can influence how his players perform. He teaches his players the team philosophy and various tactics and techniques which they will use on the court; he diagrams plays which serve as the basis for cooperation and improvisation; he develops a game plan and adjusts it as the game unfolds; and he motivates, inspires and instructs his players, helping them to perform to their best as individuals and as a team. In this way, although nobody is "in control," the entire team plays "under control."

Given the nature of war, the remarkable thing is not that a commander cannot be "in control" but rather that he can achieve any sort of influence at all. We must recognize that the object of effective command and control is not to be "in control." War being what it is, command by direction and command by planning are bound to fall short of the desired effect. We conclude, therefore, that we need a "looser" form of influence—something more akin to the willing cooperation of the basketball team than to the omnipotent direction of the chess player—which can provide the necessary degree of guidance in an uncertain, disorderly, time-competitive environment without stifling the initiative of subordinates.

WHAT MAKES UP COMMAND & CONTROL?

The words "command" and "control" can be nouns, and used in that way the phrase *command and control* describes an entity or, even better, a system—an arrangement of different elements which interact to produce effective and harmonious actions. What are these basic elements of command and control?

The first element of command and control is *people*—people who gather information, make decisions, take action, communicate and cooperate with one another in the accomplishment of a common goal. People drive the command and control system—they make things happen—and the rest of the system exists only to serve them. The essence of war is a clash between human wills, and any concept of command and control which does not account for this human dimension first is inherently flawed. Because of this human element, command is inseparable from leadership. The aim of command and control is not to eliminate or lessen the role of people, or to make people act like robots, but rather to help them perform better. Human beings—from the senior commander to a lance corporal calling in a situation report—are integral components of the command and control system, and not merely users of it.

All Marines feel the effects of fear, privation, and fatigue. Likewise they, like all human beings, have unique, intangible qualities which cannot be captured by any organizational chart, procedure, or piece of equipment. The human mind has a capacity for judgment, intuition and imagination far superior to the analytical capacity of even the most powerful computer. It is precisely this aspect of the human element that makes war in general, and command in particular, ultimately an art rather than a science. An effective command and control system must account for the characteristics and limits of human nature and at the same time exploit uniquely human skills. At any level, the key person in the command and control system is the commander. On the commander rests the final authority and responsibility for success.

The second element of command and control is *information*, which refers to representations which we use to “inform”—to give form and character to—our decisions and actions. Information is the words,

letters, numbers and symbols we use to represent things, events, ideas and values. In one way or another, command and control is essentially about information: getting it, judging its value, processing it into useful form, acting on it, sharing it with others. Information is how we give structure and shape to the material world, and it thus allows us to give meaning to and to gain understanding of the events and conditions which surround us. We can think of information as a control parameter: it provides control or structure to our actions.

There are two basic uses for information. The first is to help create situational awareness as the basis for a decision. The second is as a means of coordinating actions in the execution of the decision.

While distinct in concept, the two uses of information are rarely mutually exclusive in practice. In fact, there will usually be quite a bit of overlap, as the same exchange of information serves both purposes simultaneously. For example, coordination between adjacent units as they execute the plan can also help shape each unit's understanding of the situation and so inform future decisions. An order issued to subordinates describes the tasks to be accomplished and provides necessary coordinating instructions; but the same order should provide a subordinate insight into the larger situation and insight into how the subordinate's actions fit into that larger situation. Likewise, a call for fire, the primary purpose of which is to request supporting arms from a supporting unit, also provides information about the developing situation in the form of a target location and description.

Information takes many forms. It ranges from data—raw, unprocessed signals—to information which has been evaluated and combined into meaningful knowledge, to knowledge which has been transformed through judgment and experience into true situational awareness or understanding. A commander's guidance to his staff and orders to his subordinates are forms of information, as are intelligence about the enemy, status reports from subordinate units, or coordination

between adjacent units. Without the information that provides the basis of his situational awareness, no commander—no matter how experienced or wise—can make sound decisions. Without information which provides understanding of his concept and intent, his subordinates cannot act properly. Without information in the form of a strike brief which provides understanding of the situation on the ground, a pilot cannot provide close air support. Without information which provides understanding of an upcoming operation and the status of supply, the logistician cannot provide adequate combat service support.

Because information provides structure and meaning, no organization can function without it. The larger and more complex an organization is, the more information in total it requires to function. However, it is not necessarily true that the higher the level of command, the more information any given commander needs to make effective decisions. This is true only if command and control is centralized; but if we decentralize command and control we distribute information throughout the organization, and lessen the amount that any one commander must deal with. For this reason, Sun Tzu can say: "Generally, management of many is the same as management of a few. It is a matter of organization. And to control many is the same as to control few. This is a matter of formations and signals."

Effective command and control is not simply a matter of generating enough information. Most information is not important, or even relevant. Much is unusable given the time available. More is inaccurate, and some can actually be misleading. And, given information-gathering capabilities today, there is the distinct danger of overwhelming the commander with more information than he can possibly assimilate. In other words, too much information is as bad as too little—and probably just as likely to occur. Some kinds of information can be counterproductive—information which misleads us,

which spreads panic, or which leads to overcontrol. Information is valuable only insofar as it contributes to effective action. *The critical thing, then, is not the amount of information, but rather key elements of information, available when needed and in a useful form, which improve the commander's awareness of the situation.*

The value of information exists in time and most often describes fleeting conditions. In general, information grows quickly stale with time. Information which is valuable one moment may be irrelevant or even misleading the next.

The final element of command and control is the *command and control support structure*, which, as the name indicates, provides support to the people who create and use information. It includes the organizations, procedures, equipment, facilities, training, education and doctrine which support command and control.

Organization establishes chains of authority and responsibility, provides groups of people who work together in the accomplishment of a common mission, and establishes the channels by which information flows. Organization provides structure not only for how we group people but also for how we distribute information. Procedures are the wide range of techniques we use to perform various command and control tasks. They include, for example, the symbols used to display information on situation maps, the physical arrangement of those maps in a command post, the way information is disseminated, and the format by which reports are submitted and orders issued. Training, education and doctrine support command and control by preparing people to perform their various duties. Facilities refer to the command posts and other spaces where command and control is sometimes performed. Equipment includes the communications and other gear which support command and control, from pyrotechnics to computers.

It is important to note that although we often refer to families of hardware as "systems" themselves, the command and control system is much more than simply equipment. Quality equipment and advanced technology do not guarantee effective command and control—we need the "whole package," starting with quality people and an effective guiding philosophy. We must recognize that the components of the command and control support structure do not exist for their own sake but solely to support the people who must recognize what needs to be done and take the appropriate action.

WHAT DOES COMMAND & CONTROL DO?

The words "command" and "control" are also verbs, and used that way the phrase *command and control* describes a process—a collection of related activities.* Command and control is something we *do*. These activities include, but are not limited to, gathering and analyzing information, making decisions, organizing resources, planning, communicating instructions and other information, coordinating, monitoring results and supervising execution.

While we want to improve the efficiency of the command and control process, we should not become so wrapped up in feeding and improving the process that we lose sight of the object of command and control in the first place. For example, we should not become so concerned with the ability to gather and analyze huge amounts of information efficiently that we lose sight of the reason for the

* We draw an important distinction between a process, a collection of related activities, and a procedure, a specific sequence of steps for accomplishing a specific task. Command and control is a process. It may include procedures for performing certain tasks, but it is not itself a procedure and should not be approached as one.

information in the first place—namely, to help the commander gain a true awareness of the situation as the basis for making and implementing decisions. The ultimate object is not an efficient command and control process; the ultimate objective is the effective employment of military action.

So rather than ask what are the functions that make up command and control, we might better ask: What should effective command and control do for us? First, it should provide insight into the nature and requirements of the problem facing us. It should develop intelligence about the enemy and the environment. As much as possible, it should seek to identify enemy capabilities, intentions and vulnerabilities. It should seek to understand our own situation—to include identifying our own vulnerabilities. In short, it helps us gain situational awareness.

Next, command and control should provide a vision, meaning that it should devise suitable and meaningful goals, and it should adapt those goals as the situation changes. It should devise appropriate actions to achieve those goals. It should provide direction and focus of effort to create vigorous and harmonious action among the various elements of the force. It should provide a means of continuously monitoring developments as the basis for adapting. It should provide security to deny the enemy knowledge of our true intentions. And above all, it should generate tempo of action, since we recognize that speed is a weapon.

So, what does command and control do? In short, an effective command and control process generates swift, appropriate, decisive, harmonious and secure action.

THE ENVIRONMENT OF COMMAND & CONTROL: UNCERTAINTY & TIME

The unifying principle of command and control, the defining problem which overwhelms all others, is the need to deal, one way or another, with uncertainty. Were it not for uncertainty, command and control would be a simple matter of managing resources, hardly worthy of concern. In the words of Carl von Clausewitz: "War is the realm of uncertainty; three quarters of the factors on which action in war is based are wrapped in a fog of greater or lesser uncertainty. A sensitive and discriminating judgment is called for; a skilled intelligence to scent out the truth."

Very simply, uncertainty is what we do not know about a given situation. Uncertainty pervades the battlefield, in the form of unknowns about the enemy, about the environment, and even about our own forces. It is a fundamental attribute of war. We try to reduce uncertainty to a manageable level by gathering and using information, but we know that we can never eliminate it. Why is this so? First, since war is fundamentally a human enterprise, it is shaped by human nature and is subject to the complexities, inconsistencies and peculiarities which characterize human behavior. Simply put, human beings, friendly as well as enemy, are unpredictable. Second, because war is a clash between *independent* human wills, each with freedom of action, we can never expect to be able to anticipate with certainty what our enemy's intentions are. The fundamentally interactive nature of war guarantees uncertainty.

Why is uncertainty such a problem for command and control? We have described information as a control parameter. By allowing us to provide structure, information allows us to gain a certain amount of control. Uncertainty indicates a lack of information about a situation, and a lack of information suggests the danger of losing control of the

situation. Uncertainty is thus a fundamental threat to control, and therefore a potential source of significant anxiety for any commander—especially one whose desire is to be “in control.” As a result, many unnecessary information requirements are generated in reaction to the anxiety that uncertainty creates rather than as the result of any functional need.

Command and control aims to reduce the amount of uncertainty that a commander must deal with—to a reasonable point—so that he can make sound decisions. Though we try to reduce uncertainty through information, there will always be some knowledge that we lack. We will be aware of some of the gaps in our knowledge, but some knowledge we will not even be aware that we are lacking. Imagine a continuum between absolute uncertainty, or ignorance, on the one hand and absolute certainty on the other. The difference between our actual level of knowledge and absolute certainty we can call the “Certainty Gap.” (See Figure 1.) We must understand the forces which guarantee the existence of the “Certainty Gap” and be resolved to act despite it on the basis of what we do know.

It is important to note that, according to our definition, certainty is a function of knowledge and not merely of data. Although the two are clearly related—they are both forms of information, as we will discuss—the distinction between them is important. Data is the raw material which provides the basis for knowledge. *Knowledge is the result when human beings add meaning to data through the act of cognition.* In other words, knowledge is not only a function of data but also of experience, intuition, and judgment. Properly provided and processed, data can lead to knowledge, but the terms are not synonymous. Not all data leads to knowledge; some may even hamper it. The essential lesson from this distinction is that decreased uncertainty is not simply a matter of increased information flow. More important is the quality of the information and the abilities of the

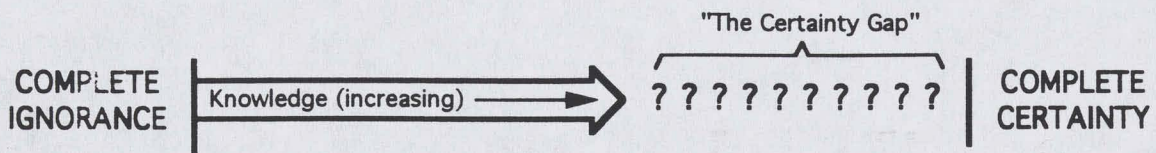


Fig. 1. "The Certainty Gap"
A fundamental problem of command and control.

person using it.

The second attribute of the problem of command and control, second only to uncertainty in order of importance, is the factor of time. Theoretically, we can always narrow the "Certainty Gap" by gaining more knowledge of the situation (accepting that there is some information we can never gain). The problem is that to gain and process information takes time. This is a problem for three reasons. First, the knowledge we gain in war is perishable: as we take the time to gain new information, information already gained is becoming obsolete. Second, since war is a contest between opposing wills, time itself is a precious commodity shared by both sides. While we are trying to get information about a particular situation, the enemy may already be acting—and changing the situation in the process. And third, the rapid tempo of modern operations limits the amount of information that can be gathered, processed and assimilated in time to be of use. Command and control thus becomes a race against time. So, the second absolute requirement in any command and control system is to be fast—at least faster than the enemy.

A tension thus exists between the battle against uncertainty and the race against time. This is the fundamental challenge of command and control. The successful commander must find a way to satisfy both, as we will see.

COMMAND & CONTROL IN THE INFORMATION AGE

Many of the factors which influence command and control are timeless—the nature of war and of human beings and the twin problems of uncertainty and time, for example. On the other hand, numerous factors are peculiar to a particular age, or at least dependent on the characteristics of that age. As war has evolved through the ages,

so has command and control. In general, as war has become increasingly complicated, so have the means of command and control. What can we conclude about the environment in which command and control must function today and into the foreseeable future?

The prevailing characteristics of the Information Age are variety and rapid change. Political upheaval around the globe has created rapidly shifting alliances and policy objectives, meaning an unstable and changeable situation at the political level. An unstable and changeable world situation can lead to countless varieties of conflict across the full spectrum of conflict, from peacekeeping operations on the one extreme to general war on the other. The distinction between war and peace may blur. Since we cannot predict when and where the next crisis will arise, or what form it will take, our command and control must function effectively in any environment.

Technological improvements in mobility, range, lethality and information-gathering continue to compress time and space, necessitating higher operating tempos and creating a greater demand for information. Military forces may move more quickly over greater distances than ever before, engaging the enemy at greater ranges than ever before. The consequence of this is a fluid, rapidly changing military situation. Whether at the political level or on the battlefield, the more quickly the situation changes, the greater the need for continuously updated information and the greater the strain on command and control.

The increasing lethality and range of weapons over time has forced military forces to disperse in order to survive, likewise stretching the limits of command and control. Military forces are bigger and more complex than ever before, with more "moving parts." They consist of a greater variety of specialized organizations and weapons. As a result, modern military forces yet again require greater amounts of information

in order to operate and sustain themselves.

Moreover, the real-time media saturation that is a feature of the Information Age tends to accelerate the speed at which events develop and to cause these events to take on crisis proportions requiring immediate action. Whether the situation is an international crisis or a fluid tactical action, the norm will be "short-fuze" rather than deliberate situations.

In the current age there is no denying the increasing importance of technology to command and control. Advancements in technology provide capabilities never before dreamed of. But technology is not without its dangers, namely the overreliance on equipment on the one hand and the failure to make use of the latest capabilities on the other. It is tempting, but a mistake, to believe that technology will solve all the problems of command and control. In fact, used unwisely, technology can be part of the problem: advancing technology can contribute to information overload and to the dangerous illusion that certainty and precision in war are not only desirable, but attainable.

In this complicated age, the command and control system is especially vulnerable, and not just to the physical destruction of facilities and personnel. As the command and control system becomes increasingly complex, it likewise becomes increasingly vulnerable to disruption. Among other things, command and control is vulnerable to disruption by information overload, the overreliance on technology, misinformation, communications interference, lack of human understanding, lack of technical proficiency or training, mechanical breakdown, and systemic failure due to overcomplexity.

CONCLUSION

Although command and control systems have evolved continuously throughout history, the fundamental nature of the problem of command in war is timeless. Noteworthy improvements in technology, organization and procedures have not eased the demands of command and control at all over time, and probably never will. While these improvements have increased the span of command and control, they have barely kept pace with the increasing dispersion and complexity of war itself. No matter what the age or technology, the key to effective command and control will come down to finding a way to deal with the fundamental problems of uncertainty and time. No matter what the age or technology, effective command and control will come down to people using information to decide and act wisely. And no matter what the age or technology, the ultimate measure of command and control effectiveness will always be the same: Can we operate faster and more effectively than the enemy?

Chapter 2

Command & Control Theory

Confronted with a task, and having less information available than is needed to perform that task, an organization may react in either of two ways. One is to increase its information-processing capacity, the other to design the organization, and indeed the task itself, in such a way as to enable it to operate on the basis of less information. These approaches are exhaustive; no others are conceivable. A failure to adopt one or the other will automatically result in a drop in the level of performance.

—Martin Van Creveld, *Command in War*

Having defined the problem—having reached a common understanding of the nature of command and control—we turn to developing a theory about the command and control process, and its constituent activities, which will in turn serve as the basis for creating an effective command and control system.

POINT OF DEPARTURE: THE OODA LOOP

Our study of command and control theory starts with a simple model of the command and control process known as the *OODA Loop*. The OODA Loop applies to any two-sided conflict, whether the antagonists are individuals in hand-to-hand combat or large military formations. OODA is an acronym for Observation-Orientation-Decision-Action,

which describes the basic sequence of the command and control process. (See Figure 2.) According to the model, finding ourselves in a conflict we first make observations about the situation—that is, we take in information about our own status, our surroundings, and our enemy. Having observed the situation, we next orient on it—we make certain estimates, assumptions, analyses and judgments about the situation in order to create a cohesive mental image. In other words, we figure out what the situation means to us. Based on our orientation, we decide what to do—we come up with a plan. Then we put the plan into action. This includes disseminating the plan, supervising to ensure proper execution, and monitoring results, the feedback from which takes us full circle to the Observation phase. Having acted, we have changed the situation, and so the cycle begins again. It is worth noting that, in any organization with multiple decision makers, there will be multiple OODA Loops spinning simultaneously, although not necessarily at the same speed, as each commander exercises command and control at his own level.

Importantly, the OODA Loop recognizes that command and control is a continuous, cyclical process. In any conflict, the antagonist who can consistently and effectively cycle through the OODA Loop faster—who can maintain a higher tempo of operations—gains an ever-increasing advantage with each cycle. The slower antagonist falls further and further behind in his reactions and becomes increasingly unable to cope with the deteriorating situation. With each cycle his actions become less relevant to the true situation and his command and control becomes increasingly ineffective.

The essential lesson of the OODA Loop is the importance of generating tempo in command and control. In other words, *speed is an essential element of effective command and control*. Speed in command and control means shortening the time needed to make decisions, plan, coordinate, and communicate—shortening the time needed to

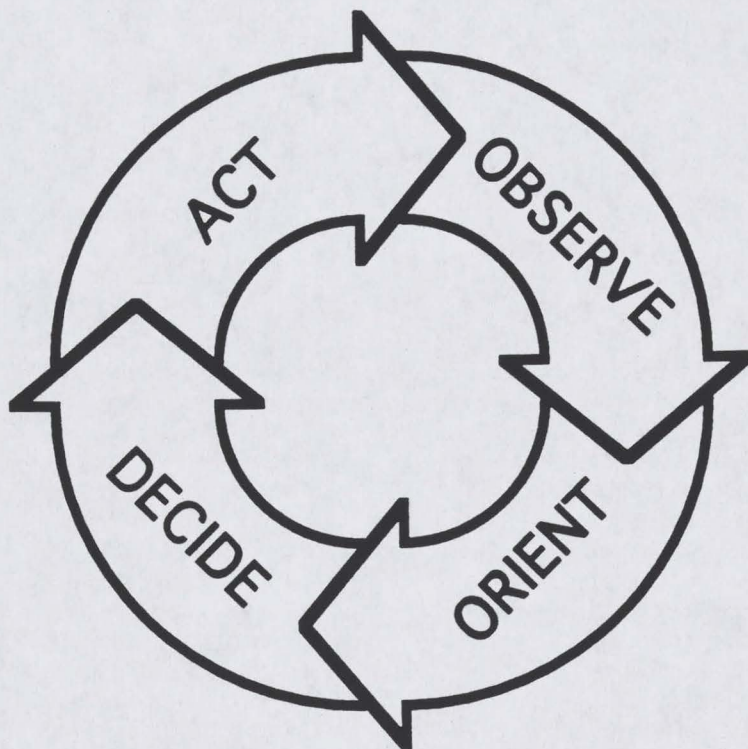


Fig. 2. The Command & Control Process.
The OODA Loop.

accomplish any of the necessary command and control activities. Since war is competitive, it is not absolute speed that matters, but speed relative to the enemy: the aim is to be faster than our enemy, which means interfering with the enemy's command and control as well as streamlining our own. The speed differential does not necessarily have to be a large one: a small advantage exploited continuously can quickly lead to decisive results. (The ability to generate a higher operational tempo does not negate the willingness to bide time when the situation calls for patience. The aim is not merely rapid action, but also meaningful action.)

THE INFORMATION HIERARCHY

We have made the point that information is essential to command and control. We use the term "information" generically, to refer to all manner of descriptions or representations, from raw signals on the one hand to knowledge and understanding on the other. We will continue to use the term generically (as when discussing information theory or information management), but it is important to recognize that there are actually four different classes of information, which occupy a hierarchy. (See Fig. 3.) It is also important to understand the differences between these four classes, because they are of different value in supporting command and control, and to understand what happens to information as it moves from one level to the next on the hierarchy.

Raw data are the lowest class of information. They constitute raw signals picked up by a sensor of any kind (a radio antenna, an eyeball, a radar, a satellite) or communicated between any kind of nodes in a system. Data are bits and bytes transferred between computers, individual transmissions sent by telephone or radio or facsimile, or a piece of unprocessed film. In other words, raw data are signals which have not been processed, organized, integrated, evaluated or interpreted

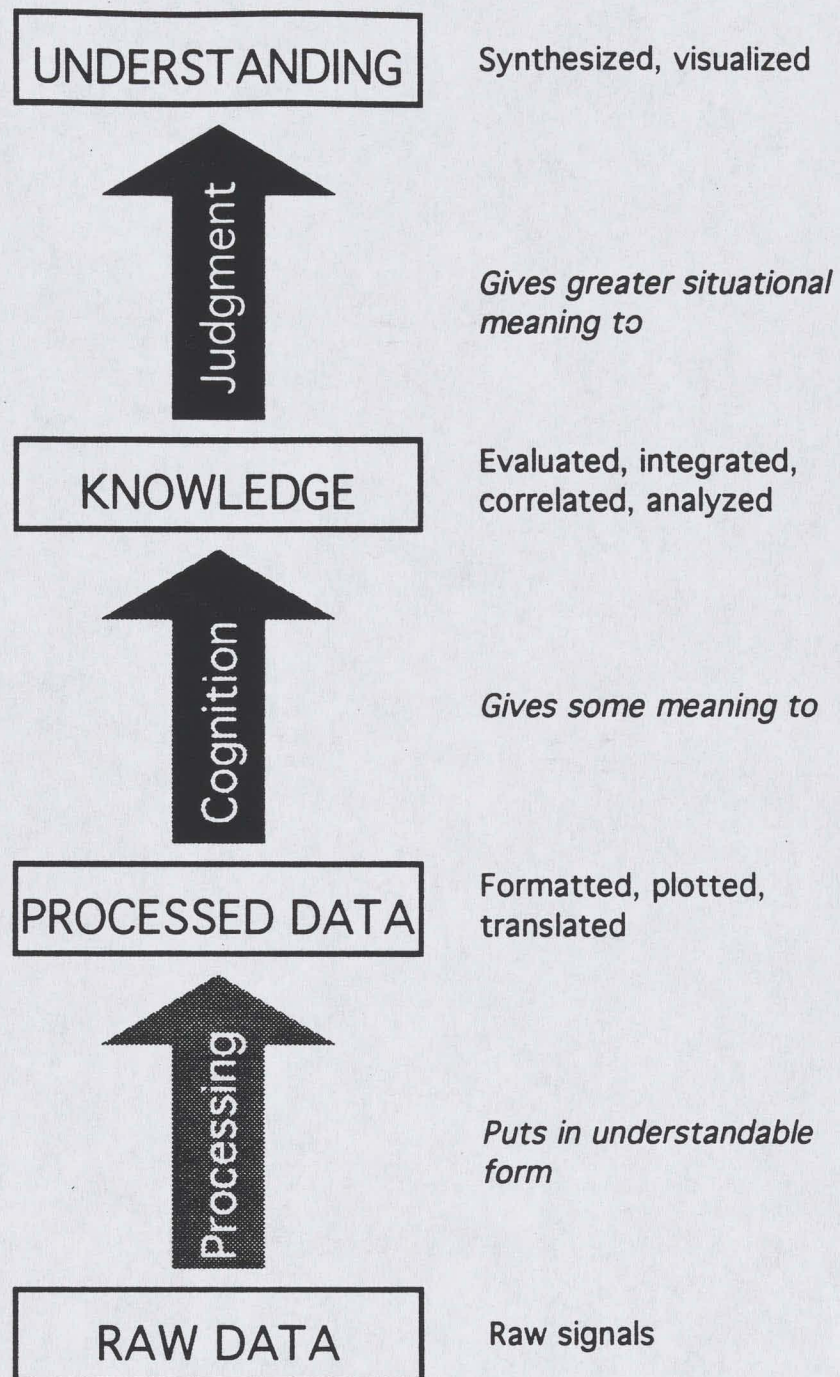


Figure 3.
The Information Hierarchy

in any way. Clearly, this class of information is of little use until it is transformed in some way to give it some sort of meaning.

The next class is data that have been processed into or displayed in a form that is understandable to the people who must use it.* Processed data refer to film that has been developed into a photograph. Radio transmissions copied into a standard report format are processed data, as are a computer file displayed as text or a graphic on a screen, grid coordinates plotted on a map, or an intercepted enemy message deciphered. Just the act of processing data gives the data a limited amount of value. Clearly, processed data are more useful to people than raw data—and may have some immediate value as is—but they still have not yet been evaluated, analyzed or given any substantive meaning.

Next higher on the information hierarchy is knowledge, which is data that have been analyzed to provide meaning and value. Knowledge is data which have been evaluated as to reliability, relevance and importance. Knowledge is various pieces of processed data which have been integrated to begin to build a picture of the whole situation. It is pieces of data which have been interpreted as to what they could possibly indicate. For example, military intelligence is a form of knowledge, as compared to combat information which has not yet undergone analysis and evaluation. Likewise, situation reports which have been pieced together to create an estimate of the situation represent knowledge. Clearly, at this level we are starting to get a product which is useful for decision making, but we are not quite there yet.

* This class is often referred to as "information," in a more specific usage of that term. To avoid confusion, we will continue to refer to this class as "processed data" and will use "information" to refer to the full range of information classes.

The highest class of information is understanding, which is knowledge that has been synthesized and applied to a specific situation to gain a deeper level of awareness of that situation. We can think of understanding as a sort of "interior" knowledge—knowledge of the inner workings of a situation. We may *know* what is going on; we *understand* why. Understanding results when we put the chunks of knowledge together properly, use judgment and intuition to fill in the gaps, and arrive at a complete mental image of the true situation. Understanding means we have achieved *coup d'oeil* or gained situational awareness. Understanding reveals the critical factors in any situation. It reveals the enemy's critical vulnerabilities. It reveals the patterns and "logic" of a situation. It is understanding which thus allows us to anticipate events—to recognize in advance the consequences of new developments or the effects of our actions on the enemy. And in doing these things it allows us to decide what action to take. We should try to make understanding the basis for our decisions—although recognizing that sometimes we will not be able gain full understanding.

The distinctions between the different classes of information are gradual and not always very clear. It is not always easy to tell exactly the difference between raw and processed data, for example. But it is important to realize that there is a difference and to realize that knowledge is more valuable than data, for instance. Moreover, it is also important to recognize that information undergoes transformations as it moves up the hierarchy and that something is happening to it to cause it to transform.

Raw data are formatted into processed data, as we might expect, through *processing*. Processing is a low-order activity which can be accomplished essentially by the rote application of procedure. It involves formatting, collating, ordering, plotting and so on. Much of processing occurs automatically (whether by humans or by machines) without our even being aware that it is taking place—our ears and

brains processing sound waves into sentences or a facsimile machine processing bits of data into understandable text or graphics. In many cases, machines can process data much more quickly and efficiently than people can. In fact, processing is an ideal use for technology and an area in which technology can improve command and control immensely.

We turn processed data into knowledge through the activity of *cognition*. Cognition is essentially the act of learning what something means, at least in general terms. To a degree, cognition may be based on rules ("If A happens, it means B"). Expert systems and artificial intelligence can assist with cognition to a certain extent—by helping to integrate pieces of processed data, for example. But cognition is primarily a human mental activity. Unlike processing, it is not primarily a procedural act, but an act of learning.

We transform knowledge into understanding through the act of *judgment* (or judging). Judgment is a purely human skill, based on experience and intuition, beyond the capability of any current artificial intelligence or expert system—it simply cannot be reduced to procedure or rules (no matter how complex).

We should note that as information moves up the hierarchy from data to understanding a sort of integration occurs. Multiple bits of raw data are pieced together to make processed data. Numerous pieces of processed data coalesce into knowledge. Various chunks of knowledge distill into understanding. This integration is essential to eventually reaching understanding, because it involves reducing the total number of "pieces" that must be considered at any one time. The vast number of bits of raw data that describe any situation would overwhelm any commander *if they had to be considered singly*. It takes a certain amount of time and effort to make these transformations as we move up

the hierarchy, but without this integration effort the commander would be overwhelmed by a staggering number of things to consider.

We should also recognize that, as we move up the hierarchy, we are dealing with increasingly intangible and qualitative products and activities. Moreover, while the differences between the classes are gradual, there seems to be a real qualitative difference between the levels of data on the one hand and knowledge and understanding on the other. Data, raw or processed, describe primarily events and things. Knowledge and understanding describe patterns, relationships and possibilities. Whereas data refer to facts and figures, knowledge and understanding have to do with meaning.

Why is this important? By nature, data are significantly easier to generate, quantify, reproduce and transmit than are knowledge and understanding, and so there is a natural temptation to focus on the former at the expense of the latter. But it should be clear that what the commander needs in order to make effective decisions is knowledge and understanding. Likewise, what subordinates need in order to execute effectively is not merely data but knowledge and understanding of the commander's concept and intent. The goal in command and control should not be to be able to collect, process and communicate vast amounts of data—and increase the danger of information overload in the process—but to achieve a level of knowledge approaching (if not actually reaching) understanding.

If we present the commander with raw data, he must process them himself. Then he must think about the processed data to turn them into knowledge. Finally, he must apply judgment to the knowledge to reach eventual understanding. All of these activities take time and energy, and this is important because timeliness in decision making is of critical importance. Now, we recognize that we cannot simply provide the commander with ready-made understanding. He will have to make

some of the final judgments himself. But, in order to make this process as quick and easy as possible, we should strive to provide him information that is as easily assimilable and as close to final form as we can.

IMAGE THEORY

And this means providing information in the form of images. Human beings do not normally think in terms of data or even knowledge. They think in terms of ideas, or images—mental “pictures” of a given situation. Not only do people generally think in images, they understand things best as images and are inspired most by images. In this respect, we can say that an image is the embodiment of our understanding of a given situation or condition. (The term *coup d'oeil*, which refers to the ability of gifted commanders to intuitively grasp what is happening on the battlefield, means literally “stroke of the eye.”) Images apply not only to the military problems we face but also to the solutions. For example, a well-conceived concept of operations and commander’s intent should provide a clearly understood mental image of the operation and the desired outcome.

Moreover, evidence suggests that people assimilate information more quickly and effectively as visual images than as textual forms. In this respect, a picture really may be worth a thousand words. The implications of this are widespread, ranging from technical matters of presentation—the use of maps, overlays, symbols, pictures and other graphics to display and convey information visually—to highly conceptual matters of sharing “vision” and intent.

Our image of a situation is based not just on the facts of the situation, but also on our interpretation of those facts. In other words, it is based not only on available information, but also on our individual

cognitive processing of that information—it is based on our intuition, appreciation, judgment and so on, which in turn are the product of our biases, preconceptions, training, and past experiences. New information which does not agree with our existing image requires us to validate the image or revise it. Needless to say, if we are going to command and control effectively, the images which we create and which we communicate to others must approximate reality. Conversely, if we want to deceive our enemy we try to implant in his mind an image of the situation which does not match reality and so trigger poor decisions.

We generate images from our own observations as well as from information we receive from others. In general, the higher the level of command, the more we must receive our information from others and the less we can rely on our own observations. Any but the smallest-unit commander receives most of his information by proxy; much of the Observation phase thus consists of receiving various types of signals, each of which requires a human, or series of humans, to send it to the appropriate commander. This causes several problems. First, as we have discussed, uncertainty is inherent in any situation. When we observe a situation firsthand we have an intuitive appreciation for the level of uncertainty—we have a sense for how reliable the image is—and we can act accordingly. But when we receive our information secondhand, we usually lose that sense. This is especially dangerous in a high-technology age, since impressively displayed information tends to take on an appearance of infallibility. Second, as human beings we can sense intuitively more about a situation from firsthand observation than we can faithfully communicate to others. Third, since each of us interprets events and information differently, that information which we do communicate is distorted to one degree or another with each node that it passes through on its way to its final destination. And fourth, this same information is likewise delayed with each node through which it must pass. Since the value of information exists in time, this can be critical.

The commander needs to be able to generate an accurate image of essentially three different "pictures." The first is a "close-up" of the situation, a "feel" for the action which he can gain best through personal observation and experience. From this picture the commander gets a sense of what his subordinates are experiencing—their physical and moral state. It is from this image that the commander gets a sense of what he can demand of his people and what he cannot. In the words of Israeli General Yashayahu Gavish about his experience in the 1967 Arab-Israeli war: "There is no alternative to looking into a subordinate's eyes, listening to his tone of voice."

The second picture is an "aerial" view of the overall situation at any given level—such as we might get from a three-dimensional situation map or an aircraft high over the battlefield. From this view the commander tries to make sense of the relative dispositions of forces and the overall patterns of the unfolding situation. From this view he also tries to gain an appreciation for the difference between the situation as it exists and the desired end state. Gaining this view provides a quality we can call "topside"—an understanding of the big picture. If "*insight*" is the illumination to be achieved by penetrating inner depths, *topside* is what comes from a far-overhead vantagepoint, from a bird's eye view that reveals *the whole*—the big picture; how the parts fit together." Much of the information which goes into creating this image comes from higher headquarters.

The third picture is the operation as seen through the eyes of the enemy commander, from which we try to uncover possible enemy intentions and anticipate possible enemy moves. Of the three pictures, the first is clearly the most detailed but may offer a very narrow field of vision. The commander who focuses only on this image risks losing sight of the big picture. The second picture provides an overall image but lacks critical detail—just as a situation map does not capture the

reality of actual events on the battlefield. The commander who focuses only on this image risks being out of touch with reality. The third picture is largely a mental exercise limited by the fact that we can never be certain of what our enemy is up to.

A squad leader or a fighter pilot, as examples, may simultaneously be able to generate all three images largely from his own observations. A higher commander, however, feels a tension between satisfying the need for both the "close-up" and "topsight" images—the former best satisfied by personal observation at the "front" and the latter probably best satisfied from a more distant vantage point, such as a command post or higher headquarters.

By nature, as we have mentioned, any system which attempts to communicate images by transmitting information will suffer from a certain degree of distortion and delay: something gets lost in the translation. There are several ways to deal with this problem. The first is for the commander to view critical events directly to the greatest extent possible (consistent with the competing need to stay abreast of the overall situation); in this way he avoids the distortions and delays which occur when information filters through successive echelons. But because as war has evolved it has become increasingly complex and dispersed, commanders have found it increasingly difficult to observe all, or even most, critical events directly. One historical solution to this problem is a technique known as the "directed telescope," which can be especially useful for gaining a "close-up" image. This technique involves the commander's use of trusted and like-minded officers to act as his "eyes and ears," to observe selected events and report directly. The commander may direct the "telescope" at the enemy, at the surroundings, or at his own forces. In theory, because these officers or units report directly, the information arrives with minimal delay, and because they are trusted and like-minded, it arrives with minimal distortion. Directed telescopes should not replace regular reporting

chains, but should augment them—to avoid burdening lower echelons with additional information gathering, to check the validity of information generated through regular channels, and to keep subordinates on their toes. Improperly used, directed telescopes can damage the important feeling of trust a commander seeks to build with his subordinates.

The second way to deal with the problems of delay and distortion of information is to rely on implicit communications to the greatest extent possible. Implicit communication minimizes the need for explicit transmission of information. Theoretically, because implicit communication requires individuals who share a common perspective, the information will suffer minimal distortion as it passes up or down the chain. We will discuss implicit communication in greater detail later.

The third way to deal with the problems of delay and distortion of information, as we will also discuss later in more detail, is to decentralize decision-making authority so that the individual on the spot, the individual who has direct and accurate observation of the situation at that spot, is the person making the decisions.

THE COMMAND & CONTROL SPECTRUM

Historically, there have been two responses to dealing with the fundamental problem of uncertainty. The first is to pursue certainty (or as close to it as possible) as the basis for effective command and control. The second is to accept uncertainty as a fact of life and to learn to function in spite of it.

The first response to the problem of uncertainty is to try to eliminate it by creating a powerful, highly efficient command and

control apparatus able to process huge amounts of information and intended to reduce nearly all unknowns. The result is *detailed* command and control. Such a system stems from the belief that if we can impose order and certainty on the disorderly and uncertain battlefield, then successful results are predictable. Such a system tends to be technology intensive in an effort to maximize efficiency as a means of eliminating uncertainty.

Detailed command and control can be described as *coercive*, a term which effectively describes the manner by which the commander achieves unity of effort. In such a system, the commander commands with a "tight" rein, using planning or personal direction as the method of command. Command and control is centralized, formal, and highly structured. Orders and plans are detailed and explicit and their successful execution requires strict obedience and minimizes subordinate decision making and initiative. Detailed command and control emphasizes vertical, linear information flow: in general, information flows up the chain of command and orders flow down. Discipline and coordination are imposed from above to ensure compliance with the plan.

In a system based on detailed command and control, the command and control process moves slowly and ponderously: information must be fed up to the top of the chain, where sole decision-making authority resides, and orders must filter to the bottom to be executed. Understandably, such a system does not react well to a rapidly changing situation. Nor does it function well when the vertical flow of information is disrupted. While distrust is not an inherent feature of detailed command and control, organizations characterized by distrust tend toward detailed command and control. Underlying detailed command and control is the desire by the commander to prevent his subordinates from making mistakes.

Since we have already concluded that war is inherently uncertain, this approach represents an attempt to overcome the fundamental nature of war. Since we have already concluded that positive direction is impossible in war, this method must necessarily fall short of its desired result. The question is whether it nears the desired result enough to achieve overall success.

By contrast, the opposite approach accepts war for what it is. The opposite response to the problem of uncertainty is to learn to cope with it by creating a system which can function effectively in that environment. In other words, rather than increasing the degree of certainty we achieve, we reduce the degree of certainty that we need. (An important first step in accomplishing this is to let go of the perceived imperative to be "in control.") The result is *mission command and control*. Mission command and control can be described as spontaneous: as with the basketball team mentioned earlier, unity of effort is not the product of conformity imposed from above but of the spontaneous cooperation of all the elements of the force. Subordinates are guided not by detailed instructions and control measures but by their knowledge of the requirements of the overall mission. In such a system, the commander commands with a "loose" rein—command by influence—allowing subordinates significant freedom of action and requiring them to act with initiative. Discipline imposed from above is thus replaced by self-discipline throughout the organization. Whereas detailed command and control stems from the desire to prevent subordinates from making mistakes, mission command and control is based on the desire to allow subordinates the opportunity to succeed—and the commander's desire not to interfere with subordinates' actions.

Mission command and control is decentralized, informal, and flexible. Orders and plans are brief and simple, relying on subordinates to effect the necessary coordination and on the human capacity for

implicit communication—the ability to communicate through mutual understanding with minimal information exchange. By decentralizing decision-making authority, mission command and control seeks to increase tempo and improve the ability to deal with fluid and disorderly situations. Moreover, with its reliance on implicit communications, mission command and control is less vulnerable to disruption of the information flow than is detailed command and control.

The two approaches to the problem mark the two theoretical extremes of a spectrum of command and control. (See Figure 4.) In practice, no commander will rely entirely on either purely detailed or purely mission methods. Exactly what type of command and control we use in a particular situation will depend on a variety of factors, such as the nature of the operation or task, the operating environment, the nature and capabilities of the enemy, and, perhaps most of all, the qualities of our own people. This is not to imply that the two types of command and control are of equal value and merely a matter of personal preference. While, as we have mentioned earlier, detailed command and control may be appropriate in the performance of specific, precise tasks of a procedural or technical nature, such as the control of air traffic and airspace, it is less than effective in the overall conduct of military operations in an environment of uncertainty, friction, disorder and fleeting opportunities, in which judgment, creativity and initiative are required. (Although historically this has hardly prevented various militaries from adopting detailed command and control.) Our understanding of the true nature of war, the relative theoretical merits of the two approaches, and the lessons of history all point toward mission command and control as the decidedly superior form, capable when done well of generating greater adaptability, tempo, focus and harmony. Conversely, because it decentralizes decision-making authority and grants subordinates greater freedom, mission command and control demands more of leaders at all levels.

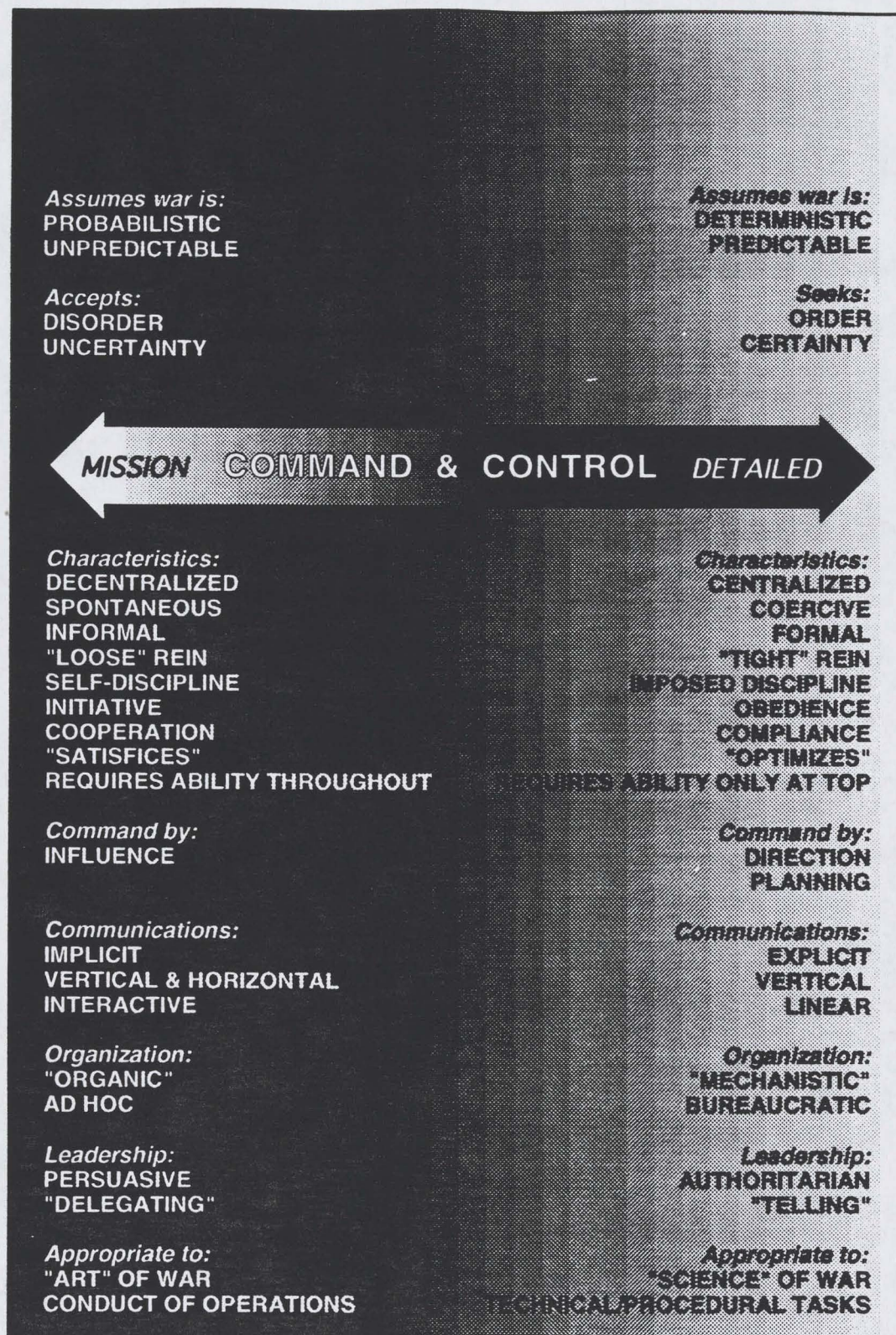


Fig. 4.
The Command and Control Spectrum

Our overall approach to command and control affects and is affected by our approach to the various activities which make up the command and control process. The remainder of this chapter will therefore discuss leadership, organization, communications, information management and decision making theories in light of the overall command and control spectrum.

LEADERSHIP THEORY

Leadership is the influencing of people to work toward the accomplishment of a common objective. Because war is fundamentally a human endeavor, leadership is essential to effective command and control. There are two prevailing theories of leadership, which generally correspond to the theories of command and control and thus occupy opposite ends of a spectrum.

The authoritarian theory of leadership is based on the assumption that people naturally dislike work and will try to avoid it where possible, and that they must therefore be coerced, directed and threatened with punishment in order to get them to make adequate effort toward the accomplishment of the common goal. This theory further argues that people actually prefer to be directed and try to avoid responsibility. The result is an autocratic, regulating, "carrot-and-stick" style of leadership which aims at achieving immediate and unquestioning obedience. The leader announces his decision and expects his subordinates to execute it. The authoritarian leader is sometimes also known as a "telling" or "directing" leader. While authoritarian leadership may result in rapid obedience, it will normally also result in subordinates who are highly dependent on the leader, require continuous supervision, and lack initiative.

The opposite theory of leadership, known as persuasive leadership, is based on the assumption that work is as natural as rest or play. People do not inherently dislike work. Work can be a source of satisfaction (in which case people will perform it willingly) or a source of punishment (in which case they will avoid it). According to this theory, external supervision and the threat of punishment are not the only means of getting people to work toward the common objective. The persuasive theory argues that people will exercise self-direction and self-control to the degree that they are committed to the organizational objective. Under proper conditions, people will learn not only to accept responsibility, but to actively seek it. According to this theory, the capacity to exercise imagination, ingenuity and creativity in the solution of unit problems is widespread throughout any unit. Leadership thus becomes a question of inspiring, guiding and supporting committed subordinates. The leader encourages subordinates to perform freely within limits he has set. The persuasive leader is often also known as a "delegating" leader. Over time, effective persuasive leadership will generally result in subordinates who exhibit a high degree of independence, self-discipline and initiative.

The leadership style we adopt in a given situation will depend on a variety of factors. Key among them is the level of maturity of the subordinate. By maturity we refer to how motivated, experienced and willing to accept responsibility the subordinate is. In this respect, maturity does not necessarily refer to age or seniority. The more mature the subordinate, the more delegating and persuasive we can be; the less mature, the more authoritarian we will be forced to be. All other things being equal, we prefer the persuasive approach because it seeks to gain the committed performance of subordinates and encourages subordinate initiative. Moreover, persuasive leadership is not based on continuous supervision, an important consideration on an "empty" battlefield on which detailed direction is problematic.

ORGANIZATION THEORY

Although we do not usually think of it as such, organization is an important tool of command and control. How we organize can complicate or simplify the problems of execution. By task organizing our force into capable subordinate elements and assigning each its own task, we in effect also organize the overall mission into manageable parts. The organization of our force, then, should reflect the conceptual organization of the plan.

There are two basic approaches to organization. The first is known as the *mechanistic* approach. This approach, the traditional approach, conceives of the organization as a machine—a clock, for example, a precisely meshed system of gears—an essentially closed system emphasizing internal efficiency. Each subordinate element is like a gear in the machine, with clearly delineated responsibilities and functions. Each component of the organization focuses on performing its own assigned task, with little concern for the overall functioning of the organization. Overall functioning is the concern of the machine operator—the senior commander. In the mechanistic organization, relationships among components are clearly defined. The organization operates, with little variance, according to clearly established rules and procedures. Individuals tend to become comfortable and efficient in their routines. Mechanistic organizations function best in stable or static environments characterized by a high level of certainty, but they tend to lack flexibility. The quintessential mechanistic organization is the bureaucracy, characterized by a well defined hierarchy, centralization and vertical, linear information flow.

The other basic approach to organization is known as the *organic* approach. This approach thinks of the organization as a single living organism—an animal surviving in the wild, for example—an

essentially open system in which the emphasis is on adapting to the environment. Task descriptions are looser, as are the relationships among different elements. Responsibilities and functions are constantly redefined based on the situation at hand. Rather than operating strictly according to clearly delineated areas of responsibility, the components of the organic organization cooperate based on the overall requirements. We can say that the organic formation is even self-organizing to a certain extent. The organic organization is thus more flexible and changeable than the mechanistic one, often characterized by temporary and continuously adjusting task groupings and nonstandard arrangements, relationships and operating procedures. This flexibility is sometimes achieved at the expense of internal efficiency since internal arrangements change frequently. Organic organizations tend more to resemble networks than hierarchies; the vertical differentiation of components is less important in the organic organization. Communication occurs laterally as well as vertically and tends to be interactive vice linear. The organic organization is best suited to unstable or turbulent conditions, when unique problems regularly arise which do not readily correspond to the rigid structure of the hierarchy.

Within these two broad approaches, specifically what should organization accomplish for us? First, organization establishes the chain of command and the command and support relationships within the force. The chain of command establishes authority and responsibility in an unbroken succession directly from one commander to another. The commander at each level responds to orders and direction received from a higher commander and, in turn, issues orders and direction to his subordinates. In this way the chain of command fixes authority and responsibility at a particular level while at the same time distributing authority broadly throughout the force; each commander has full authority and responsibility within his given sphere. Command and support relationships specify the type and degree

of authority one commander has over another and the type and degree of support that one commander provides another.

Importantly, organization should establish unity of command, which means that any given mission falls within the authority and responsibility of a single commander and that for any given mission a commander receives orders from one superior only. Similarly, organization should ensure that a commander has authority over or access to all the resources he needs to accomplish the assigned mission. Providing a commander all the resources he needs on a routine basis (based on the availability of resources) eliminates the need to continuously request and coordinate necessary support.

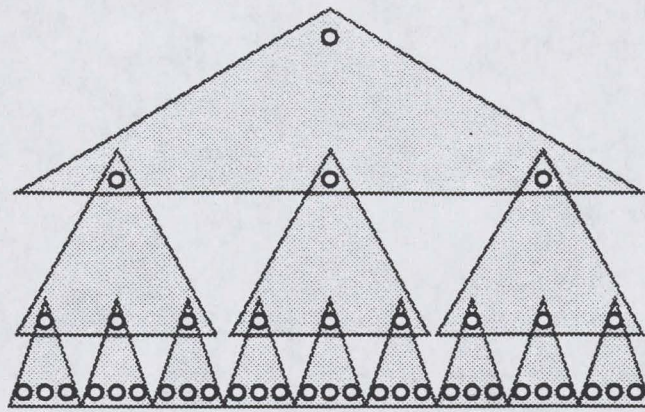
Organization divides the force into different units and establishes the overlapping structure of units within units, which is an important command and control device. These units are important not only because they facilitate the division of labor and the distribution of information within the organization, but also because they serve the important social function of providing sources of group identity for the members of the organization. For example, a Marine may think of himself first as a member of his squad, next as a member of the platoon and then as a member of a company. An organization will operate most effectively when its personnel see themselves as members of one or more groups characterized by high levels of loyalty, cooperation, morale and commitment to the group mission.

Each commander (and by extension his staff) and his immediate subordinates constitute a *mission team*—a cohesive group committed to the accomplishment of a single mission. For example, a company commander and his platoon commanders constitute a team cooperating in the accomplishment of the company mission. Each of the platoon commanders and his squad leaders also constitute a mission team cooperating in the accomplishment of the platoon mission. The size of

a mission team can vary with the situation, as we will discuss. Whereas the chain of command delineates authority and responsibility between individual commanders, the idea of a mission team is to pull individuals together into cohesive groups. (See Fig. 5.) Like the basketball team discussed earlier, each mission team functions as a single, self-contained organism—characterized by cooperation, reciprocal influence, lateral and vertical communication, and action-feedback loops operating continuously in all directions. Each member of the team may perform a different task, but always within the context of the team mission. Continuity throughout the organization is provided by the fact that each commander is a member of two mission teams, one as the senior and one as a subordinate.

Likewise, organization provides the commander with a staff appropriate to his level of command. The staff at any given level assists the commander in the execution of his duties by providing specialized expertise and allowing a division of labor and a distribution of information. The staff is not part of the chain of command and thus has no authority in its own right, although the commander may delegate authority to a staff officer if he chooses.

In order to establish the limits of authority and responsibility and to ensure effective mission teams, organization should ensure reasonable span of control. Span of control refers to the number of subordinates or activities under the command of a single commander—or within a single mission team. There is a limit to the number of subordinates that an individual can command effectively; a commander's span of control should not exceed his capability to command effectively. The optimal number of subordinates is situation dependent. For example, the more fluid and faster-changing a situation is, the fewer subordinate elements a commander can keep track of continuously. Likewise, a commander exercising command by direction, which requires him to pay close attention to the operations of



A **mission team**, a cohesive group consisting of a commander (and by association his staff) and his immediate subordinates who work together toward the accomplishment of a common goal. The size of each will depend on circumstances (shown here as four persons).

Continuity is provided by the fact that each commander is a member of two mission teams, one as the senior and one as a subordinate. Through this overlapping structure, the commander is able to extend his command over the entire force.

Figure 5.
Overlapping Units & Mission Teams

each of his subordinate elements, generally has a narrower span of control than a commander who commands by influence and lets his subordinates work out the details of execution.

Although a reasonable span of control will vary with the situation, as a rule of thumb an individual can effectively command at least three and as many as seven subordinates. Within this situation-dependent range, a greater number of "moving parts" means greater flexibility—three subordinate units vice two allows for more options and combinations, for example. But at some point we lose the ability to effectively command each unit individually and instead start to think of the units together as a single, inflexible mass. At this point, the only way to reintroduce flexibility is to group elements together into a smaller number of "moving parts," thereby creating the need for another, intermediate echelon of command. The evolution of the Marine rifle squad during the Second World War is a good example of this. Entering the war, the rifle squad consisted of nine Marines—a squad leader and eight squad members with no additional internal organization. Experience showed that this "unitary" squad lacked the flexibility needed for small-unit fire and maneuver. Moreover, the squad leader often could not effectively command eight Marines as individuals. The answer was the creation of an intermediate organizational level, the fire team—which also allowed an increase in size to thirteen Marines. The creation of the fire team decreased the number of immediate subordinates the squad leaders had to deal with, yet at the same time actually enabled the squad leader to extend his influence over a larger squad.

In general, "narrowing" span of control means "deepening" the organization by adding layers of command. But the more layers of command an organization has, the longer it takes for information to move from top to bottom and vice versa—and, consequently, the slower and less responsive the organization becomes. The "flattening" of an

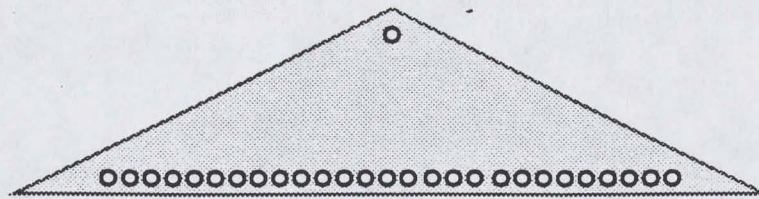
organization in an effort to increase tempo by eliminating echelons of command necessitates "widening" spans of control. A tension thus exists between organizational "width" and "depth" which the commander will have to resolve. (See Figure 6.)

Finally, organization does not apply only to people and equipment. Equally important, it applies to information. In large part, organization determines how we distribute information throughout the force and establishes the channels by which we communicate.

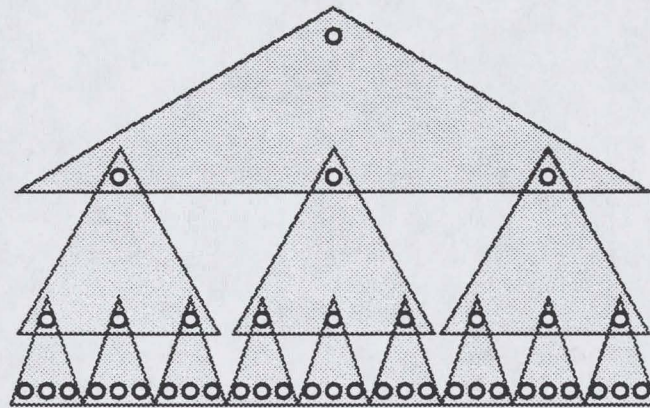
Information may flow vertically within the chain of command, but it should not be restricted by the chain of command. It also flows laterally between adjacent units, or even "diagonally"—between a platoon and an adjacent company headquarters, for example, or between a supported unit and a supporting unit outside the chain of command. Information flows informally and unofficially—that is, according to personal relationships between people—as well as according to formally established channels. These informal channels provide an important redundancy and are especially important in team building. Finally organization provides *standard* channels, which follow the lines created by established command and support relationships and by which most information will flow, and *alarm* channels, which are reserved for the transmission of urgent time-sensitive information. We will discuss standard and alarm channels in greater detail later.

COMMUNICATIONS THEORY

As we have shown, effective communications are largely a matter of effective organization. But this extremely important element of command and control exhibits nonorganizational characteristics that are worthy of discussion.



Example of an extremely "flat" organization with "wide" span of control; direct link between top and bottom.



Example of the same unit organized "deeper" with "narrower" spans of control; never more than three "wide"; two intermediate echelons between top and bottom.

Figure 6.
Organizational "width" and "depth."

We have discussed the importance of images to effective command and control, but it is not enough simply to generate accurate images. Because military operations require cooperative effort, it is equally important that we be able to communicate those images accurately to others. We want our subordinates and seniors to have the same image of the situation that we have. We want units on our flanks to share the same image, so that we can coordinate effectively with them. Additionally, we want our subordinates to have an accurate image of our plan—an accurate understanding of our concept and our intent—so they can execute it effectively. It is through communications that we share these images with others. Like organization, communication serves an essential social function.

Communications are any method or means of conveying information from one person or place to another as a means of improving understanding. In general, effective organizations are characterized by intense, unconstrained communications—that is, the free and enthusiastic sharing of information throughout the organization. Moreover, communications have an importance far beyond merely the exchange of information. Separate from the quality or meaning of the information exchanged, the act of communicating builds connections or bonds within an organization and so is an important device in building trust, cooperation, cohesion and mutual understanding.

The traditional view of communications within military organizations is that the subordinate supplies the commander with information about the situation and the commander in turn supplies the subordinate with decisions and instructions. This linear form of communication is consistent with detailed command and control, but does not work effectively in a system based on mission command and control, which instead requires interactive communications characterized by continuous feedback loops. Feedback provides the means to enhance

and confirm mutual understanding and image sharing. Linear and interactive communications apply to lateral coordination as well as to vertical communications within the chain of command.

We communicate by any variety of means: face-to-face conversation, radio, telephone, data link, written word, visual signal, picture or diagram. Human beings have the ability to communicate not only in the words they use, but also by tone of voice, inflection, facial expression, body language, and gestures. In fact, evidence suggests that in face-to-face conversation, humans actually communicate most by visual means (such as gestures, body language or facial expressions), second by vocal nonverbal means (such as tone or inflection), and least by the actual words they use.

Moreover, if they have a mutual understanding formed of familiarity, shared experiences and a common outlook, people can communicate implicitly—that is, they achieve mutual understanding and cooperation with a minimal amount of information having to be transmitted—in much the same way that the members of a seasoned and well coached basketball team can move without the ball and anticipate teammates' actions, even when improvising. A key phrase or even an understood look can sometimes communicate more than a detailed order. Implicit communication also minimizes the problems of delay and distortion typically associated with information flow. In other words implicit communication seeks to maximize understanding and image sharing while at the same time minimizing the actual flow of explicit information and thereby making the organization less vulnerable to the disruption of information flow.

INFORMATION MANAGEMENT THEORY

Since effective command and control, as we have said, is concerned with getting the right information to the right person at the right time, a word is in order about how we manage information flow.

There are two basic methods by which we initiate communications: *supply-push* and *demand-pull*. A supply-push system pushes information from the gatherer to the user, either as the information becomes available or according to a schedule. Such systems are said to be *information-driven*: the delivery of information is triggered by the availability of that information. The advantages of supply-push are that the commander does not need to request the information and that the information generally can be counted on to arrive in a timely fashion. The challenge with a supply-push system is to be able to anticipate the commander's information needs. It is primarily from supply-push that the danger of information overload arises. Although a supply-push system can be quite fast, it rarely represents the optimal allocation of collection and processing resources.

By contrast, a pure demand-pull system does not rely on the ability to anticipate information needs; it is inactive until a demand is made on it. In a pure demand-pull system, the user generates all information requirements. Such systems are said to be *demand-driven*: the flow of information is triggered by the demand for that information. If the information is readily available—already resident in some data base, for example—the demand can be filled quickly and efficiently. However, if the information is not readily available, the demand typically triggers a “demand cascade,” as the requirement filters down the chain of command until it reaches the appropriate level for gathering. This takes time and can be a burden to lower echelons—especially in a centralized command and control system in which all information must be fed to the senior echelons. The alternative to the “demand cascade” is for the commander

to keep dedicated gathering assets which answer directly to him, such as the directed telescopes already mentioned.

Demand-pull can ensure the optimal allocation of scarce resources to those tasks which the commander has identified as critical; it can deliver information specifically tailored to the commander's information needs; and it will produce only that information which the commander requests. These characteristics can be both strengths and weaknesses of a demand-pull system. They can be strengths because information flow is tailored specifically to identified requirements. However, they can also be weaknesses because there will often be information requirements that the commander has not anticipated, and in a pure demand-pull system those requirements will go unsatisfied. One definite disadvantage of demand-pull is the cost in time, since the search for information may not begin until the commander has already identified the need for that information. In the time between the demand for information and the delivery of the information, the information may have become obsolete.

As mentioned earlier, we can also manage information by the channels we use to transmit it. Most information will follow *standard* channels—that is, it will follow the routines created by normal command and support relationships. In contrast to standard channels, an *alarm* channel has no set format or schedule and does not follow established lines. Rather than operating routinely like standard channels, the alarm channel works only by exception. If developing events are consistent with the commander's image, the alarm remains inactive. The alarm triggers only when some unexpected information threatens to violate the commander's image—information about some event which would likely upset the basic scheme, for example, or emergency instructions to react to an unexpected situation. Alarm information most definitely does *not* follow standard paths, where it could get lost among more routine information. A commander may

explicitly identify certain alarm triggers—contingencies which he anticipates could disrupt his plan. Or alarm triggers may be implicit, based on mutual understanding. In any event, successful alarm information flow requires that subordinates share the commander's image and recognize events which violate the commander's estimate of the situation.

Finally, we can discuss information management according to the way information is transmitted. First, information may be broadcast, sent simultaneously to a broad audience—anyone with access to the information network—to include different echelons of command. The great advantage of broadcast is that it gets information to the widest audience in the shortest amount of time. If the information is of a generic nature, this method may be extremely efficient. However, since the information is sent to a wide audience with varying information requirements, the information cannot be tailored specifically to suit any given commander's needs. Perhaps the greatest drawback of broadcast transmission is that undisciplined use of this method can quickly lead to information overload.

The alternative to broadcast is point-to-point transmission—or “narrowcast”—in which information is sent to a specific user or users. As appropriate, information is then passed sequentially from point to point. Point-to-point transmission has two basic advantages. First, information can be tailored to meet the specific needs of the recipient. Second, point-to-point transmission has built-in control mechanisms which broadcast transmission lacks. Each node in the sequence serves as a control mechanism, filtering and integrating information as appropriate before passing it on—lessening the risk of overload and tailoring information to the needs of the next recipient. The major disadvantages of point-to-point are that information moves more slowly and that with each node that the information passes through the chances of distortion increase.

In practice, the different aspects of information management are far from incompatible; in fact, combined wisely they can effectively complement one another in the same command and control system.

DECISION-MAKING THEORY

Decision making is central to command and control. A principal aim of command and control is to enhance the commander's ability to make sound and timely decisions. Several general principles apply. First, since war is a clash between opposing wills, we must realize that we cannot make decisions in a vacuum. We must take our enemy into account, recognizing that while we are trying to impose our will on him, he is trying to do the same to us. Second, whoever can make and implement his decisions faster gains a tremendous, often decisive advantage. Decision making is thus a time-competitive activity. Third, a military decision is not merely a mathematical computation. Decision making requires the intuitive and analytical ability to recognize the essence of a given problem and the creative ability to devise a practical solution. This ability is the product of experience, education, intelligence, boldness, perception and character. Fourth, since all decisions must be made in the face of uncertainty and since every situation is unique, there is no perfect solution to any battlefield problem; we should not agonize over one. We should adopt a promising course of action with an acceptable degree of risk, and do it more quickly than our foe. As General George Patton said: "A good plan violently executed *Now* is better than a perfect plan next week." And finally, in general, the lower the echelon of command, the faster and more direct is the decision process. A small-unit leader's decisions are based on factors that he usually observes firsthand. At successively higher echelons of command, the commander is further removed from

events by time and distance. As a consequence, the lower we can push the decision-making threshold, the faster will be our decision cycle.

As we might expect, the defining features of the command and control problem, uncertainty and time, exert a significant influence on decision making. As knowledge about a situation increases, our ability to make an effective decision also increases. At some point in the process, however, when basic knowledge has been satisfied and the effort focuses on details, we reach a point of diminishing returns—when the potential effectiveness of the decision does not increase in proportion to the information gained or the time and effort needed to gain it. Meanwhile, as the amount of information increases to a point, the time needed to make an effective decision decreases. Beyond that point, however, additional information has the opposite effect; it only serves to cloud the situation, impeding understanding and causing the commander to require longer to reach the same decision that he could have reached sooner with less information. This reinforces the point made earlier that it is not so much the amount of information that matters, but the right element of information available at the right time.

There are two basic, and fundamentally different, approaches to how we make decisions. The approach we choose must be consistent with our overall philosophy of command. The traditional view is that decision making is an analytical process, based on generating several different options, identifying criteria for evaluating these options, assigning values to the evaluation criteria, rating each option according to the criteria, and tabulating the scores to find the best option. The basic idea is to compare multiple options concurrently to come up with the optimal solution. As a result, analytical decision making tends to be methodical, complex, time consuming and information intensive. Theoretically, experience is not necessary to effective analytical decision making; only reasoning power is.

The other basic approach is called intuitive decision making, which rejects the computational approach of the analytical method and instead relies on an experienced commander's (and staff's) intuitive ability to recognize the key elements of a particular problem and arrive at the proper decision. Intuitive decision making thus replaces analysis with an intuitive skill for pattern-recognition based experience and judgment. The intuitive approach focuses on situation assessment, as opposed to the analytical model which focuses on the comparison of multiple options. Intuitive decision making aims at "satisficing," finding the first solution which will satisfactorily solve the problem, rather than on "optimizing," as the analytical approach does. The intuitive approach is consistent with our view that, war being ultimately an art rather than a science, there is no absolute right answer to any problem. Intuitive decision making works on the assumption that, due to the judgment gained by experience, the commander will generate a workable first solution, and therefore it is not necessary to generate multiple options. Intuitive decision making is generally much faster than analytical decision making. If time permits, the commander may evaluate his decision; if he finds it defective, he moves on to the next reasonable solution.

Each approach has different strengths and weakness, and which model is better in a given situation depends on the nature of the situation, particularly on how much time and information is available. The analytical approach may be appropriate for mobilization, pre-hostility, or contingency planning, when time is not a factor and extensive information can be gathered. The analytical approach may be useful in situations in which it is necessary to document or justify a decision (more likely to be the case in an environment of detailed command and control), or in decisions requiring complicated computations which simply cannot be done intuitively. Moreover, an analytical approach may have some merit in situations in which

commanders are inexperienced or in which they face never-before-experienced problems. However, having said this, the intuitive approach is more appropriate for the vast majority of typical tactical or operational decisions—decisions made in the fluid, rapidly changing conditions of war, when time and uncertainty are critical factors.

While the two models represent conceptually distinct approaches to decision making, they are not necessarily mutually exclusive in practice. The commander may, for example, incorporate certain analytical methods into an essentially intuitive process when the situation warrants and time permits.

CONCLUSION

Our beliefs about the true nature of war lead us to one of two responses to dealing with the fundamental problem of command: either pursuing certainty or coping with uncertainty. No other possible responses exist. These responses lead to two distinctly different theories of command and control. Each theory in turn imposes its own requirements on the various aspects of command and control—decision making, communications, information management, planning, organization, training, education, doctrine, and so on—and so forms the basis for a distinct and comprehensive command and control system. The question is: Which approach do we adopt? The Marine Corps concept of command and control is based on accepting uncertainty as an undeniable fact and being able to operate effectively despite it. The Marine Corps command and control system is thus built around mission command and control, which allows us to create tempo, flexibility and the ability to exploit opportunities but which also requires us to decentralize and rely on low-level initiative. In the next chapter we will discuss the features of such a command and control system.

Chapter 3

Creating Effective Command & Control

The fact that, historically speaking, those armies have been most successful which did not turn their troops into automatons, did not attempt to control everything from the top, and allowed subordinate commanders considerable latitude has been abundantly illustrated.

—Martin Van Creveld, *Command in War*

Having arrived at a common understanding of the fundamental nature and having laid out the key theories of command and control, our final step is to develop the characteristics of an effective command and control system. How do we create effective command and control, both in our units and within the Marine Corps as a whole?

THE CHALLENGES TO THE SYSTEM

Before we discuss the design features of our command and control system, it might help to review the challenges that the system must face. What obstacles must our command and control system overcome and what must it accomplish? First and foremost, the system must deal effectively with the twin problems of uncertainty and time. It must function effectively across a broad spectrum of conflicts and

environments—that is, in “any clime and place.” Moreover, while designed principally to work effectively in war, it should also apply to peacetime activities, operational or administrative; we should not expect Marines to learn one system on a peacetime basis and then have to shift to another for war.

It must provide the ability to adapt to rapidly changing situations and to exploit fleeting opportunities. It should be able to generate a higher tempo of action than the enemy. It should be able to withstand disruption of all kinds, created by the enemy or self-induced, which we recognize will be a normal course of events. It should be able to gather information quickly, accurately and selectively and get the right information to the right person at the right time and in the right form—without creating information overload. It should enhance effective image building and sharing.

The command and control system should provide insight into the nature of the problem facing us and into the nature and designs of our enemy. It should help us to identify critical enemy vulnerabilities, and should provide the means for focusing our efforts against those vulnerabilities. At the same time, it should conceal our true designs from the enemy. It should establish goals which are both meaningful and practicable, and it should devise workable plans to accomplish those goals.

It should facilitate making timely and sound decisions despite incomplete and unclear information, and it should provide the means to modify those decisions quickly. It should allow us to monitor events closely enough to ensure proper execution and allow modifications, yet without interfering with subordinates' execution. It should communicate instructions quickly, clearly and concisely, and in such a way that provides subordinates the necessary guidance without inhibiting their initiative.

In short, it must enhance the commander's ability to perform his duties—to "put the pieces together"—and so serve as a force multiplier. With this in mind, what should be the features of such a command and control system?

MISSION COMMAND & CONTROL/ COMMAND BY INFLUENCE

First and foremost, our fundamental approach should be based on mission command and control. We realize that theoretically pure mission command and control as described earlier is impossible in practice and that the type of command and control we exercise in a particular situation must depend on the unique requirements of the situation. But we should employ a mission approach to the greatest possible extent that the situation allows. Why is this so? By distributing uncertainty and decision-making authority, mission command and control is the method which better deals with equal effectiveness with the problems of uncertainty and time. Since we recognize that precision and certainty are impossible in war anyway, we sacrifice them for speed and agility. Moreover, mission command and control is central to the tactics of maneuver warfare. It provides the flexibility to deal with rapidly changing situations and to exploit fleeting windows of opportunity. It provides the degree of cooperation necessary to ensure harmony of effort yet gives commanders at all levels the latitude to act with initiative and boldness.

Mission command and control relies on the use of command by influence as its overall command method. Command by influence becomes the means by which the commander extends his authority over the entire force. We reserve the use of command by direction to intervene dynamically at critical places and times. We may rely on

command by planning to a limited extent in exceptional cases—deliberate operations when the necessary coordination cannot be achieved any other way—but we generally avoid the use of planning as a regulatory mechanism.

The higher the level of command, the more general should be the supervision and the less the burden of detail. Mission command and control seeks to minimize the degree of direction exercised during execution; the senior intervenes in the subordinate's conduct of operations only in exceptional cases. Thus every commander in his own sphere is accustomed to the full exercise of authority and the free application of judgment and imagination. Mission command and control relies on the use of mission tactics, in which the senior assigns missions and explains his intent, but leaves subordinates free to choose the means and manner of accomplishment. The senior achieves unity of effort—in the form of cooperation—before the fact, through the proper preparation of his subordinates and through his use of commander's intent. While assigned tasks may be obviated by events, the commander's intent is enduring and inviolable and allows the subordinate to act with initiative yet in harmony with the senior's desires. Mission command and control thus seeks to maximize low-level initiative while achieving a high level of cooperation in order to ensure better battlefield results.

Orders should include restrictive control measures and should prescribe the manner of execution only to the minimum degree needed to provide for necessary coordination which cannot be achieved by any other means. Orders should be brief and simple, relying on subordinates to work out the details of execution (and at the same time providing them the latitude to do so) and to effect the necessary coordination. Mission command and control thus places a premium on lateral coordination between units as well as vertical communications up and down the chain.

One way to describe our philosophy is that the basic idea is not to increase our *capacity* to perform command and control (thought of as the various functions, like planning, information processing and coordination, which go into command and control). Instead, the idea is to decrease the amount of command and control that we *need* by replacing explicit command and control activities with spontaneous, self-controlled cooperation based on low-level initiative, unified vision, mutual trust, and implicit understanding and communications.

LOW-LEVEL INITIATIVE

Initiative is an essential element of mission command and control, since mission command and control depends on the willingness of subordinates to act without instructions. Our maneuver warfare doctrine places a premium on seeking and rapidly exploiting fleeting opportunities, and this is possible only through low-level initiative. Initiative amounts to distributing the authority to decide and act throughout an organization rather than localizing it in one spot. And as we have already discussed, where there is authority, there is also responsibility. In other words, not only must subordinates be free to act on their own authority, they must view it equally as their responsibility to act.

Our command and control must be characterized by a bias for decision and action at all levels. Put another way, the command and control process must be self-starting at every level of command, meaning that each commander within his own sphere acts upon the need for action rather than on orders from above directing him to act. One way senior commanders can foster low-level initiative is by making use of permissive control measures which encourage rather than restrict action, such as assigning minimum objectives rather than maximum

limits.

It is important to point out that initiative does not mean that a subordinate has the freedom to act without regard to guidance from above. Initiative is no excuse to act like a "loose cannon." In fact, if anything, initiative places an even greater burden on the subordinate. Initiative requires that the subordinate always keep the larger situation in mind and act in consonance with his senior's intent—to always act with "topside." The freedom to act with initiative thus implies a greater obligation to act in a disciplined and responsible way. Initiative places a greater burden on the senior as well. Delegating authority to his subordinates does not absolve him of ultimate responsibility. He must frame his vision and intent in such a way that they provide his subordinates sufficient guidance to act in consonance with his desires while at the same time not restricting their freedom of action. Commanders must be adept at expressing their desires clearly and forcefully. This is a skill that requires practice.

Additionally, initiative has an important psychological effect on the members of an organization. Recognizing what needs to be done and taking the action necessary to ensure success is a satisfying experience and a powerful stimulant to human endeavor. People who are not merely carrying out orders but are acting on their own initiative feel a greater responsibility for the outcome and will naturally act with greater vigor. Thus, initiative spread throughout, rather than localized with the senior commander, is a source of great strength and energy for any organization, especially in times of crisis.

If we are going to emphasize initiative, we must recognize that subordinates will take unexpected actions. This imposes on the senior commander a willingness to accept greater uncertainty with regard to our own forces.

UNIFIED VISION

Without a unified vision there simply can be no mission command and control. In a decentralized command and control system, without a common vision there can be no unity of effort. The decentralized actions become diffused and lack cohesion.

It is a unified vision which pulls the various "local" actions of the force together. Unified vision establishes purpose and focus. It energizes the organization. It provides the "logic" that allows subordinates to act semi-independently yet in harmony with one another. In effect, a unified vision provides the basis for decentralized decision making and action.

The vision should provide an understanding of the situation as it exists as well as an image of the desired end state. It should establish the underlying intent of operations. It should provide "topside."

In a system based on mission command and control, providing this unified vision is one of the primary responsibilities of the commander and one of his most important means of exerting influence over the organization. In a sense, our approach to command and control requires commanders to become visionaries—at least when it comes to the nature and direction of military action. This in turn means that one of the primary responsibilities of command is to continuously strive for situational awareness.

Because situations change continuously, the commander must continuously adapt his vision as required, and he must continuously impart this vision to the entire organization. Imparting is not merely a matter of "telling," but also a matter of "selling"—of persuading and gaining enthusiastic commitment.

MUTUAL TRUST

Mission command and control demands mutual trust among the members of the organization—trust in the abilities and judgment of subordinates, peers and seniors. Trust is the essential basis for cooperation. It is a function of familiarity and respect, which in turn are the products of shared values and outlook. A senior trusts that his subordinates will carry out the assigned missions competently with minimal supervision, will act in consonance with his desires, will inform him as necessary of any developments, and will effect the necessary local coordination. Subordinates meanwhile trust that the senior will provide the necessary guidance and will support them loyally and fully, even when they make mistakes.

Trust has a reverse side: it must be earned as well as given. We earn the trust of others by demonstrating competence, a sense of responsibility, loyalty and self-discipline. This last is essential. Discipline is of fundamental importance in any military endeavor. But since mission command and control is decentralized rather than centralized and spontaneous rather than coercive, discipline is not imposed from above; it must be generated from within. In order to earn his senior's trust, a subordinate must demonstrate the self-discipline to accomplish the mission with minimal supervision and to act always in accord with his senior's larger intent. The senior, in order to earn his subordinate's trust, must likewise demonstrate that he will provide the subordinate the framework within which to act and will support and protect the subordinate in every way when he exercises initiative.

Mutual trust also has a positive effect on morale and unity; it increases the individual's identity with the group and its goals. Mutual trust thus contributes to a supportive, cooperative environment.

IMPLICIT UNDERSTANDING & COMMUNICATION

The final essential ingredients of effective mission command and control are implicit understanding and communication. Cooperation is essential to any military operation, but since mission command and control seeks to minimize restrictive control measures, centralized coordination and detailed instructions, we must find another way to create cooperation. We do it by relying on implicit understanding and communications. These peculiar human abilities allow us to harmonize our actions intuitively with others.

Implicit understanding and communication do not occur automatically. They are abilities which we must actively foster, and are the product of a common ethos and repeated practice—as with the members of the basketball team mentioned earlier who think and move as one or the members of a jazz band who can improvise freely without losing their cohesion. This has significant implications for doctrine, education and training, as we will discuss.

INTUITIVE DECISION MAKING

Based on the firm belief that precision is less important than initiative and rapid action, our command and control system should emphasize intuitive decision making as the norm, while admitting that certain deliberate situations may benefit from a more analytical approach. We choose the intuitive model as the norm because we realize that the vast majority of situations will be fluid, changeable and uncertain and that time will be short. Emphasizing experienced judgment and intuition over deliberate analysis, the intuitive model helps to generate tempo, while also having the inherent flexibility to deal with uncertainty.

Moreover, the intuitive model is consistent both with the belief that there is no perfect solution to battlefield problems and with a system which presumes the capacity for sound judgment from decision makers at all levels of the organization. However, we should understand the factors which favor an analytical approach, and when the situation warrants—especially when time is not a critical factor—we should maintain the ability to reinforce intuitive decision making with analysis.

INFORMATION MANAGEMENT

Our management of information should facilitate the rapid, distributed and unconstrained flow of information of all kinds in all directions while at the same time providing the ability to discriminate as to importance, quality and timeliness as a means of providing focus and preventing information overload. It should support the flow of both information which contributes to situational awareness and information used in execution. In the case of the latter, it should enhance the commander's ability to communicate his vision with clarity and intensity. In any event, the ultimate aim, stated earlier but worth repeating, is to supply the right information to the right person at the right time in the right form.

We should supply information, to the greatest extent possible, in the form of meaningful images rather than in masses of raw data. This means, among other things, that our system must have the means of filtering, fusing and prioritizing information. By filtering we mean assessing the value of information and culling out that which is not pertinent or important. By fusing we mean integrating information into an easily usable form and to a level of detail appropriate to the level of command. And by prioritizing we mean expediting the flow of important information. All information management should focus on

critical information requirements, a focus which demands vision on the part of the commander and understanding on the part of subordinates in order to identify and recognize those critical needs.

We recognize that information travels by a variety of means and channels. We acknowledge the importance of implicit as well as explicit communications and informal communications as well as formal, and our system must make use of all of these channels. Our system must provide for lateral and "diagonal" as well as vertical communications and should ensure that information flow is interactive rather than linear. Our system should provide redundant channels as a safeguard against disruption; which channel information follows is less important than whether it reaches the right person.

To the greatest extent possible, since information is changed by each person who handles it, important information should pass directly between principal users, eliminating middlemen specialists, such as equipment operators or clerks. Wherever possible, person-to-person information should be communicated by word of mouth and face to face, since humans communicate not only by what they say but also by how they say it. The desire to have principals communicate directly and by voice whenever possible does not mean that we do not need to keep a record of communications; permanent records are important as a means of affirming understanding and for historical reasons.

Our information management system should be a hybrid exhibiting the judicious use of standard and alarm modes, broadcast and point-to-point transmission, and supply-push and demand-pull.

While most information will follow *standard* channels, we should maintain *alarm* channels for critical, time-sensitive information. When an alarm-triggering event occurs, the gatherer communicates the information to the appropriate commander by the most direct means

available, even if it means "jumping" intermediate echelons of command. Echelon-jumping does not mean, however, that intermediate echelons are left "out of the loop." After critical information has passed directly between the primarily concerned echelons, both those echelons should inform intermediates by standard channels.

Generic information of value to a variety of users at a variety of echelons may be broadcast, the transmission method which gets information to the broadest audience most quickly. However, we must exercise discipline with respect to broadcast transmissions to avoid the danger of information overload. In comparison, we should use point-to-point transmission—or "narrowcast"—for information which is not of generic value or which needs to be tailored to suit the needs of individual users.

Our information management system should also exhibit the best characteristics of supply-push and demand-pull. We recognize that supply-push is the most efficient way to provide much of the information needed routinely—whether broadcast or point-to-point, standard mode or alarm. Through the implicit understanding and shared images of its members, the system should attempt to anticipate the commander's needs and should attempt to "push" that information to an easily accessible, local data base. The commander then "pulls" from the base only that information which he needs. In this way we avoid the danger of information overload associated with supply-push and broadcast, and we avoid the delay associated with demand-pull.

We also recognize that the commander will likely be unaware of the need for certain information, so we must ensure that truly critical, time-sensitive "alarm" information is "pushed" directly to the commander without delay. Additionally, since no system can effectively anticipate all the commander's information needs, we must have a means of gathering and supplying specific elements of

information on demand. This means should provide the required information quickly and directly, and without creating a "demand cascade" which burdens lower echelons. In other words, our system should provide the commander with directed telescopes, be they people or equipment, by which he can satisfy his own specific information needs quickly. It is important, however, that the directed telescope not interfere (or be perceived to interfere) with the normal functioning of the chain of command: the perception of spying or intruding on the province of subordinate commanders can lead to distrust within the organization.

LEADERSHIP

Because people are the first and most important element of our command and control system, strong and effective leadership is of essential importance to our command and control. Mission command and control, which places a premium on decentralization and subordinate initiative, requires predominantly a persuasive, or "delegating," approach to leadership. We believe that under the proper conditions Marines will be motivated to perform to the highest standards, and so it becomes the role of leadership to unleash this potential. Leadership is thus a matter of enlisting the committed, enthusiastic and loyal performance of subordinates, both as a general quality in the unit and in support of each specific mission. Since commanders commanding by influence are not overly involved in the details of execution, one of the primary roles of leadership will thus be to provide the continuously adapting vision which holds the decentralized actions of subordinates together.

Another important role of leadership will be to create a close-knit sense of "team," which is essential to developing trust and understanding within the organization. Leadership should reinforce the

common core values which are the basis for implicit understanding and trust. Leaders should strive to create an atmosphere of mutual support in which subordinates are encouraged to demonstrate initiative and to effect the necessary coordination "locally." Importantly, this means preventing a "zero-defects" mentality, which tends to squelch initiative, from arising in the unit.

Leadership also becomes a matter of developing subordinate maturity—which means engendering in subordinates a willingness to exercise initiative, the judgment to act wisely, and an eagerness to accept responsibility. Leader-as-teacher is an essential component of our approach to leadership.

PLANNING

Planning is the act of preparing for future decisions—whether to help generate situational awareness in support of a decision or to develop plans which serve as the common point of departure for subsequent decisions. In that respect, we can think of a plan as a practical scheme for solving a problem—but not as the solution itself. Planning is meant to facilitate decisions—not to replace the need for making decisions at the necessary time and place. In particular, because an act was not properly planned for is no excuse for inaction or delay. The time for planning is not when the moment of decision has arrived, but before.

Planning facilitates future decisions by helping commanders to make provision for those things which are not likely to change or which are fairly predictable (such as geography and certain aspects of supply or transport), to examine their assumptions, to come to a common understanding about the situation and the direction of future operations, and to anticipate possible enemy actions and thus consider

possible counteractions.

Depending on the situation and the nature of the preparations, planning may be done hastily and informally or deliberately and formally. However, we should keep in mind that all planning takes time and thus often occurs at the expense of tempo. Moreover, just because time may be available does not mean that we should use it to develop lengthy, detailed plans. Even when preparation time is available, we can often put it to better use than in detailed planning. Elaborateness and detail are not generally measures of effective planning. Instead, plans should convey the *minimum* amount of instruction necessary for effective execution. *Plans should be as clear, simple and concise as the situation permits.*

We should not view any plan as a script which regulates our conduct; rather we should view any plan as merely a common starting point from which to depart as the situation requires. Since plans represent preparations for possible future action, and since the future will always be uncertain, plans must be flexible and adaptable. In other words, they should allow us the opportunity to pursue a variety of options, which is not the same as prescribing detailed contingencies for a variety of eventualities.

Planning is clearly an important aspect of command and control, but it has an inherent danger. Overplanning leads to overcontrol, which inhibits tempo and stifles initiative and flexibility. Plans which constrain the actions of subordinates unnecessarily are one of the primary methods of imposing detailed command and control, whether intentionally or not. We must consciously guard against using planning in this way. It is important to keep in mind that the primary object of planning is not so that we can feel we are "in control"—that is, it is not so that we can try to direct events with certainty and precision—although planning has frequently been misused for this

purpose.

We recognize that certain types of planning have to do primarily with quantitative, scheduling or technical matters—such as in calculating the amount of supplies or transport needed for a given operation. These are plans which deal with the “science” of war, and we recognize that these will necessarily involve a certain amount of detailed and deliberate analysis and calculation. Mobilization, deployment, embarkation, logistical and flight operations planning are all examples of types of planning which involve such “number crunching.” While these types of planning should occur in advance of operations so as not to hinder operating tempos, they should not occur inflexibly so far in advance that they are unresponsive to changing conditions.

We must be careful to distinguish such technical planning from planning which deals with the overall conduct of operations—planning which deals with the “art” of war. The staff procedures and analysis which may be necessary when it comes to quantitative matters are not appropriate for broader conceptual planning. Rather, such planning should attempt to broadly influence rather than precisely direct future actions. It should impart vision—communicate the mission and the underlying intent in order to provide subordinates with the necessary topsight, should provide for adequate support, and should otherwise leave the subordinate broad latitude in the manner of execution. As with decision making, we should try to decentralize execution planning to the lowest possible levels, so that those who must execute have the freedom to develop their own plans. A plan should dictate a subordinate’s actions only to the minimum degree essential to provide necessary coordination which could not be accomplished any other way. In fact, rather than dictate a subordinate’s actions, a good plan should actually create opportunities for the subordinate to act with initiative.

FOCUSING COMMAND & CONTROL

Focus of efforts is a central concept of maneuver warfare, and it applies to command and control as to any resource. The focus of the command and control effort should reflect the overall focus of efforts. We should focus the command and control effort on critical tasks and at critical times and places, which we can do by a variety of means. We concentrate information-gathering assets and other command and control resources where they are needed most. We concentrate planning, coordination, analysis and other command and control activities on the most important tasks and we exercise economy elsewhere. We prioritize information requirements and concentrate gathering, processing and communications on the critical elements. We filter and fuse information and we manage information flow to ensure that critical, time-sensitive information moves quickly and effectively and less important information does not clutter communications channels. We manage that most precious of all commodities, time, to ensure that the most important tasks receive our earliest and utmost attention. We especially ensure that the commander devotes his time and energies only to critical tasks and that he is protected against mundane distractions. The commander should only do those things which only the commander can do, or which nobody else can do adequately. Routine tasks must be delegated to others. Clearly, in order to focus command and control, we must have adequate guidance, and therefore one of the essential functions of command is to focus the command and control effort.

The key way a commander can provide focus is by his personal attention and presence. In the words of Field Marshal Sir William Slim: "One of the most valuable qualities of a commander is the flair for putting himself in the right place at the vital time." As we have mentioned, by positioning himself at the critical spot the commander can observe events more directly and avoid the delays and distortions that occur as information filters up the chain of command. In so doing,

the commander can gain firsthand the essential "feel" for the situation which cannot be gained any other way. Equally important, he can *influence* events more directly and avoid the delays and distortions that occur as information filters *down* the chain of command. By his personal presence the commander can provide the leadership that is so essential to success in war. And simply by the moral authority that his personal presence commands, the commander directs emphasis to the critical spot and focuses effort on the critical task. The commander thus becomes the focal point of the command and control effort, and the whole system supports and reinforces him.

We have already discussed the need to gain accurate images of several different "pictures." The commander goes wherever he must to get the most important picture. For the "close-up" picture, this often means at the "front"—which does not necessarily mean at the forwardmost point of contact on the ground, but wherever the critical action is taking place or the critical situation is developing. For ground commanders, even senior ones, this may in fact mean at or near the point of contact. But for others, and even for ground commanders, this may mean with a subordinate commander in the critical sector, in a ready room listening to flight debriefs during an important phase of an air campaign, at a critical point along a route of march, or in an aircraft flying over the battlefield. If the critical view at a particular moment is the "overall" picture, the commander may want to be in the operations center of his command post piecing together various reports from far-flung sources, or even at a higher headquarters learning about the larger situation (although in general it is better for senior commanders to come forward than for subordinate commanders to go rearward to exchange information). And for that matter, if he is trying to get inside the mind of an adversary who has made a bold and unexpected move that has shattered his image of the situation, the best place may be sitting against a tree by himself, sequestered from distractions, alone with a map and his thoughts.

Clearly, our philosophy of command calls for energetic and active commanders with a flair, as Slim says, for being in the critical place, lending leadership, judgment and authority wherever it is needed most. The commander might start at his command post, where he can piece together an overall image and supervise the development of the plan, but should then usually move "forward" to supervise execution at the decisive spot, returning to the command post only long enough to adjust his overall image of the developing situation before moving out again to the next critical spot. The important point is that the commander must not feel tied to his command post, unable to leave it for fear of missing a valuable report. When the commander leaves the command post, it is imperative that he empower the staff to act on his behalf. The staff must be able to act with initiative when the commander is away, and therefore must share the commander's image of the situation and understand his designs. Mutual trust and implicit understanding apply to the staff as much as to subordinate commanders. If he does not empower the staff to act on his behalf, the commander will become a prisoner in his own headquarters, out of touch with reality and limited in his ability to influence events.

THE COMMAND & CONTROL SUPPORT STRUCTURE

It is important to keep in mind that the command and control support structure merely provides the supporting framework for our command and control system; it does not constitute the system itself. The sole purpose of the support structure is to assist people in making effective use of information—which means helping to accelerate understanding and facilitate cooperation. In addition to supporting our approach to command and control, the components of our command and control support structure must be compatible with one another. And since people are the driving element behind command and control, the

components of the structure, together and alone, must be "user friendly"—that is, they should be designed first and always with people in mind.

TRAINING, EDUCATION & DOCTRINE

Collectively, training, education and doctrine prepare people for the role they play in command and control. First, since mission control demands initiative and sound decision making at all levels, training, education and doctrine must aim at fostering initiative and improving decision-making ability among all Marines. It is not enough to allow initiative; we must develop an eagerness to accept responsibility. Moreover, we should develop an institutional prejudice for tolerating mistakes of action, but not inaction. Training and education, especially, should seek to develop in leaders the pattern-recognition skills that are essential to intuitive decision making.

Second, training, education and doctrine must prepare Marines to function effectively in an environment of uncertainty, disorder and limited time. Exercise scenarios should purposely include elements of disorder and uncertainty—an unexpected development, an unexpected unit introduced into the scenario, or a "short-fuze" mission change, as examples. Field exercises and command post exercises should purposely include disruption of the command and control system—for example, "destruction" of a main command post or loss of communications during a critical phase of an operation. Planning exercises should incorporate severe time limits, for example, to simulate stress and tempo. As Field Marshal Erwin Rommel said: "A commander must accustom his staff to a high tempo from the outset, and continuously keep them up to it."

Third, doctrine and training should teach techniques and procedures

which place a premium on flexibility, speed and adaptability—fast and simple staff planning models, for example. Doctrine and training should provide an understanding of when to apply different techniques and procedures—when to use intuitive or analytical decision-making techniques, for example.

Last and perhaps most important, training, education and doctrine should provide a shared ethos, common experiences and a shared way of thinking as the basis for the trust, cohesion and implicit communication that are essential to mission command and control. Doctrine especially should establish a common perspective on how Marines approach the problems of command and control.

PROCEDURES

Command and control procedures, the techniques by which we perform various command and control functions, must be consistent with our view of an uncertain environment and with our overall style of command and control. First of all, we must recognize that procedures *per se* apply only to rote or mechanical tasks. They are not acts of judgment, nor meant to replace the need for judgment. Procedures may help with the decision process, for example, but the decision itself is a product of judgment. In that respect, the purpose of procedures “is not to restrict human judgment, but to free it for the tasks only it can perform.” We must keep in mind that procedures are merely tools, to be used, modified or discarded as the situation requires. They are not rules which we must follow slavishly.

Our command and control procedures should be designed for speed and simplicity. They should be designed for simplicity so that we can master them easily and perform them quickly and smoothly—“instinctively”—under conditions of stress. They should be designed

for speed so that we can generate tempo, which we recognize to be a fundamental characteristic of effective command and control. Streamlined staff planning sequences, for example, are preferable to deliberate, elaborate ones. The standard should be simple models which we can expand if time and circumstances permit, rather than inherently complex models which we try to "crunch" when time is short—which is likely to be most of the time. As Second World War German General Hermann Balck said to his staff: "Don't work hard, work fast."

MANPOWER

Since people are the first and driving element of our command and control system, effective manpower management is essential to command and control. And since our command and control is based on decentralized authority we can argue that command and control is not just the province of senior commanders and their staffs: all Marines are involved in command and control in one way or another. Any Marine who contributes to effective operations by practicing mission tactics and using initiative to further his commander's intent and exploit opportunities is likewise contributing to effective command and control. It is important, then, that all Marines, regardless of grade, be well versed in the principles and methods of mission command and control.

More specifically, since mission command and control relies heavily on individual skills and judgment, our manpower management system should recognize that all Marines of a given grade are not interchangeable, and should seek to put the right person in the right billet based on specific ability and temperament. Additionally, the manpower management system should seek to achieve personnel stability within units and staffs as a means of fostering the cohesion, teamwork and implicit understanding that are vital to mission command

and control. We recognize that casualties in war will take a toll on personnel stability, but the greater stability a unit has initially, the better it will absorb those casualties and incorporate replacements.

ORGANIZATION

The general aims of organization with regard to command and control should be to create unity of effort, reasonable spans of control, cohesive mission teams, and effective information distribution. Organization should not inhibit communications in any way, but instead should facilitate the rapid distribution of information in all directions and should provide feedback channels.

In general, we should take an organic approach to organization, maintaining the capability to task organize our forces to suit the situation, to include the creation of nonstandard and temporary task groupings. However, the commander must reconcile this desire for flexibility with the need to create implicit understanding and mutual trust, which are the product of familiarity and stable working relationships.

Mission command and control requires the creation of self-contained task groups capable of acting semi-autonomously. By task organizing into self-contained, self-reliant task groups, we increase each commander's freedom of action while at the same time decreasing the need for centralized coordination of support.

We should seek to strike a balance between organizational "width" and "depth" that is suited to the particular situation. The aim is to "flatten" the organization to the greatest extent compatible with reasonable spans of control; we should have the organizational flexibility to eliminate or bypass selected echelons of command or staff

as appropriate in order to improve operational tempo and the speed and accuracy of information flow. Additionally, it is not necessary that all echelons of command exercise all functions of command. Just as we task organize our force, so should we task organize our command and control structure.

A word is in order about the size of staffs. The historical trend toward complexity has led over time to larger and more complex headquarters units—especially in organizations which rely on detailed command and control. Likewise, the larger and more complex the headquarters, the more information it requires to function. This increase in information in turn requires an even larger headquarters, and the result is a spiraling increase in the size of headquarters units. However, the larger a command and control organization, the longer it generally takes that organization to perform its functions. In the words of General William T. Sherman: "A bulky staff implies a division of responsibility, slowness of action and indecision, whereas a small staff implies activity and concentration of purpose." Additionally, a large staff takes up more space, emits a larger electromagnetic signature and is less mobile than a small one, and consequently is more vulnerable to detection and attack. A large staff, with numerous specialists, may be more capable of detailed analysis and planning than a small one, but we have already established that we generally value speed and agility over precision and certainty. We should therefore seek to keep the size of staffs to a minimum in order to facilitate a high operating tempo and to minimize the space and facilities that the headquarters requires. The ideal staff would be so austere it could not exercise fully detailed command and control.

EQUIPMENT & TECHNOLOGY

Equipment, to include facilities, is an integral part of any command and

control support structure, but we must remember that it is only one component. As we have mentioned, there are two dangers in regard to command and control equipment, the first being an overreliance on technology—the belief that all the answers to the problems of command and control rest in technology—and the second being a failure to make use of technological capabilities. The aim is to strike a balance which gets the most out of our equipment and at the same time integrates technology with the other components of the system.

We believe very strongly that the object of technology is not to eliminate people from the command and control process, or to reduce their role, but rather to enhance their performance. As a first priority, therefore, equipment and facilities should be user friendly. Technology should seek to automate routine functions which machines can accomplish more efficiently than people, freeing people to focus on the aspects of command and control requiring judgment and intuition. We may even use technology to assist us in those activities so long as we do not make the mistake of trying to replace the person who can think with the machine that cannot.

Command and control equipment should improve the flow and value of information within the system. But as we have said repeatedly, improving information is not simply a matter of increasing volume; it is also a matter of quality, timing, location, and form. To the greatest extent possible, therefore, communications equipment should connect principals directly, minimizing the need for specialized operators. Additionally, equipment should minimize the input burden placed on subordinates; ideally, the input of information into the system should be automatic. Last, but hardly least, technological developments should focus on presenting information in a way that is most useful to humans—that is, in the form of meaningful visual images rather than lists of data.

As with all the components of our command and control support structure, our command and control equipment should be consistent with our overall approach to command and control. For example, equipment which facilitates the accurate, real-time monitoring of the activities of subordinate units (without becoming meddlesome in the operations of those units) is not inconsistent with our approach to command and control. However, equipment which facilitates and encourages the micromanagement of subordinate units is inconsistent with our approach to command and control. Moreover, such technological capability tends to fix the senior's attention at too low a level of detail. A regimental commander, for example, does not as a rule need to be able to keep track of the movements of every squad (although with position-locating technology it is a temptation); a regimental commander needs a more general appreciation for the flow of action. A commander who focuses at too low a level of detail (whether because the technology tempts him to or not) risks losing sight of the larger picture.

The reality of technological development is that equipment which improves the ability to monitor what is happening usually also increases the temptation and the means to try to direct what is happening. Consequently, increased capability on the part of equipment brings with it the need for increased understanding and discipline on the part of users. Just because we have the technological ability to micromanage does not mean that we should.

CONCLUSION

Our approach to command and control recognizes and accepts war as an uncertain, disorderly and time-competitive clash of wills and seeks to provide the commander the best means to win in that environment. We

seek to exploit trust, cooperation, judgment, focus, and implicit understanding to lessen the effects of the uncertainty and friction that are consequences of war's nature. We rely on mission command and control to provide the flexibility and responsiveness to deal with uncertainty and to generate the tempo which we recognize is a key element of success in war. We focus on the value and timeliness of information, rather than on the amount, and on getting that information to the right people in the right form. We seek to strike a workable balance among people, procedures and technology but we recognize that our greatest command and control resource is the common ethos and intellectual framework, and the resulting bond, shared by all Marines.

End Notes

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