Program on Information Resources Policy

△ *Center for Information Policy Research*

🛡 *Harvard University*

WORLDWIDE C³I AND TELECOMMUNICATIONS

Raymond Tate

**Raymond Tate Associates; formerly Deputy Assistant
Secretary of the Navy and Deputy Director of the
National Security Agency**

**Ray Tate has a unique background that bridges from
the environment of the White House basement to the
outside world — with vertical integration from the
national leadership to the "grunt" in the field. He has
weathered a number of national crises, has had experi-
ence in both command situations and intelligence, and
thus offers a valuable personal context on national
affairs.**

I would like to put the top-down, White House-oriented view Bill Odom has given
you into a strategic and even, to some degree, a worldwide tactical context, commenting
on the inputs, particularly intelligence from the different areas — where it goes in, its
uniqueness and timeliness, and how the control structure relies on this information base,
a large part of which is intelligence data.

Since I am no longer a member of the government, I am talking from my perspective of
a little more than 25 years since the last days of Harry Truman. And I can assure you that
all the presidents differed, and therefore so has the White House, being an organization
of the man who's the boss. All the White Houses I have known, meaning the plural
method of operation of the government, have varied over time. That is a point you might
keep in mind as you talk about command and control. How do national decisions get
transformed from the people who make them to the many thousands who have to carry
them out?

I believe the era that began when John Kennedy was President during the Cuban missile crisis has led to many of the activities we will discuss today. Kennedy's ability to negotiate and carry out a big portion of the President's responsibilities failed during the Cuban missile crisis because of communications. He was, for example, totally unable, in the time period available at that time, to advise every South American ambassador through the Department of State that he was going to invoke the Monroe Doctrine — that he was going to take positive action against Khrushchev's introduction of missiles that he thought were offensive into the island of Cuba. That system literally fell on its face, not only to his chagrin, but to his outright rage, I have been told.

I was then a junior in the National Security Agency dealing with the cryptography involved in those operations, and knew the principals very well. I knew some of the problems. The potential for many of them had been predicted for eight or nine years. But nothing was done about it, because each major element of the government had absolute control over its own communications — how they were done and to some degree, in the case of the State Department, even what crypto was used. That was one of the principal causes of the President's inability to respond in the time frame he thought necessary during that period. As a matter of fact, subsequent to the crisis the President appointed two commissions that had some responsibility for the entire field of communications, to suggest improvements. They recommended that the State Department communications system be completely revamped and that, until that was done, the CIA actually take over, use its circuits, do whatever was necessary to run the President's communications until it was decided to give it back to State. That turned out to be some years later. I may want to use that as a backdrop for where we were in 1963, a perspective for where we are now, and to reflect many things that will contribute to where we are going, at least in the near term and maybe as far in the future as five to ten years.

I think before we start talking about the projections of things that we are going to see in the 1980s, we should set the stage by asking where we think the environment of the government of this country will be in the 1980s, because we need to judge whether the projections we are making are in synch with what we think the country needs, or whether they are at cross-purposes. We can say that the 1980s will breed crises, the United States will be involved globally, and our involvement may change in character to include aid without overt intervention, acting in concert with allies, and taking diplomatic-political-economic measures. Last spring, before the Middle Eastern problems we are having now, in the budget battles and the weapon system tradeoffs if you weren't doing something that applied to a war in central Europe you were in big trouble to start with. In the very short period since, six or nine months, I have seen drastic changes, and I am beginning to see those changes permeate the judgments of the E-ring of the Pentagon. Because, in fact, we remain a world power and we will be a world power for a long time, and these elements will be present in our decision making process and our responsibilities to the world.

I would also like to submit to you that we have literally had a 20- to 25-year explosion in the general use of communications, predominately by the government, up through 1976 into the 1976-77 time frame — virtually exponential. In the 1950s we were at a very small level of government and military communications, including the State Department. Then we went into the overseas trunk business pretty heavily. We started developing military tropo and microwave. We had previously predominantly used HF for long-haul. We went up to 10,000 circuits on the AUTOVON, the military telephone system. Starting in

26

the mid-1960s we began the federal telephone system, which is the civilian element of the government's communications. It is still expanding today, and is larger than AUTOVON. Then AT&T, ITT and others started building additional overseas cable capacities, and we have had a significant increase in those as well. We started utilizing the international satellite network, which has grown exponentially for worldwide communications. In the mid-1970s we began to get into the domestic satellite business. In the last several years we have had virtually a one-third increase in total communications being handled on government and commercial systems of the United States. The domestic communications satellite has added a great deal of capacity. I can't think of any better words to describe what has happened over this period than, in fact, a communications explosion.

That being the case, more and more of the decision making process — the coordination of the process and the business of decisions themselves — depends largely, and in some cases even totally, on communications. For example, the law now says that *before* the President can actually use troops, even though he has the authority in some cases, he must consult with key members of Congress. Since the Watergate crisis Congress has injected words concerning advice and notification of the leadership of the House and the Senate. I know of examples under President Ford (the Mayaguez incident was one) in which hours were spent trying to find a key senator on a Sunday so that the President of the United States could comply with the current law and notify him that he was going to take action. I think things like that need to be understood in context. So we have recognized in many forms the utter essentiality of these communications, even in the decision making process of this country. Their availability, timeliness, security and effectiveness are critical.

Now I would also submit, having been at one time in my life an engineer, that the proof of any program is its testing. Let's look at some crisis periods that have occurred since Cuba. The Navy was a participant in three of the largest crises we had during the 1960s, because they were owners of the Liberty, Pueblo and EC-121 intelligence platforms.

The Liberty, to refresh your memory, was one of the seven World War II Liberty Ships that had been reconfigured as intelligence collectors, much like the Soviet trawlers which you have been aware of for quite a long time. The USS Liberty was monitoring the Egyptian-Israeli war of 1967 when the Israelis dispatched a flight of tactical aircraft and came very close to sinking the ship. Some of our people suffered casualties, both military and civilian. The Israeli Intelligence Service knew that the ship was there, and knew what was being done with it, a fact which has made this event extremely controversial for a long time. The context in our terms here is that the commander of the Sixth Fleet was informed by the Washington intelligence apparatus that it had evidence that the Liberty was going to be attacked and to provide protection for it. That message was never really acted upon, and the ship was dead in the water when it was hit. So the end result was no accident.

You are probably more familiar with the Pueblo case. There has been a Congressional investigation, the results of which are in the public domain. I was a first-hand participant in one small phase of the Pueblo operation; the National Security Agency notified the National Reconnaissance Center in the Pentagon of the danger of an attack more than two days in advance. The Center notified the Naval Command in Japan of the likelihood that the North Koreans would take offensive action against the Pueblo, and that they should take that into consideration. The Pueblo's deployment schedule itself was a function of the local fleet command, not the National command. This turned out, as the

investigation indicated, to have been a snafu through the command and control system. Several different commands were blamed, but the bottom line is that it did not work. The ship was not notified, and we had not only a physical disaster to a United States Navy ship — the first one ever hijacked on the high seas — but personal embarrassment to the government of the United States.

In 1969 something very similar happened to the EC-121 aircraft, a converted propeller-driven Constellation on an intelligence mission in South Korea. It's almost a carbon copy of the other incidents. The North Koreans' intentions were known to the military system; yet the EC-121 was not notified, and was shot down with total loss of life.

Another case: the Saigon evacuation in 1973. We had very good clear-language communication to the end of the evacuation, but there were a lot of problems because it was unsecured, and in fact the North Vietnamese had total monitoring going on and knew exactly what was occurring during the entire period. Another example is the communication during the Mayaguez incident. From a command and control standpoint they were significantly better than in any of the other crisis periods I have mentioned. Yet from my point of view (at that time I was the senior cryptographer for the United States) it was a disaster, and needlessly cost the lives of a number of Marines. I will show you exactly how that occurred and why in a moment. Now in the Lebanon crisis the Sixth Fleet actually landed Marines, and the command and control of that operation was much better. We still had crypto problems, but the President had virtually constant touch with the military force involved.

So we have gone through six major international crises, plus of course the present hostage problem which is really of a different nature. But the Presidents even by 1976 have had improvements in their ability to act as Commander-in-Chief and direct command operations through the system — a great deal better than they had in previous years, although there still are some problems, as in the Mayaguez case, that while the President had command and control, the enemy knew everything he was going to do at about the same time as the commanders on the site, and took some direct actions against them. The White House issued orders in the Mayaguez incident (Fig. 1) down the National Military Command System, which went through a borrowed satellite, the NATO IIB. (The point where the security broke down was the Naval Command at Clark Air Force Base, under the Commander of the United States Seventh Air Force coordinating to the Seventh Fleet, which was in Japan but deployed units all over this area.)

The forces that transmitted the orders were using HF voice, all in the clear. Orders to the helicopters to take the islands were passed from the Air Force to the Navy. Over the circuit the two commanders revealed how many helicopters and how many men were involved, where they were going, at what time, and the replenishment rate. I don't know anything more an enemy commander needs to know in order to defend himself against an operation. Even if uneducated, he had the information to take action against our force, and he did. A number of the helicopters were shot down — the most dangerous part was the retrieval. We did not have the helicopter force to retrieve the Marines as close to simultaneously as possible, so there was a delay of several hours between one wave of retrieval and another. There was quite a battle going on there and both sides were fighting hard. Once the first wave of Marines was evacuated, that left the remaining ones very vulnerable. The forces were very greatly diminished, and that was when the Marines took the heaviest casualties and actually lost a full helicopter load of Marines. All the informa-

14-15 MAY 1975

HF & UHF
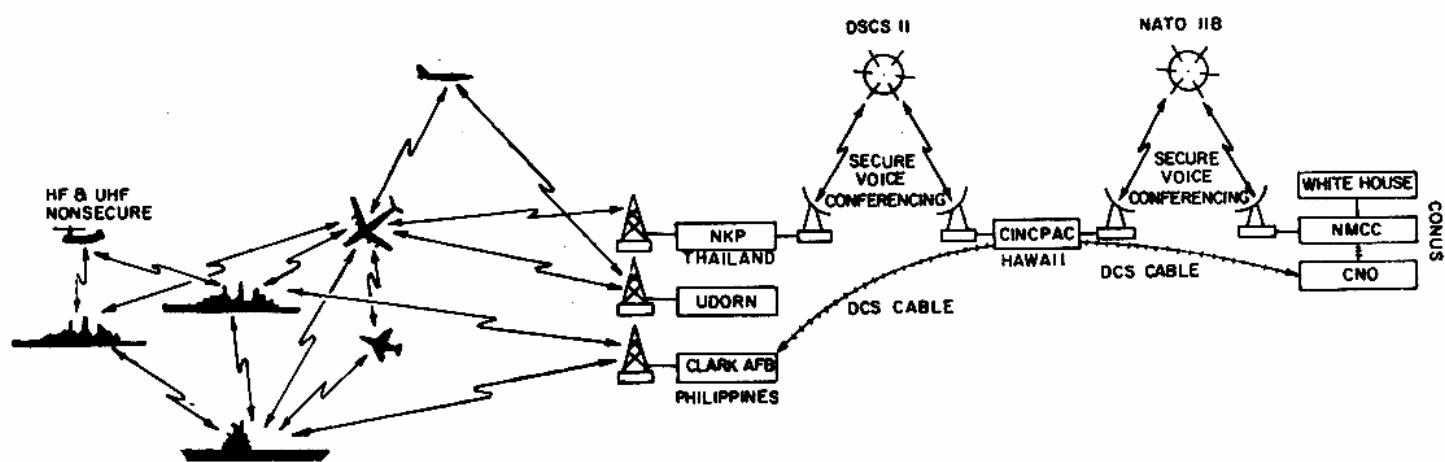NONSECURE

DSCS II

NATO IIB

SECURE
VOICE
CONFERENCING

SECURE
VOICE
CONFERENCING

WHITE HOUSE

NKP
THAILAND

CINCPAC
HAWAII

NMCC

CONUS

UDORN

DCS CABLE

DCS CABLE

CNO

CLARK AFB
PHILIPPINES

DCS CABLE

Figure 1. Mayaguez Voice Nets

29

tion, the plans for that retrieval, were passed through those unsecured nets. I know two men, now Major Generals in the Marine Corps, who went through that operation and are still extremely bitter about that involvement; it was their units that took the losses. The point is: we talk of command and control as a method of using communications to carry out the will of our command authority. But I can tell you, unless those communications are secure, many times it is better not to have them.

Now if we go down through the system with this background — from the White House the links go to the Secretary of Defense, to the JCS, the unified and specified commands, and down through the system. This is the WWMCCS system (Fig. 2), in which the center is, of course, the National Command Authority. The president, or his successor, uses the National Military Command Center, or the alternate center, on both, and the National Military Airborne Command Post as the source of communications that move out on the various systems to all the people shown in the figure, including allies, commands like the Sixth Fleet, and the different incoming and outgoing sensors, intelligence satellites — the DCS system of the BMEWS. This interrelationship is, by and large, considered the strategic system. If we look at it another way (Fig. 3), you see it starting from the National Military Command Post out to the different interfaces. The JRC I refer to is an organization within the Pentagon, the Joint Reconnaissance Center. It is the unit of the JCS that commands the reconnaissance resources of the Defense Department — all three services — airplanes, ships, everything.

Student. Can you explain the difference between the Joint Reconnaissance Center and the National Reconnaissance Office?

Tate. The NRO, National Reconnaissance Office, runs space activities.

Student. Where does NRO fit into this interface pattern?

Tate. It really doesn't. The NRO is an R&D organization that plans, builds, provides and operates satellites. So, in a crisis period, the NRO is not really a major player, and I'm talking about crisis players.

Let me describe the tie-in of the National Intelligence System (Fig. 4). If we start at NSA, we have a system like this: the Defense Space and Missile Activity (DEFSMAC), located in NSA, is a combination of the DIA with its military components and the NSA. It has all the inputs from all the assets, and is a warning activity. They probably have a better feel for any worldwide threat to this country from missiles, aircraft or overt military activities, better and more timely, at instant fingertip availability, than any group in the United States. So DEFSMAC is an input to NSA, but it is also an input to DIA and CIA and the White House Situation Room and everybody else. COMINT, the principal activity at the National Security Agency, drives the monitoring in many ways of Soviet and other communications. There is electronics intelligence, or ELINT, mainly weapon-system-oriented inputs from worldwide sources; those are analyzed within the National Security Agency for technical characteristics, but not for intelligence impact. NSA is not charged with making judgments about what all this means. They are technicians. They have the largest single population of foreign language experts in the United States, and one of the largest in the world outside the Soviet Union. They are primarily mathematicians, engineers and technical analysts who are stating facts that go to DIA and CIA. They are the

SIXTH FLEET

TACTICAL COMMUNICA-
TIONS SYSTEMS

PERSIAN
GULF

SINAI

DEFENSE
COMMUNICATION
SYSTEM

SERVICE
HQS

EMBASSIES

DOD
AGENCIES

NATIONAL MILITARY COMMAND

SIOP
FORCES

BMEWS

MEECN

PAVE
PAWS

WWMCCS
UNIQUE

NATIONAL
COMMAND
AUTHORITIES

SYSTEM

WWMCCS
UNIQUE

UNIFIED &
SPECIFIED
COMMANDS &
COMPONENTS

THEATER
NUCLEAR
FORCE

WARNING
SATELLITES

(NMCC, ANMCC
NEACP)

MAYAGUEZ
& H.E. HOLT

BANGKOK

GERMANY

KOREA

"BATTLE AREA"

Figure 2. Worldwide Military Command and Control Network

31

Figure 3. NMCS Interfaces

Collectors   Processors   Collection Coordinators   Producers   Production Coordinators   Decision   Consumers

State/FS[2]

DIA/Attache

Spec DOD Photo Intel.

NPIC

NSA

DCI/ COMIREX

NSA

DCI/ SIGINT

SCAs[1]

Military Services

DCI/ HRC

Other Dept's

CIA

DDO
DDI
DDS&T

CIA/ DDS&T

State/ INR

DIA

DCI[2] Production Committees

NIOs

NFIB

DCI

Secretary of State

Secretary of Defense

CIA
DDI
DDS&T

President

NSC Staff

Finished
Finished Coordinated National Intel.
Raw Human Source
Raw SIGINT
Raw Imagery

1. Service Cryptologic Agency
2. Economic Intelligence
   Joint Atomic Energy Intelligence
   Scientific and Technical Intelligence
   Weapon and Space Systems Intelligence
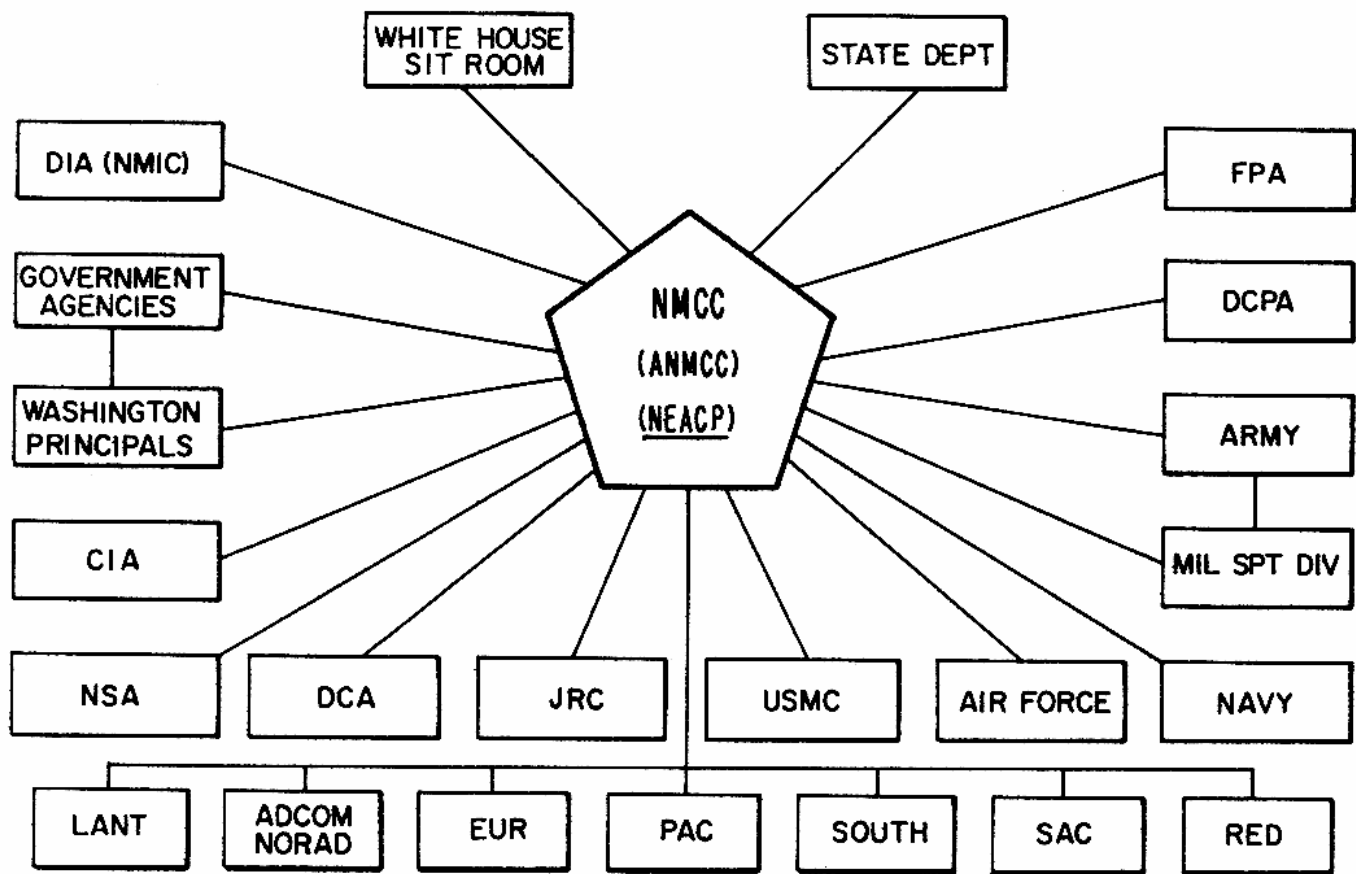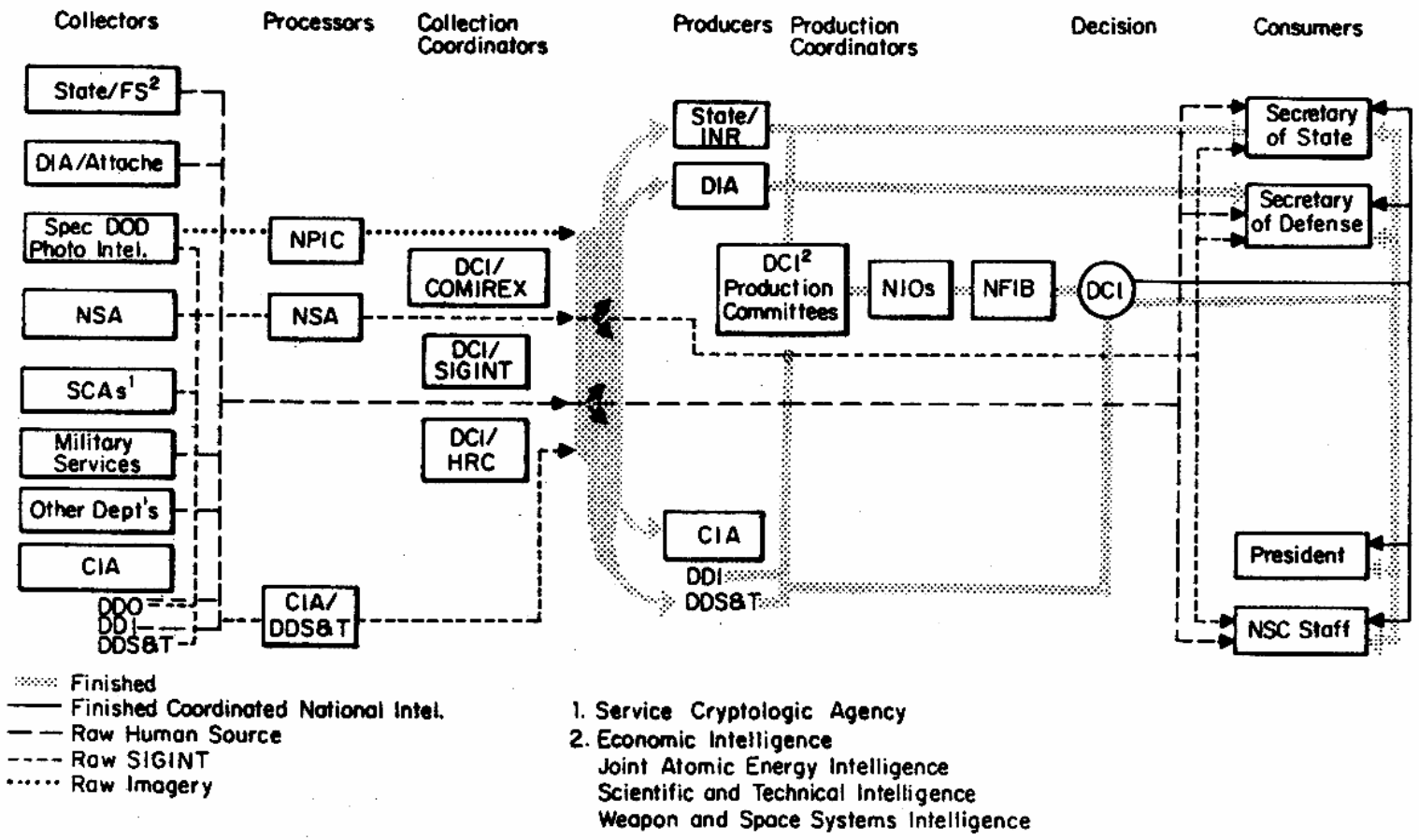
Figure 4. Flow of Information Through the Intelligence Community

ones who put our intelligence products together. They interpret what the technical sensors are telling them and put it in context.

However, you will notice that, in fact, the Situation Room at the White House has a direct line to the NSA. And the warnings in the crisis periods I talked about did not, in fact, go serially through the chain of command. They go in parallel. Therefore the Situation Room in the White House is notified immediately when NSA decides there is a serious problem. So this is a short-circuit for what is called critical intelligence that goes directly to the President of the United States; and nobody can stop it unless they physically do not show the President the warnings. This system was set up after the Cuban missile crisis, largely by John Kennedy, and it still works today. If you think it is a sterile system in which everybody works together and it works without flaws, forget it! It is a human system that has personalities.

Student. But that still depends on timely issuance of notifications from NSA. NSA still stands between the sensors and the consumers.

Tate. Not totally; it depends on what the product is. At one time that was true. But, for example, for military questions, many sensors in Europe (the Far East has been greatly reduced since the loss of Udorn in Thailand) have direct tipoffs to the CINCs, to Al Haig when he was there, and to the American Commands in Europe. All this comes back simultaneously to NSA and other centers in Washington. The commander has, on his own authority, the ability to go from colonel level to the President level when he judges that it is critical; he doesn't go through a big maze of people. And when he declares a "critical," people start swarming out of the woodwork from all directions.

With DIA the inputs are somewhat different. NSA does not have a human intelligence input, it's not in that business; it's a technical organization. The DIA and CIA both do. The DIA, in fact, has a different and larger portion of foreign inputs than NSA. Some ELINT and some telemetry from other sources come in here, and are exchanged back and forth. The CIA is very similar. The DIA by law is essentially the J2 or the intelligence officer of the Joint Staff, so its input goes right into the JCS and to the Secretary of Defense, and is a factor in any orders coming from the National Military Center. It is good to see that all tied together. It can be thought of as a duplicative maze in the first instance, but my judgment is that it is duplicative only in the third instance — not the first. And it does work, it has worked. It is another part of the residue of the mop-up after the Cuban missile crisis that is still working.

If we go straying into the strategic world, looking at what happens once the command authority in the White House has told the Secretary of Defense to do something — the sequence of strategic warnings or strategic orders from the Military Command Post, the Military Command Center, generally goes out many ways simultaneously. It can bring in the different command posts — the NEACP, which is the President's Command Post, National Command Post One to CINCSAC, or the TACAMO, a Naval submarine element, and this, of course, activates the entire process of the Triad. This is generally the alert sequence of events and is practiced often.

Now there is interaction between the strategic systems by sensors, some of them satellites, and by means of other kinds of inputs. Generally the DSCS satellites, the FLTSATCOM, and other such forces then come into being to make the circle work, until

eventually orders go out to the Minutemen or the strategic force operational commanders.

I would like to dwell just a moment on the TACAMO, the airborne command post for the ballistic missile submarines. The only method we have today of talking to a submarine underway (I am not talking about submerged submarines) is through the 28 TACAMO VLF airborne command posts. Half are in the Pacific under the command of the Seventh Fleet in Honolulu, the other half are on the U.S. east coast. They trail a mile of wire with a big chunk of lead on the end of it and output the power required to talk to either a submarine at periscope depth or a submerged submarine floating a buoy. We have developed the system called Seafarer in upper Michigan and Wisconsin, where they transmit ELF signals down into a certain type of granite so that the signal permeates the earth into the sea and you could talk to submerged ballistic missile submarines throughout the world. President Carter has chosen not to release that program for deployment, even though the Senate and the House have approved it during three budget cycles. The 1980 budget that came through in December and January has a clause in it that says unless the President makes up his mind and says the system is needed for the national defense it will be deleted from the Defense budget and won't be put back in.

Now, if we go to the tactical arena, all this national defense information has to get out to the people who fly airplanes and shoot guns, mainly the conventional part of the forces as compared to the strategic (principally nuclear forces, although there are some tactical nukes). This is one example of how the intelligence flow works. It is under constant improvement. The Beta program is an R&D program going on now in which the Army and the Navy are developing a data processing system to quickly turn around intelligence information and provide it to tactical commanders in as near real time as possible. If you are trying to bypass bureaucracy, a lot of it is found in this series of links too, so you are trying to get the information to tactical units in as automatic a form as possible. A very large ADP system is being built, hopefully compatible with the existing set of sensors and the existing command structures modeled after the command structure in Europe. So we try to put intelligence at the strategic levels in as near real time as possible, and in time, with systems like this, we will have parallel intelligence as quickly as possible going throughout the command, all the way down to units.

Student. As part of that, have they done anything more with the idea of using state-of-the-art computer technology to get down to the S2 at battalion-brigade levels?

Tate. Yes, they are working hard on it. It is primarily a military rather than a technology problem — there has not been any agreement to my knowledge, even in the Air Force and the Army, on exactly what that S2 needs to know. Once you establish that, the technologies can put in simple filters to ensure that he is not inundated with data unless it is what he wants to be told. That is going to take time. We are making progress, but views naturally clash, depending on your vantage point and preferences. The Commander of the Sixth Fleet, for instance, is a good friend of mine. In the Pentagon he had one view; as the Commander of the Sixth Fleet he has another view, and his view now is that he is being inundated. His predecessor made a big case, with some justification, that he was never told enough. So you have both extremes, and a pendulum effect.

Oettinger. May I suggest the class read a paper of mine, a collection on computer communications, which deals with this problem. If I may take issue, Ray, I don't think

35

the problem is solvable, in the sense of finding one level between what is inundation and what is too little. I stress that because you were talking before about give-and-take between personalities. If it were only personalities you might have some selection scheme which would put compatible people together. But underlying that is the fact that you can't win statically. At one extreme you feed everything to somebody and he can't possibly assimilate it all, so you start putting in fixed filtering; but on what basis do you do that? At the other extreme, if you have some information which has been carefully interpreted and worked over, you get the reaction "Oh, those guys at CIA — it's all worthless stuff; it may be elegant, but it's ten weeks after the fact and who needs it?" So while the technical components are an important element in all this, at the heart of the matter is the intellectual problem of figuring out how to live with the tension between overload at one extreme and the wrong kind of filter by the wrong sort of people with excessive delays at the other extreme. I've witnessed at first hand a number of players falling on their swords, or appearing to, over that same issue. It's very, very complex. These are not just questions of personalities, but theories of warfare: how do you do that? Some commanders, as you point out, want to know everything. There are others who simply want to know what they need to do.

Tate. Let me give a quick example. When Admiral Moorer was Chairman of the JCS, he was one of the most articulate critics of parts of the intelligence system around. He wasn't exactly a peon, being Chairman of the JCS, and he articulated his criticism to anybody who would stop and listen. Some of us finally got tired of that; while things were a long way from perfect, still a lot of people were working on the problem, a lot of resources were being spent and improvements were being made. Two sensor systems, part of whose data I personally controlled, were feeding directly into CINCUS NAVEUR, for example — the Navy type of data that no human ever saw until it hit them. Several of us got together and said, "We will fix them, we will inundate him. We'll just send him so damn much stuff that it will swamp him." And we did. It took about a month. And the system just backed up, and we started getting calls — "Hey, slow it down, what's going on," etc. So it is a live, complex problem, maybe it's not even solvable, but it is extremely important. There could be data in there that would make the difference between Mayaguez or no Mayaguez — and nobody wants that to happen again if we can prevent it.

I'll run quickly through some tactical systems. There is a significant upgrade of the Navy's Fleet Command Centers, to try to deal with all the data they are starting to get, because you can't do that with grease pencil charts. You would be surprised how many commands in the world are still working the air and submarine problems with circles and a seaman first class with grease pencils. That's not exactly conducive to fast-moving operations. A lot of effort is going into these kinds of things. As for the long haul communications picture as I see it from the Navy's standpoint: we still have SHF satellites and DSCS II. Superimposed on all this, I believe the Navy is going to be forced to stay in the HF region to the year 2000, maybe forever. They have tried to get out of the business, but they are hurting. The satellites still, when they work, work very well, but when they fail they work very badly. The command of worldwide forces just can't depend on such frailties in the future. So the most modern communications in the world will be overlaid on an HF domain for a long time.

Student. What do you mean by failure in the satellite? I have been at the receiving end of the HF when it occasionally got through; you could never understand it so you made

pious noises and ignored whatever they were trying to say; and I have had occasional access to satellite facilities and gotten communication. You can always get noise through HF, but do you really get that much more communications through it?

Tate. Two points. First, we aren't using the HF media very well, in fact not nearly as well as the Soviets. Second, the satellites work very well when they are there, but we have had problems with the failures of DSCS II, for example. I can remember in 1975, as part of the basic command and control of the Mayaguez incident, we had a DSCS II failure that caused havoc. Now if the Navy had, for example, been using the DSCS as its only command and control mechanism for the Persian Gulf area or anywhere else in the world (and it virtually did for awhile), we would have been up the creek.

Going back to my first point, the Soviets have done detailed studies on ionospheric sounding for some 15 years, and studied which part of the spectrum is usable on a 24-hour basis at different locations throughout their interest areas. They do this automatically. They transmit it to their forces all the time. They change their frequencies and go to the usable portions, and they have extremely reliable HF communications. We don't. We can't even change our frequencies except day and night. We do not have any military or other facility in this country transmitting the ionospheric projections, which change on a daily basis, to the operating forces so they can understand what they are supposed to be doing. So a big part of the time we are operating against the laws of physics. That's understandable. A program I helped foster is going on in the Navy now to upgrade HF. It's hopefully going to deal with this on a more systematic basis. But the United States Air Force has the same problems.

Another point. Fig. 5 shows the principal areas of the worldwide defense communications system that are covered by satellite communications — and also by intelligence. The striking thing about this is that a big portion of the whole globe is not even covered — particularly south of the equator. Budget reductions since the Vietnam War, from 1969 until last year when the Congress stopped them, cut out intelligence coverage and did not supply a big part of satellite communications and resources. So what we have is a belt of pretty good communications. But don't think that, if the Cuban missile crisis came again, South America would be in instantaneous touch by satellite over U.S. government communications. We could bridge this by using some of the commercial satellites if the bandspace was available.

Oettinger. Let me just interject: don't underestimate alternatives. The other night Don Hornig, who was Johnson's science advisor, was telling me how the President heard of the Eastern power failure. Hornig himself heard of it through a phone call from his daughter. He started making some phone calls himself, and was prepared when he got through to Lyndon Johnson, who heard on the car radio. But it was quite a while before any kind of official channels had it. It wasn't a military problem, it wasn't military apparatus. It was a command and control problem of the government. But since it was not a military problem there were no established channels. In that situation, the civilian alternatives, including the President's car radio, were the principal means of coordination.

Tate. As a postscript to your example, in the last 18 months of Lyndon Johnson's administration, nothing delighted Johnson more than getting there early and finding out what was going on in the world over the international press services, and then calling his staff

MAJOR COMMUNICATIONS COVERAGE
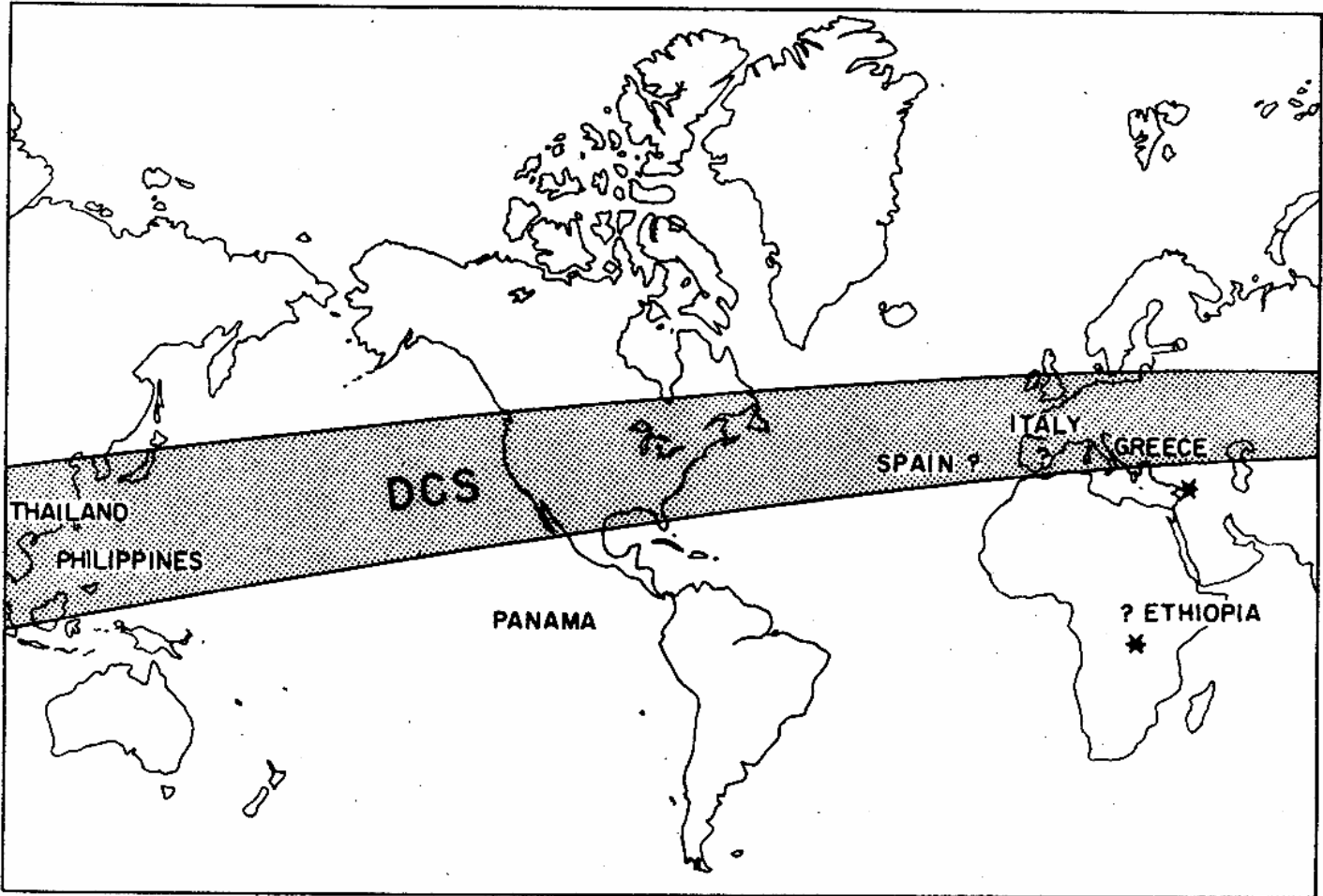## BY DEFENSE COMMUNICATIONS SYSTEM (DCS)

Figure 5. Satellite Communications Coverage

and asking them why they hadn't told him. He had the wire services' teleprinters installed in the Oval Office. Which in my opinion degraded the Office of the President.

The FLTSATCOM is the principal Navy worldwide command and control satellite system, although the Navy owns only about 40 percent of it; the rest is used by the Army and Air Force. But a point of interest is that that bird was designed and programmed through the Congress for a three-year operational lifespan. There are three of them up and we have never had a failure, and now it looks like they are going to go eight years each at least, with any luck. All of the consumables and projections have eight-year lifespans, and the question is, what do we do with all the other follow-on plans that are programmed in the system going into a LEASESAT mode? The FLTSAT was intended by Congress to be the last DoD-owned communications satellite. It probably won't be, but that was the intention. So future DoD communication services are to be leased from private industry, and the follow-on birds, being built by Hughes Aircraft for the LEASESAT program, are now scheduled to go from 1985 to 1995. The TDRSS, being done by TRW for Western Union and NASA, is a worldwide system in which there is a relay between four satellites, if positioning is accurate, to talk to the shuttle and to carry out real-time communications between very sophisticated space activities. The most modern thinking is going into that system. A new concept for worldwide navigation is the Global Positioning Satellite concept, a three-service system, which achieves up to about three or four meters of accuracy for such things as navigational submarine positioning and ICBMs.

Let me come to my conclusions. Having spent a substantial part of my life in the intelligence, command and control, cryptography and electronic warfare business, as well as some of the space activities, I have concluded that the command, control and communications function in the broad sense is one of the most complex tasks I know. It has to take into account many of the things that have come up in questions here this afternoon. It really means that improvements are automating human kinds of functions that are very much influenced by the ability of the commander — the President, an intermediate commander or a tactical commander — to make up his mind what needs to be done, to have all the information practical with which to make the decision, and get the decision transmitted as quickly as possible. I call that a human-order system, and automating and improving that is a difficult task indeed.

Consider one oversimplified example. A naval task force today has to be prepared to fight a sophisticated air war in which it has to provide its own scouting force, its own airplanes for sensors, its own radar sensors, its own antisubmarine aircraft, its own fighter aircraft, and its own bomber aircraft on one platform. It has to be prepared to fight against a surface force of standoff missiles that now travel from 125 to 140 miles. It has to defend itself against the largest submarine fleet the world has ever seen. So it fights a three-dimensional war — and that's not even taking into consideration the elements needed to do amphibious landings or shore support. Now, either it is equipped when it leaves its home ports and deploys to someplace like the Indian Ocean, or it is not. It is not going to be reequipped or reconfigured once it is deployed. The commander has to decide where to deploy his aircraft if he is attacked. When does he use jamming? When does he not use jamming? Does he jam his own airplane? Which ship does what? How must a target be handed off between ships to make sure the whole task force is not shooting at two airplanes if nine are coming in from a given direction? These are complex human-order functions, and the instantaneous decision process is very complex. And that,

in my view, is one of the reasons it has been slow. It's criticized, and I'm one of its principal critics. But on the other hand there are reasons for a lot of its shortcomings. And it is not well understood outside the military or, I am sorry to say, in many cases even within the military.

Student. It seems that sometimes the military communications system is more dangerous than useful. I cite the Mayaguez instance, where people who don't really understand the realities of the system have a feeling that communications are omnipotent when they're not. They get caught in the trap of expecting more of a system than it can really provide and, by doing so, get so extended that they get into a great deal of trouble. I don't know if that was the case with the Mayaguez. I assume the CONUS command centers felt there was a reason to communicate the way they did.

Tate. Oh, I think so. The situation that existed between the Seventh Air Force and the Seventh Fleet during the Mayaguez incident still exists today. They still do not have a secure conferencing bridge. They have one in R&D that stemmed from the incident, and early models have reached the test stage, so they will have it. But it's a shame we do not have it now, because secure voice is not exotic technology — it could have been done twenty years ago.

Oettinger. Let me underscore the significance of that, in case it eludes anybody. That's why we stress organizational structure. What you have here is a situation in which the technical possibilities mirror organizational structure, and you like that or you don't. But if you don't understand the structure of the organization as it is, it is damn hard to understand any of the technical details — or else you get fascinated by the technical details and look for technical solutions to things that are not technical problems.

Tate. One of the big problems with electronic warfare and command and control in two of the services is quite frankly the lack of understanding of the seniors involved — not because they aren't brilliant people or well qualified military commanders — but, in my view, because they have not acquired personal understanding through the services' training and assignment process. For example, when an academy graduate begins his career his motivation in life, and rightly so, is to excel, to do the things the service thinks are more important than others, and get promoted. That means line jobs, and in the Navy it means driving ships: command jobs. A certain number of IBM punches on his record literally have to be punched, and there are only so many years in which to do that. If he is in any one spot too long he is passed over. By that means he comes to understand the system very well. The bright future commanders of a service do not acquire the technical experience that gives them the capability to make technical decisions and tradeoffs between a shooting weapon and a soft weapon.

I have seen the effects of that deficiency day in and day out, from people I know well who are personal friends. It is not that they are devious; they just don't have the background in many cases to understand where their dollars ought to be going in the tradeoffs — and there always has to be a tradeoff for dollars; and thank goodness (as a taxpayer) there is, because you cannot do everything. They have not gained full understanding of the basic importance of command and control and the other things we have been talking about. But I think this is slowly changing. The C^2 budget of the Pentagon is now

approaching $7 billion. When I was the Director of COMSEC for NSA in '75 and '76 it was about $1½ billion. Inflation is part of that, but it is more than inflation. There is more money, there is better understanding and, hopefully, better application. Still it has a ways to go, and it has been a stepchild. No military officer whose goal is to make three or four stars is ever going to get caught dead being a comm or EW officer, or running an intelligence unit, because that is not the way you do it. That's basic. We have fought these battles in the Pentagon, and sometimes you lose and sometimes you win.

Student. Were the problems the same in the Korea tree-cutting incident?

Tate. The system worked differently — and better, although it was awfully thin. Bill Clements, then the Deputy Secretary of Defense, went down to the military command post, talked to the President, got orders, and personally directed the entire operation. I have discussed it with General Stillwell, the UN Commander, and Stillwell was chagrined because he couldn't do a thing without a direct order. The entire operation was run by the Deputy Secretary of Defense. The alternatives were, if you recall, whether or not to go in and cut that tree down, and then how to deal with the kind of reaction that might result. Because the force that went in there was too small — it would have been chopped up indeed if the North Koreans had chosen to do that. No man in his right mind wanted that to occur needlessly. So there was continuous conversation with the Deputy Secretary on every move every man made; and it was done securely, using some tactical crypto equipment the Army has had for fifteen years called KY-8. They plugged it in to the helicopter of the guy directing the operation. So that one worked, from the standpoint we have been talking about.

Student. Do you think the Soviet Union has the kind of problem you are describing, with the types of military people who strive to be generals and the kind of training they get?

Tate. No. That's a very broad question, but let me discuss a couple of facets. I know the Soviet command and control system, including the principal personalities and their intelligence operation, fairly well. Science, engineering and gadgets, for whatever reason, are not taken for granted in their society and in their military elements as a whole, or in the civilian side of the house, as much as they are here or in Western Europe. The Soviets are fascinated by gadgets. And how much that has influenced the interworkings of their officer assignment or enlisted assignments systems is hard to assess. I do believe that the career path for a bright Soviet officer would be different from ours. In most instances he would have an intelligence command, and usually some degree of technical electronic training, even if he got it as a major or lieutenant colonel at graduate school, at an advanced level. He would also tend to speak the English language. Not all of them do, but most. It is a phenomenal thing to realize how many of them speak really understandable English.

So there are basic differences. Their command and control structure, for example, is threefold-redundant. They have nuclear-hardened command posts like ours, only about four times as many; at least five are nuclear-hardened and alternate to each other. Each of the major services have their own, plus national ones that tie it all together. They are connected by very modern communications, and the end result is a very effective C^2 system, in my opinion.

Student. One of the real advantages of HF is something I have personally experienced and heard a lot of other people talk about: when something unutterably stupid comes over it, you just don't hear it. Apparently during the Tonkin Gulf situation President Johnson was trying to reach the commander of one of the destroyers. It seems that the technological improvement of command and control over communication systems has overreached, or may overreach, human ability to assimilate information. So that, because the capability is there, you have decisions being made by people who are too far away from the information to know what is happening, from the national system down. From the Deputy Secretary of Defense to a Commander in Korea maybe it worked, but I can easily see an identical situation with a man sitting in the NMCC not really understanding the situation at all, and somebody at the other end saying "Yes sir."

Tate. That's a pretty broad question with a number of facets. I will tackle a couple of them. I believe the trend toward the likelihood of a tactical commander not hearing what he doesn't want to hear, a la Tonkin Gulf, has diminished a great deal with the more sophisticated systems, because whatever comes over an automated system is recorded. It's different from listening to earphones and trying to select a few interpretable words over a voice circuit. I dare say nobody's going to destroy a piece of paper with a message that has serial numbers on it and a record.

Second, let me tell you that one of the biggest complaints the senior military people in all three services have today — they are going to be faced with it forever, and they know it — is that nuclear weapons have changed the concept of warfare in a lot of subtle ways. One of the ways is that there is no absolute military command authority. Mainly it's the President, in my view, who is going to detonate a nuclear weapon with great devastation. He must exercise as much constitutional authority as he has over any facet of his office, and it's probably more important than most.

In the early days of nukes and ICBMs I participated in a study to determine how to control the weapons centrally. At the time we didn't know what was going to develop, but I'd get violent reactions, because what we were talking about was planning command and control over nukes — not downward from the headquarters of the United States Air Force through the Fifth Air Force to a wing commander to a squadron commander to a captain to a sergeant or a lieutenant; but from the White House. The military has not yet changed substantially from a basic resentment of this fact. Fundamentally the system still works as it did. I've been in the White House many nights and seen Lyndon Johnson anguished and seldom going to bed, selecting between two or three targets. The JCS gave him all the targets — but the decisions on how many civilian casualties, or the potential of this or that, were all made by the President. And that wasn't even a nuclear exchange. Whether it is right or wrong is a different matter; all I am telling you, after watching this system for better than 25 years, is that's the way it works. I don't think anybody is going to change it, particularly with respect to nuclear weapons. No Soviet Commander, thank God, without overt, direct, violent disobedience of orders, can make the nuclear decision himself without the Politburo's approval. And nobody in this country, or NATO, can do it without the President of the United States' approval. Talk of the "NATO nuclear capability" — forget it. It's an American capability that can only be released by an American officer. And this has changed the military structure. It's just that the structure hasn't caught up, or chosen to align its command structure to demonstrate that. But that's the real world.

Student. You mentioned how centralized nuclear authority is. Can you comment on the methods or techniques by which this sort of authority is reserved to the President? Because I think one of the dangers is that, by making it impossible for the subordinate commander to illegally use nuclear weapons, you are very narrowly restricting the number of targets the Soviets need to hit to "decapitate" the command authority so that we are unable to respond with nuclear weapons.

Tate. No. My activity made all of the devices and codes that create a chain of command for nuclear release. The way it is designed is that the President, the Vice President and the Speaker of the House on the civilian side, and the Secretary of Defense, the JCS, the Military Command Post and the alternate Command Posts all have the capability of acting as the central authority, in some sort of succession. The codes and devices are set up to allow that. So if all else goes, the airborne commands can take over and be the central authority, with all the capabilities — CINCSAC, Looking Glass, etc.

Student. One of the things that has not been brought up is how we integrate our communications systems with NATO and other countries. Do we run the systems and they enjoy the benefits, or what?

Tate. They aren't integrated in my view. Next week's speaker, General Paschall, as the senior communicator in the Defense Department, may have a different view. You know, an awful lot of programs are coming along. They are supposed to be integrated programs. The NICS is the communications operating command for NATO. They have three or four large programs underway — a voice switching system like our AUTOVON. It is a secure voice system currently using a German crypto box with only 240 terminals, not a massive thing. The teletype system and data are all in R&D, and within the next 10 years or so this will be a NATO integrated system. At the moment they have a net that goes from Brussels to Norway and to Greece and Turkey through Italy for their nuclear command and control. It's been there for quite a long while, and combines Tropo with conventional European PTT or "Ma Bell" kinds of commercial circuits for command of the tactical nukes. It is not survivable, not integrated. The U.S. system can't interject at a node. The physical hardware used in the airplanes and ships is a little different. And the ground forces are piecemeal. American platforms, tanks or aircraft or whatever, will probably have American radios and they will operate. If they are European-built and made by Siemans or Marconi, you'd better believe they won't intercommunicate. The Navy is different. The United States Navy in essence runs its own foreign service through its attache system. It's surprising; really they are the only modern Navy in the world outside the Soviet Union. The other navies — even to an unannounced degree the French Navy, though it's not a member of NATO — and certainly the British and the Scandinavian Navies go a long way to make sure they can communicate and therefore interoperate with the United States Navy. The other services — kaput.

Student. I realize you have to differentiate between Presidential nuclear releases and conventional systems, but all the crises that we have looked at show the highest levels of command reaching down to the lowest levels, and in each case we talk about an isolated incident, or a situation where Johnson chooses a finite number of targets. Would you care to comment about how it might work or not work when you get into a situation such as a massive invasion of Western Europe or, more likely, a North Korean invasion of the South?

Tate. That's a very good point, because it's not one ship or one airplane or one of this or that. You could draw a parallel with the Korean War from a command standpoint, or, better, with Westmoreland's command structure in the Vietnam War; his orders came from Washington, not CINCPAC. Admiral Gayler is still chagrined that when he was CINC-PAC, and quoted as the authority over a big chunk of the earth including Vietnam, he never issued an operational order out there — they came from Washington. The parallel there was, of course, that we did have headquarters "running" the war, obviously in a more generalized policy way, rather than a one-platform incident. In a world of nuclear weapons I just don't see the President ever giving up that capability.

Student. I think you have to differentiate between the purely conventional and the nuclear.

Tate. But the potential is always there. The Soviets appear to outload tactical missile nukes in their submarine naval forces, in all their long-range air, and those forces depart the Soviet Union as a matter of course. The chance of accidents is high, and that's a sobering thought. I just don't see a President delegating, even in a conventional tactical war like Vietnam. If we went into Iran to get the hostages, well, nukes there are out of the question. In the Mediterranean, Syria, anywhere around there, the President would have to keep control, because you can't conceive of nukes getting out of hand in that area. The Middle East worries me a great deal, not only the stress and the international problems, but the chance of violating this parity you might say we and the Soviets have over command and control of nukes. Third parties aren't that sophisticated; look how long it took us. So I do think there is a lot of danger.

Student. You indicated that NSA, in its role as a primary SIGINT/ELINT collector for the intelligence community, doesn't have an organic analytic capability, and that the bulk of those functions go over to the DIA and the CIA. Is that a correct statement?

Tate. It depends on what's being analyzed. The raw product coming in from all those sensors, technical data of all sorts, is analyzed by engineers, mathematicians, telemetry experts and others. NSA does the technical analysis; the results are passed to the DIA or the CIA, depending on their nature. As for intelligence analysis, that's supposedly done by the DIA or CIA from all sources.

Student. That was what I wanted to ask you about. What is your impression, after having been a senior official of one of our highest level intelligence agencies, of the intelligence community's success in integrating intelligence from all sources? Because it seems there's a proliferation of intelligence agencies, all subordinate to somebody else, and a very real difficulty in integrating intelligence from all sources. We in the Army have had fantastic difficulties, as you know, in achieving that, just at the tactical level where we all wore the same uniform and were all going to the same mission. How do we do it on the national level?

Tate. I have tried to help work on that problem for a long time. First of all, I believe in the check and balance system in intelligence work. There is so much importance attached to the final judgment you give the President. For example, Kennedy was told that the missiles were really out there before he had more than one or two photographs, before we had

the photos of the missiles actually visible on the ships. The assessment can make the difference in whether you approach a war, or else do something extremely serious of a non-military nature. For example, I firmly believe the Soviet Union has for years manipulated a lot of commercial markets in the world, commodities and other things. That has nothing to do with national security in a military sense. They have a significant cash flow problem. How do you make money in a cash flow problem? You can turn your intelligence system around and use it to get all sorts of data you can actually use in commercial ventures, etc. The Soviets have done this in Western Europe. I believe in the checks and balances of those judgments. Not only because of the importance of the reaction to them — I think that, where there is time, and there often is at least at the most senior levels, there should be room for some debate.

Take a different aspect. Intelligence has become so technical that it takes real specialists to do many facets of it. NSA has the largest collection of mathematicians under one organizational roof in this country, and for very good reasons. Breaking codes, judging weapon systems, and all the technical judgments involved in analysis, are a lifetime career in themselves. Many of the people there are absolute experts on the Soviets. Some of the people, particularly those who came in the latter part of World War II, were schoolteachers and whatnot — there was a large influx of math teachers, many of them women, many of them still there. Some are well beyond retirement, but they have worked these Soviet activities for 20 to 25 years, they think like them. And that's the best kind of analyst to have. Because it is difficult to "mirror-image" a potential opponent like an Oriental, or a Soviet — who in my view has tendencies similar to Oriental. You need longevity to think in that way, to imagine, if such-and-such a thing happens, what your opponent's reaction would be.

So, then, intelligence is seldom the whole story. It's a web, a sequence of events, pieces in a puzzle that is seldom or never completely put together. Postulations have to be run. Those technical people have an essential mission, not just in doing their technical job, but also in judging the implications. But then I think the implications ought to be scrutinized at the national level, not by someone who has spent his whole life looking at the Ninth Regiment or the rocket force.

Student. What interests me is that there is always controversy between the technical specialists — at CIA, DIA, NSA — who have done that for twenty or thirty years, and the analyst.

Tate. Do you know that the '73 war was an intelligence failure? I was sitting in a colleague's office on the afternoon in which the White House Situation Room was put on a SIGINT alert, and it went over to the big maze and was not believed. That came out in congressional testimony later. But each time the system is "pinged" it seems to upgrade the operation and make it a little more sensitive. I don't know what the answer is; but it is give and take. I believe in give and take, but I would also like to see less bureaucracy. Appointing a DCI was an effort to do that.

Student. This system, with its checks and balances, is supposed to give 48 hours warning to the SACEUR. What is your degree of confidence in the 48-hour minimum?

Tate. I think in most cases they'll get it. The mechanism is rigged up to get it to them in microseconds — when it is understood. That understanding at times, unfortunately, falls into the maze.

Oettinger. I want to caution you against talking about solutions, because there is simply a fundamental tension between rapidity and checks and balances. I know nothing in technology, or in making organizational wiring diagrams and so on, that is going to eliminate that tension. You simply have to work out how you best live with it, and what kinds of institutions and what kind of flexibility you provide — that is, how much is prearranged and how much ad hoc — so that when something happens, a one-shot crisis or a broader problem, you can react with the understanding the situation calls for, realizing there is no perfect solution, and you may have to make it ad hoc. I want to underscore what I said about the understanding of senior commanders. It seems to me critical to understand that there are no pat answers. If you accept that, how do you live with that tension in some better way than we manage now? That's a central kind of question. There is no fixed level at which you can set things and say that's the way. So I think it is important not to think in terms of solutions that set one level of instantaneity, or mandatory review. It won't be the right level.

Tate. I agree. Nationally prominent, brilliant Americans have helped come up with what we've got — like Bill Baker, President of Bell Laboratories, Edward Teller, Clare Boothe Luce, Ambassador Murphy, Edward Land — that is an awful lot of brain power. If I knew a solution I would have tried to work the problem differently.

Student. Picking back up on warnings of crises — it seems from my experience that in the private sector (and I've talked to people in the public sector as well) it's always easy after the fact to go and say so-and-so said 48 hours ahead this was going to happen. But generally, so-and-so has said many times that the same thing was going to happen and it didn't. That is, I think, a big part of the problem. You are getting so many predictions all the time which don't turn out to be correct that you just get one more and you put it aside. I think that is one of the fundamental tensions in the system. Is that a problem from your experience? A lot of false starts?

Tate. Not nearly as much as it used to be. There always will be some. Kissinger has talked about the three levels of crisis escalation. Once you are in the first level, which means something might happen, people work longer hours, more people are involved and there is more sensitivity, more concentration on it — and I think that tends to clamp down on the Chicken Little effect.

Student. Or do you get more cries that the sky is falling, because now people are starting to look at it harder?

Tate. Not as many as you'd think. There are some, and there are arguments. But people tend to be pretty responsible, because there's the reciprocal of Chicken Little: if you're wrong, nothing you say will ever be accepted. You are talking about a human-order problem. Someone can have every indication that something is going to occur, and then he changes his mind — or he was playing games with you to start with. He influences that decision as much as you. In fact, you are virtually "sync'd in" on being a follower, rather

46

than a leader, in following a crisis period of that nature. So it is complex. But I think there are built-in checks that deal pretty well with the Chicken Littles. All I can say is, it works.