

**A DEEPER THEORY OF COMMAND AND CONTROL IS NEEDED**

In an age of abundant, almost limitless, information and communications capabilities, decisionmakers are increasingly faced with the problem of too much information, rather than too little. In today's information-oriented society, winnowing, filtering, correlating, and fusing information have become as important as acquiring the information, or (regrettably) even as important as its content, if not more so. Understanding what information is most essential for decision-making—so that the information being communicated, processed, or displayed can be bounded—is now a major issue in the design of computer-aided decision support systems.

Nowhere has the problem of overabundant information become more apparent than in military command and control, where the accelerating technologies of communications and computers<sup>1</sup> have flooded commanders at all levels with so much information that they sometimes seem no longer able to digest or comprehend it. The prevailing approach to this problem is to apply still more technology in

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<sup>1</sup>Nothing on the face of the earth is changing more rapidly than the numbers and capacities of electronic communications networks. The capacity of the communications networks available to the public has been doubling every two or three years for more than a decade and is likely to continue that pace for more than a decade to come. For some of the broader implications of this extraordinary change, see Carl H. Builder, "Is It a Transition or a Revolution?" *FUTURES: The Journal of Forecasting, Planning and Policy*, Vol. 25, No. 2, March 1993, pp. 155–168.

the form of computers and software, in order to sort through, filter, and display the information in ways that will assist the commander in focusing on the “right” information. Of course, this approach assumes that the commander and his responsibilities, circumstances, and decisions are understood well enough for his information needs to be anticipated.<sup>2</sup> It also assumes that the C2 issues for commanders are acquiring enough information, sorting through it, and then maintaining connectivity with subordinates so that they can be directed.

How technology could or should be applied to the issue of command and control has been addressed by a number of writers, but contemporary *theories* about command and control (C2) are, by and large, theories about organizations and communications. Such theories often take the form of charts or diagrams: As organizational charts, they relate commanders to the things they control; as network-wiring diagrams, they relate communications nodes and links in terms of their informational functions or capacities. In these theories, commanders are the occupiers of boxes, and what flows through the channels is messages.

But such theories do not explain what C2 does and does not do, can and cannot do. Perhaps most importantly, they do not explain the qualities of the ideas or how those ideas are expressed within the system. A comprehensive theory of C2 should explain not only how to organize, connect, and process information, it should also explain something about the quality of ideas and their expression and about how the qualities of people contribute to or detract from C2, not just how they should be organized and wired together. What is needed is a deeper theory that encompasses the high-level, creative aspects of command as well as the direct-order and control aspects.

A theory of C2 should explain how C2 systems, including commanders, should work and the ideal circumstances in which that work can occur, and should provide performance measures for commanders and their staffs, as well as for the communications and computers that support them.

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<sup>2</sup>In this report, we use *he/his* throughout for clarity, not to imply gender significance.

Kenneth Allard, in commenting on the following definitions of *command*, *command and control*, and *command and control system* in the *Department of Defense Dictionary of Military and Associated Terms*, notes that “one of the most striking characteristics of these definitions is the extent to which they evoke the personal nature of command itself, especially the fact that it is vested in an individual who, being responsible for the ‘direction, coordination, and control of military forces,’ is then legally and professionally accountable for everything those forces do or fail to do”:<sup>3</sup>

*Command*: “The authority vested in an individual of the armed forces for the direction, coordination, and control of military forces.”

*Command and control*: “The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures which are employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.”

*Command and control system*: “The facilities, equipment, communications, procedures, and personnel essential to the commander for planning, directing, and controlling operations of assigned forces pursuant to the missions assigned.”<sup>4</sup>

When we use these three terms, the above definitions are implied in them.

Going beyond personality alone, our theory suggests that the essence of command lies in the cognitive processes of the commander—not so much the way certain people do think or should think as the ideas that motivate command decisions and serve as the basis for control actions: Ideally, the commander has a prior concept of impending

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<sup>3</sup>Kenneth Allard, *Command, Control, and the Common Defense*, Washington, D.C.: National Defense University, Institute for National Strategic Studies, revised 1996, pp. 16–17.

<sup>4</sup>U.S. Joint Chiefs of Staff, *Department of Defense Dictionary of Military and Associated Terms*, Washington, D.C.: Office of the Joint Chiefs of Staff, JCS Pub. 1, January 1986, p. 74 (quoted in Allard, 1996 rev., p. 16).

operations that cues him (and his C2 system) to look for certain pieces of information.

Our theory cuts through the technological overlay<sup>5</sup> that now burdens the subject, and can be used as a template to reexamine some familiar historical instances of C2 success and failure. The theory represents an attempt to separate the intellectual performance of the commander from the technical performance of the C2 system.

## COMMAND CONCEPTS

Looking across the history of military operations and considering the substance of communications between commanders and their subordinates, we noted that one of the most consistently evident topics is some vision of the conduct of a military operation: what could and ought to be done in applying military force against an enemy. Renowned commanders are concerned mostly with explaining and asking after their vision or expectations of possible and desirable operations: “Are things going as we planned (envisioned)? If not, what is broken and needs fixing? Why and where are things going wrong? Is the plan (vision) wrong, or does it simply need some adjustment?”

The source of such visions, of course, lies inside human minds—in complex sets of ideas that might be called “command concepts.” Evidence of command concepts is found mostly in war and battle plans, sometimes in the setting of military objectives, less often in the deployment and commitment of forces, and perhaps least often in the issuance of direct orders.

We define a *command concept* as a vision of a prospective military operation that informs the making of command decisions during that operation. If command concepts are the underlying basis for command, then they provide an important clue to the minimum essential information that should flow within command and control systems. If what flows through command and control networks is (or ideally should be) command concepts, then informational needs can be bounded. Rather than creating a C2 system that can transmit all

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<sup>5</sup>The technological overlay is mostly from communications and computers, which are changing at a remarkable pace. Command and control itself is conducted mostly in and through human minds, which change much more slowly.

the information that can be acquired, or all that the bandwidth will bear, an ideal C2 system would transmit *only information that helps the commander convey his command concept, or alter it*. From that perspective, reporting the number of vehicles in a battle, for example, is pertinent only if it is somehow relevant to the command concept or how the concept will evolve. And since commanders do not need to adopt a new concept until it is clear to them that the existing one has failed or can be bettered, what a commander must hear, at the minimum, is information that disturbs or refutes his concept, even though he probably wishes to hear its confirmation.

The following is a list of elements that should be found in an ideal command concept:

- Time scales that reveal adequate preparation and readiness, not just of the concept but of the armed forces tasked with carrying out that concept.
- Awareness of the key physical, geographical, and meteorological features of the battle space—situational awareness—that will enable the concept to be realized.
- A structuring of forces consistent with the battle tasks to be accomplished.
- Congruence of the concept with the means for conducting the battle.
- What is to be accomplished, from the highest to the lowest levels of command.
- Intelligence on what the enemy is expected to do, including the confirming and refuting signs to be looked for throughout the coming engagement.
- What the enemy is trying to accomplish, not just what his capabilities and dispositions may be.
- What the concept-originating commander and his forces should be able to do and how to do it, with all of the problems and opportunities—not just the required deployments, logistics, and schedules, but the nature of the clashes and what to expect in the confusion of battle.

- Indicators of the failure of, or flaws in, the command concept and ways of identifying and communicating information that would change or cancel the concept.
- A contingency plan in the event of failure of the concept and the resulting operation.

Finally, if the notion of command concepts has validity, it should apply to all levels of command—from theater commanders to squad leaders, each of whom will have his own command concept that forms the basis for his decisions. Each of those concepts should be hierarchically nested and consistent. That is, the squad leader understands his platoon leader's concept for platoon operations and has then developed his own for squad operations, which is supportive of the concept for the next higher level and consistent with it.

## **CASE HISTORIES**

In theory, therefore, if a commander's vision of battle was sound and was fully conveyed to subordinates beforehand, there would be no need for information to be in the C2 system during the ensuing battle. Conversely, the theory suggests that needing a given amount of information in the C2 system during the battle relates directly to failures associated with the validity or completeness of the command concept or its clear conveyance to subordinates.

We look at this theory through the lens of six battles drawn from modern military history. In each of these historical cases, we look for the existence, clarity, and expression of a command concept. We ask if the command concept was valid and adequately supported by the C2 system. If no explicit concept, such as an operational plan, exists, we infer an ideal concept from information on all aspects of the battle.

We also chose our examples to illustrate instances in which:

- The command concept was either ideal or unsound for the circumstances presented to the commander.
- The expression of the concept by the commanders was either complete—that is, the expressed concept contains all the elements listed in the preceding section—or incomplete.

- The C2 system was either adequate or inadequate to support the commander and his command concept.

Collectively, these six cases support and illuminate our theory: Admiral Chester Nimitz at Midway and General Douglas MacArthur at Inchon provide near-ideal examples of a valid command concept, completely expressed, and adequately supported by their C2 systems. Field Marshal Bernard Montgomery at MARKET-GARDEN provides an example of a command concept that, although clearly expressed, was structurally unsound because it tried to fit the operation to the available air forces rather than deciding which service or force would be best after carefully researching the plan. In addition, it was not adequately supported by a C2 system that could correct its errors, and it ignored correct intelligence. Lieutenant Colonel Harold Moore at Ia Drang and General Heinz Guderian at Sedan, for different reasons, did not have clearly expressed command concepts. They relied on their doctrine and training instead; and their C2 systems, while otherwise adequate, could not substitute for the strategic decisions that had to be made and communicated. General H. Norman Schwarzkopf in DESERT STORM had an adequately detailed and expressed command concept; when events required him to accelerate his plans, his C2 system served him well in alerting him to those events.

## CONCLUSIONS

If it can be demonstrated that command concepts are (or ideally should be) the essential substantive content of the information flowing through command and control systems, then a powerful theory of command and control is indicated. Ideal commanders and ideal command concepts are, of course, only a reference point, rarely if ever observed in war. But they can serve as a useful reference point for a theory of command and control that:

- Defines the highest-priority information—what command and control systems must be designed to handle most quickly and with the highest fidelity.
- Separates the proper *intellectual* burdens of the commander from the *communication* burdens of the command and control system, both before and during the battle.

- Makes the commander, not his C2 system, responsible for the quality of his ideas, his ability to express them, and his receptivity to information that disturbs or refutes his ideas.

If the theory is valid, the division of burdens between C2 systems and the people using them becomes clear. For the C2 system, there are three primary burdens:

- To provide commanders with the information they need to develop and refine command concepts.
- To communicate command concepts—faithfully and clearly—down the chain of command.
- To communicate discovered or impending failures of command concepts—quickly and clearly—up the chain of command.

For the people using the C2 system:

- Command concepts should be primary features of *battle planning*. The consistent mapping of command concepts to combat plans must be made a feature of battle planning at all levels. A spectrum of operationalized command concepts that spans echelons and time should be developed.
- The task of formulating and expressing a command concept should be embedded in *leadership development* and warfighting doctrine.
- Doctrine must ensure that command and control via command concepts is reflected in the manner, content, frequency, and discipline of message traffic on *command networks*.

## **DIRECTIONS FOR FUTURE WORK**

The research reported here was designed as a preliminary exploration of a general theory of command and control. Our limited objective was to learn whether there was anything obvious in the history of modern warfare that might refute the idea before investing in further research to develop the theory and to apply it to the design and evaluation of C2 systems. There are at least three initial directions for further development of this theory.

The first direction for additional work is to take a different approach to validating the theory: Conduct a series of interviews or discussions with (a) living commanders from all services to reflect their experiences onto our theory and to inquire whether their experiences resonate with or undermine it, and (b) doctrine writers and force developers who are currently grappling with the issue of how to apply technological advances to enhance force effectiveness.

The second direction is to examine the implications for this theory on the real-world problem of the development of C2-system design. In an era of limited resources, what does the theory tell us about how to think about procurement decisions? How do we think about trade-offs between improvements in raw power and enhancements to overall system flexibility? How do we design decision support systems that are empowering but not constraining? What examples from recent history are illustrative of the rewards and pitfalls of making the right or wrong systems decisions?

The third direction is to extend and refine the theory to ensure that it can be generalized over services and their different media (air, land, and sea) for operations. With the growing tendency toward jointness and the blurring of traditional roles and missions between services, it may be that these distinctions are not as important in the present as they may have been in the past. It is also likely that, regardless of medium of combat or service, the pre-battle requirements for information are similar, as is the importance of developing a viable command concept.