Principles of communications

By Sid Heal

Communications is called the "voice of command" for good reason. You cannot command when you cannot communicate. Accordingly, communications is a command responsibility. In fact, communications is so essential to the success of any tactical operation that the military considers command, control[1] and communications nearly inseparable and signifies their relationship with the abbreviation "C³." Many a fiasco has been averted when communications enabled corrective measures in a rapidly changing situation.

There are four fundamental and interrelated requirements for an effective communications system:

- ***Reliability*** assures that communications will function when needed and relies heavily on careful planning and dependable equipment.
- ***Security*** is essential to deny unauthorized persons information of value that could be used to adversely affect an operation.
- ***Speed*** is somewhat relative in that it describes the time it takes to move a message from a sender to a recipient. While it would be nice to have every message instantaneously delivered from a sender to the recipients, in reality this is often impractical, especially when more than one method may be required to move the same information. This frequently occurs when the sender is at a command post and the recipient is deployed in the field. For example, a message may start as text, then be transmitted by radio or telephone, transcribed back to text, and then delivered by messenger. To be effective, information must arrive in time to be of value. Too late is the same as absent.
- ***Flexibility*** is the ability to both support a wide dispersion of units as well as adapt to adverse and varying conditions. Flexibility is often achieved with redundancy; that is, by duplicating communications channels so that if one fails another is available.

While these four requirements are interrelated, they are not always compatible. Tactical conditions will almost always require some trade-offs, but of the four, reliability is the most critical. While compromises may be necessary with security, speed and flexibility, any tactical organization that cannot rely on its communications quickly loses cohesion and focus.

Regardless of the method used to transfer information, there are only four forms information can take: *Signals* (including gestures), *text* (including numbers), *graphics* (including photographs, charts, maps and so forth) and *language*.

Some forms easily lend themselves to transmission by one method but not another. Computers, for example, are excellent for text and graphics, but signals and language are more difficult. Radios and telephones are excellent for signals and language but poor for text and graphics. Furthermore, tactical situations will always dictate what type of equipment is suitable. For instance, even the most portable laptop computer is awkward

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in tactical settings. Consequently, a good communications system uses the advantages of one method to offset the disadvantages of another. The importance of planning becomes self-evident.

Communications may be thought of as a "data stream" and the "flow of information" varies in volume and direction depending on how it is to be used. Understandably, a greater volume flows through command posts than deployed units and the higher the echelon, the greater the volume. Even without an understanding of what information is being transferred, headquarters units are easily discerned by observing the volume of communications traffic routed through them. (This is a foundation for the military's signal intelligence, or "SIGINT." Many an enemy headquarters has been identified and targeted by simply noting the volume of information flowing to and from them.) Ideally, the information in the data stream can be tapped by any authorized person, whether intended for them or not. This allows the information to become shared knowledge. This shared knowledge is the most critical component of a "common operational picture." A common operational picture is one of the best ways to create synergy.[2] This is seldom practical, however, and efforts must be made to ensure the right information is routed to the right people.

It is not the amount of information that is important, however, but rather the amount of understanding. Tactical commanders are inundated with information of all kinds and in all formats, but it is the ability to determine what is relevant and how important it is that is critical, and the format of the information has much to do with the amount of understanding contained within it. For example, if you were visiting a strange city, would you rather have someone give you directions from the airport to your hotel over a telephone, or would you rather have a map with the route highlighted? Even if the directions were written in elaborate detail, nearly everyone would still prefer the map. While both formats can be provided on a single piece of paper, a map (graphic) provides far more understanding than text for this type of task. Disorientation, lost bearings and missed turns are nearly impossible to correct with text without returning to recognizable landmarks but are easily amended or compensated for with a map. Understanding can be tremendously enhanced by using multiple forms of information. Using our previous example, providing a map gives our driver a strategic perspective that can then be augmented with verbal directions via a cell phone.

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Communications systems are comprised of the various methods for transmitting information and the configurations these take are limited only by the imagination and resourcefulness of the planner. Over the ages, information has been conveyed with smoke, bugles, drums, flags, messengers and even birds. Nowadays, computers, radios, telephones and fax machines are taken for granted.

When designing a tactical communications system, one of the most fundamental questions to be answered is whether the system should be a collaborative or noncollaborative system. A collaborative system is one that requires compatible equipment or software for both the sender and recipients. A system that uses radios is a good example. Both the sender and the recipients must be equipped with compatible equipment and a common frequency. Noncollaborative systems do not have this requirement. A public address system for crowd control is an example of a noncollaborative communications system since the recipients do not need to have any special equipment, or even need to cooperate.

Noncollaborative systems are especially useful when impromptu communications are required. Because telephones and computers have become nearly ubiquitous in the modern world, some communications systems that rely on them might be considered noncollaborative since information could be shared without issuing additional equipment or software. A disaster management Web site would be one example. As software and computers become more powerful, videos, text, sound, and even graphics annotated in real-time, will provide ad hoc, two-way, multi-media communications to enable the participation of subject matter experts in crisis decisions from anywhere in the world.

There are many "moving parts" for even the most simple tactical organization and there is no doubt that command and control are the underpinnings of any successful response. Notwithstanding, communications is both the glue that binds everything together and the lubricant that reduces the friction between the many components. Commanders who neglect the importance of communications do so at their own peril. ◂◂

Endnotes

1. For more information on command and control, see "Command and Control," *The Tactical Edge*, Spring 2005, pp. 42-44, and "Command and Control Architecture," *The Tactical Edge*, Spring 1999, p. 58.
2. For more information see, "Situational Awareness and a Common Operational Picture," *The Tactical Edge*, Spring 2002, pp. 55-56.