A Network-Centric Solution

USS Missouri preparing to launch attack, Desert Storm.

DOD (Noel Guest)

Naval Operations in the Persian Gulf

By NORMAN FRIEDMAN

The Armed Forces seem on the verge of adopting a radically different network-centric style of warfare, even though few coalition partners appear willing to follow suit. It may be that the fit between network-centric and conventional warfare is poor but that the new operational style offers such benefits the United States will feel compelled to press ahead. However, conventional but less sophisticated forces can offer valuable adjunct capabilities. Considering future operations in light of the Navy experience in Operation Desert Storm suggests practices for harmonizing the employment of platforms based on disparate levels of technology.

Netted Picture—Unfettered War

Network-centric warfare relies not only on organic sensors but on a tactical picture created by integrating intelligence products. With this picture, executors can synchronize actions without requiring minutely detailed

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operations orders, attacking targets over the horizons—that is, beyond the reach of organic sensors. Thus dispersed forces can dominate large areas. Given situational awareness offered by the netted picture, decisions can be taken quickly and precisely. In addition, network-centric warfare envisages the use of relatively small numbers of precision weapons to deal with key targets as an alternative to the usual practice of attrition warfare.

What is rarely appreciated outside the Navy is that its forces have long operated in network-centric ways. Their experiences may therefore answer the coordination questions network-centric warfare raises. A shared tactical picture is not new. During World War II, U.S. and British fleets respectively developed combat information centers and action information centres, which gathered tactical pictures using on-board sensors and off-board data. With such centers the issue became how well the picture could be disseminated. Though the efforts were primitive by the standards of today, they were adequate at the time. Combat information centers, for example, enabled the Navy to destroy enemy aircraft in the Battle of the Philippine Sea—the famous turkey shoot.

Boarding party checking ship.

DOD (John Bouvia)

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Computers automated the process of assembling the picture to show more potential tracks (targets), and the associated digital link made dissemination possible in near real time. Thus computers and data links—a revolution in naval affairs of the 1960s—determined the extent to which ships could cooperate tactically. Submarine contacts could be prosecuted without interlocked computers since, as the adage goes, antisubmarine warfare (AWS) is "awfully slow warfare." However, air defense was another issue. Not only did ships have to be warned as soon as threats were detected; the netted picture was also the only reliable source of identification.

Digital tactical computers went to sea in the 1960s to receive, display, and exploit a shared (netted) tactical picture in a naval tactical data system. Other NATO navies, most prominently the British and Dutch, developed parallel systems. The picture was shared with a standardized digital channel, link 11. This enabled dispersed formations to operate together in what a network-centric tactician would call a self-synchronous fashion.

Although netting was conducted over a small area, and the content of the netted picture was limited, the result was a clear predecessor of current concepts. Several other NATO navies either adopted the American tactical net or developed their own. From the mid-1970s the Navy extended tactical concepts to create and disseminate a worldwide shipping tactical picture, initially to support Tomahawk missile strikes. The primary link was an ultra high frequency satellite channel.

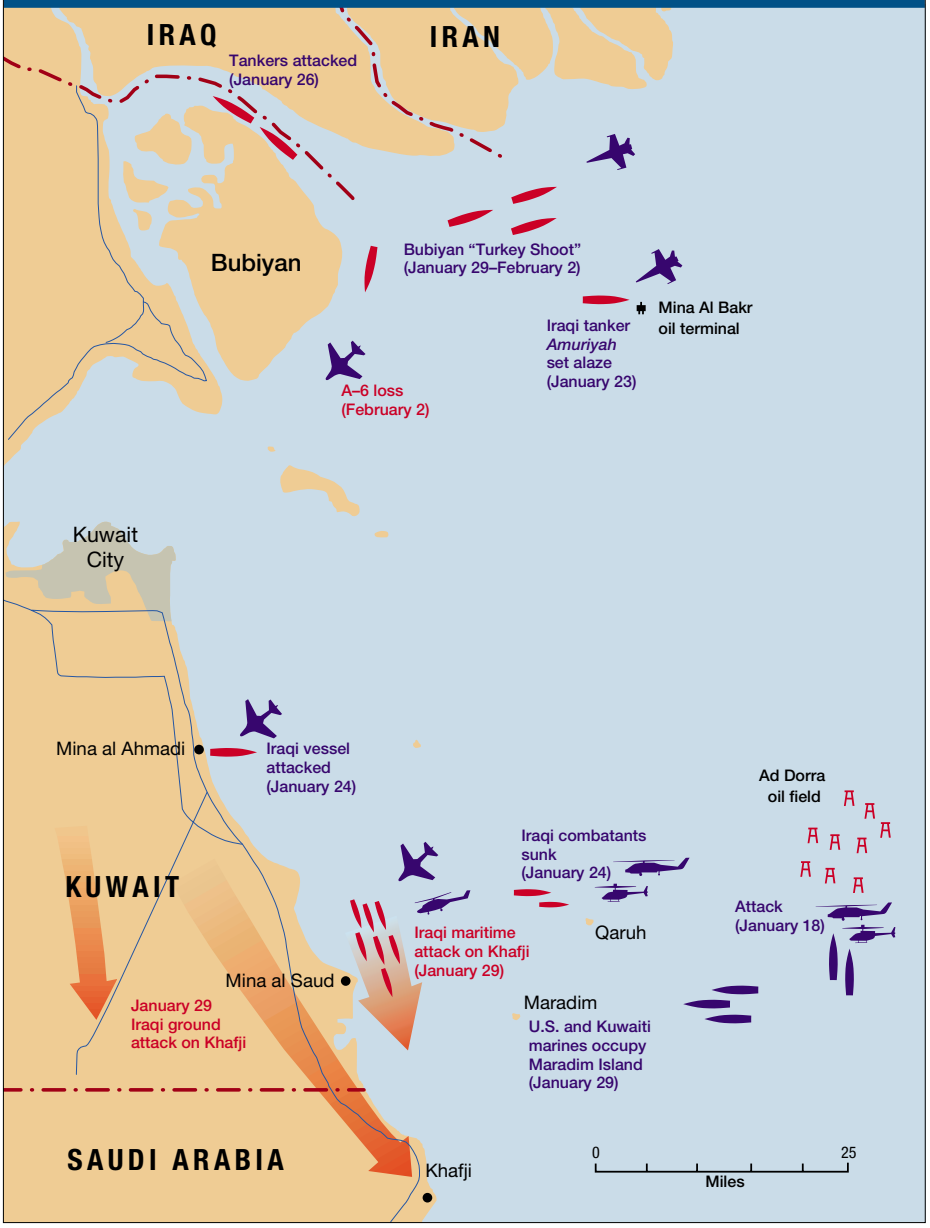
The requirement for network-centric warfare is twofold. First, the platform needs a means of receiving the link carrying the picture. Because links have a finite capacity, the picture is usually transmitted as updates. Second, the platform needs a computer to store updates and form them into a coherent tactical picture for decisionmakers. In the naval system the computerized tactical picture is integrated into weapon systems so that decisions based on the picture are implemented by the computer carrying the picture. For example, targets are assigned to weapons depending on tracks (targets) carried by the computer. Since the computer carries identification data, it can avoid friendly-fire accidents by refusing to engage a friendly track.

Aircraft often provide the main striking power of a modern navy. A fleet has relatively few planes so losses to friendly fire are serious. On the other hand, aircraft are deadly threats because they can launch stand-off antiship missiles. Therefore enemy planes must be engaged as far away as possible while friendly aircraft are identified quickly. By linking the engagement decision with identification, as given by the netted picture, a fleet can preserve its striking power. As a result, NATO ships with link 11 can cooperate tactically. Ships without it or some equivalent capability cannot. For example, whatever the advantages of combining Russian and NATO ships for a foray into the Third World, the fact that the Russian navy uses a different command structure and data link militates against exposing their warships to intense air activity. They would be too likely to shoot down friendly aircraft.

Coalition War in the Gulf

During Desert Storm the coalition placed a naval group at the north end of the Persian Gulf, where it was regularly overflown by allied aircraft returning from strikes against Iraq. The group was also in the path that Iraqi

Figure 1. Operations in Northern Gulf (January–February 1991)



Source: Edward J. Marolda and Robert J. Schneller, Jr., *Shield and Sword: The United States Navy and the Persian Gulf War* (Washington: Naval Historical Center, 1998).

aircraft would take to attack U.S. carriers, a source of many coalition strike aircraft. The ships also conducted mine countermeasures in the northern Persian Gulf.

Although many countries contributed warships, only NATO and Australian ships, sharing the data link and associated tactical doctrines, operated in the air defense zone of the northern Gulf. Even then there were problems. The airspace was also covered by land-based missiles (such as Hawks), which were not linked to the same tactical picture as ships. Mine countermeasure craft were not connected into any computerized tactical picture though they carried antiaircraft weapons. Fortunately, Iraqi aircraft flew few sorties. The coalition air force was protected largely by a rigid rule that surface-to-air weapons were not to be used. The principal exception was the defense of *USS Missouri* by *HMS Gloucester*, which shot down an incoming Iraqi missile.

Moreover, the Gulf War saw a network-centric operation on a larger scale, the international embargo directed at Iraq-bound shipping entering the Arabian Sea. An embargo may appear to be a low-tech operation, yet a small number of ships must intercept craft over a wide area. Each must be cued to meet targets well beyond the horizon, which practically defines network-centric warfare. Given a limited number of frigates and destroyers, it was difficult to ensure that all ships carrying contraband would be intercepted.

It was also important to link intelligence with ship location data because the Iraqis hoped to create an embarrassing incident to force the West to abandon the embargo. In fact Iraq did attempt such a ruse. A merchant ship, *Ibn Khaldoon*, carried baby food, and included pregnant women on board. Other crewmembers had video cameras. When marines went aboard the ship, they were to be filmed attacking women only to find baby food. Once the videotape was released to the world, the United States would be seen interfering with provisions intended for innocents, not conducting a military operation. Under the baby food, however, was contraband ammunition. Because the marines knew about the cargo and how to react, the camera captured what was beneath the deceptive layer. How and why the marines knew is the stuff of network-centric warfare, in which diverse information is fused to create the tactical picture for decisionmakers.

In support of the embargo, the ship-tracking system took account of available intelligence to identify every ship and fused information from all sources into a single, integrated picture usable by decisionmakers on the spot. Because the shipping picture was immense, it was not transmitted in one burst. Instead, like tactical data links, users got a series of updates which their computers assembled into the needed picture. Thus the user requirements included a satellite dish and modem as well as a powerful enough computer.

When the shipping tracker was devised in the 1970s, it seemed nothing short of a carrier could support the computer and display hardware, which were assembled in the tactical flag command center. But the power of computers had outstripped specifications for the center. Commercial equipment could execute the software intended for the centers. Largely through the initiative of Rear Admiral Jerry Tuttle, an off-the-shelf system was adapted as the heart of the joint operational tactical system (JOTS). Quite aside from Tomahawk targeting, the world shipping picture had enormous value to any ship commander. In that role there was no need to integrate JOTS into ship weapon systems.

the joint operational tactical system is an application of network-centric ideas

Not only could it be installed easily; it could be adapted to desktop computers, designated tactical computers largely because of this application.

JOTS is an application of network-centric ideas; for the fleet, it was one of the first uses to go beyond tactical nets. The system, which provides frigates and destroyers with the world shipping picture, passed its operational evaluation in mid-1990 before Iraq overran Kuwait and the United Nations declared an embargo. JOTS typified a new kind of defense system, software that runs on a standard, virtually stand-alone commercial computer. The software was easily reproduced and the computers were on the shelf. Thus it was simple to provide the system to enforce the embargo. It pictured not only shipping but command messages, like link 11. It became the main command tool for the embargo. Those users who had never seen JOTS found that it enhanced their systems, and indeed JOTS and successor systems are widely used by NATO navies.

U.S. and French warships moored at Manama.

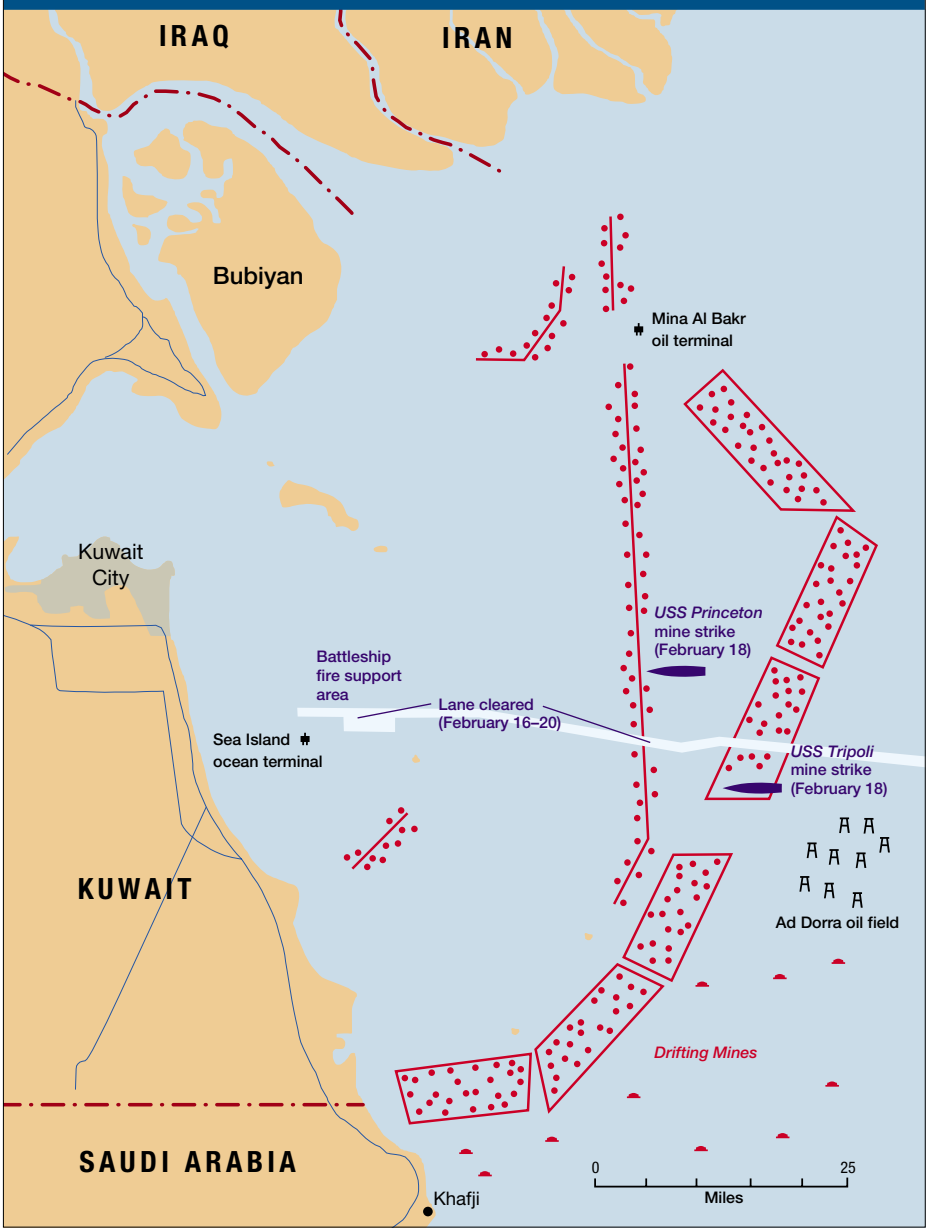
DOD (Paul J. Page)

Lessons Revealed

What does the experience of the Persian Gulf War reveal about network-centric warfare and coalition partners?

The Navy approach to combat operations is not a universal concept. Most militaries operate with tight coordination among closely-packed units. Lower-level commanders receive detailed instructions because excessive initiative may lead to disaster. Navies have the luxury of allowing greater initiative because their units are often dispersed. Their tactical pictures, at least at sea, are far simpler than those ashore. For example, in the 1960s when the Navy introduced a computer tactical picture, a typical capacity was 128 tracks—128 ships and aircraft on the screen and in memory, no more. Even that was a major advance on earlier British systems that displayed as

Figure 2. Mine Clearing Operations (February 1991)



Source: Edward J. Marolda and Robert J. Schneller, Jr., *Shield and Sword: The United States Navy and the Persian Gulf War* (Washington: Naval Historical Center, 1998).

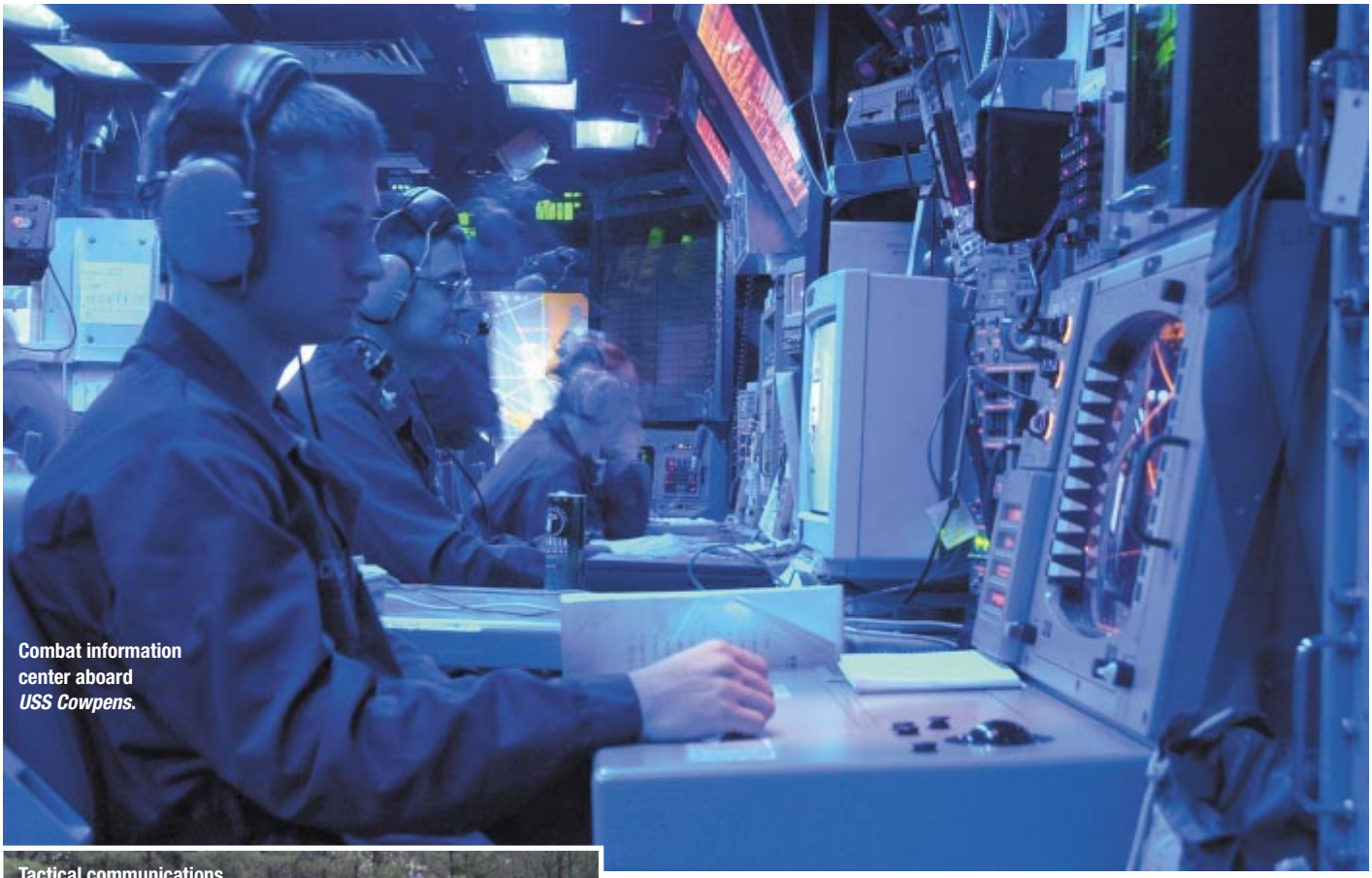
few as 24 tracks. As the Navy moves inshore, the number of vessels and aircraft which its ships see and track increase, so the standard today is approximately 4,000. That pales in comparison with requirements for land warfare, where tens of thousands of vehicles may appear within a divisional area of responsibility.

Therefore, for ground forces network-centric operation means developing a credible tactical picture on the basis of which small dispersed units can fire over-the-horizon. It is not clear how such forces cooperate with traditional militaries with densely packed units that develop firepower not from sensing but from sheer mass. It is not even apparent that network-centric forces retain the same tactical vocabulary, not to mention the same tactics.

The naval net is closely related, if only in spirit, to network-centric concepts being applied by the Army and Air Force. It integrates a tactical picture with combat control. In the Army digital battlefield concept, for example, the picture is used as a medium of command and basis for combat planning. It changes the style of combat from a concentrated mass of units on a well-defined line to a dispersed mass offering mutual support over considerable distances. Even suitable weapons for the Army are shaped by the ability to engage unseen targets.

The real challenge, however, may come not from creating a network-centric land force, but fielding one to work with conventional armies. Dispersed units are individually vulnerable because of their small size. That is entirely acceptable given mutual support and reductions in friendly fire expected on the basis of the shared picture. However, that vulnerability makes it difficult to work with a conventional force, which might be more prone to targeting errors. That is not too different from the situation of NATO versus non-NATO navies. The same may be said of air forces whose numbers are shrinking as they gain capabilities through, among other things, netting via the joint tactical information distribution system/link 16.

The same challenges for data linkage exist in combining multinational forces. In the case of NATO, extensive distribution of the crucial naval data link was completely natural because the link was needed for the wartime operations anticipated by the Alliance. But the post-Cold War world is more ambiguous. Coalitions are formed for a given operation and are unlikely to survive beyond its end, as seen in Desert Storm. If such operations require access to shared tactical pictures via encrypted data links, how can access be shared in a conflict but not afterwards? The picture really determines how network-centric forces fight. Access may enable a country to corrupt the key data in future conflicts when not a coalition partner. But providing a computer terminal while retaining physical control at all times would not



Combat information center aboard *USS Cowpens*.

Fleet Combat Camera Group (David C. Mercil)

Tactical communications system, Grecian Firebolt '99.

55th Signal Company (Francisco L. Romo)

enhance the cohesion of coalitions, which presents a dilemma.

Like past conflicts, the Persian Gulf War revealed that joint and combined integration often is essential. Air defense did not depend on the location of the platform, but rather on its common pictures of air activity. The longer the reach of existing missiles—probably an inevitable result of providing them with enough energy to deal with fast incoming targets—the more systems must share the same volumes of responsibility in the air. They must also share the same tactical picture. Widespread distribution of link 16, the joint tactical information distribution system, should go far in solving this problem, but only for the United States and some of its allies. Achieving network-centric solutions for integrated land, sea, air, space, and special operations forces will prove an even greater challenge and require innovative, low cost, and readily adaptable technology

Extending the common picture to joint forces assigned to a temporary or ad hoc coalition is problematic. Network-centric warfare can be a slippery slope. Integrating forces that are adapted only in part to network-centric systems requires disabling the unadapted portion and also inserting a bridging capability to compensate for diverse technology. JOTS illustrated that some advantages of network-centric warfare can be gained by forces that are not specially adapted to it. The system was almost a pure information terminal that did not have to be physically integrated in ship combat systems. Commanders could look at shipping pictures and shape their actions. It was a simple system that worked. The Navy example offers a proven method for the rapid integration of high and low tech forces. **JFQ**