

# Naval War College Review

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Volume 59  
Number 1 *Winter*

Article 4

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2006

## SSGN

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### Recommended Citation

Sykora, Charles D. (2006) "SSGN," *Naval War College Review*: Vol. 59 : No. 1 , Article 4.  
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## SSGN

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### A Transformation Limited by Legacy Command and Control

*Captain Charles D. Sykora, U.S. Navy*

*A pivotal tenet of the new defense strategy is the ability to respond quickly, and thus set the initial conditions for either deterrence or the swift defeat of an aggressor. . . . Today we increasingly rely on forces that are capable of both symmetric and asymmetric responses to current and potential threats. . . . Such swift, lethal campaigns . . . clearly place a premium on having the right forces in the right place at the right time. . . . We must also be able to act preemptively to prevent terrorists from doing harm to our people and our country and to prevent our enemies from threatening us, our allies, and our friends with weapons of mass destruction.*

ANNUAL REPORT TO THE PRESIDENT AND CONGRESS, 2003

**A**s budget challenges put increasing pressure on the operational forces, the ability to deter both potential adversary nations and terrorists will require the warfighting platforms of the United States to be ready to perform diverse missions in parallel. Transformation of operational and tactical precepts will be required to support these increasing demands. The nuclear-powered guided-missile (actually, cruise-missile) submarine, or SSGN, is just such a

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*Naval War College Review, Winter 2006, Vol. 59, No. 1*

transformational asset. Indeed, the converted *Ohio*-class cruise-missile-carrying submarine is in many ways a “poster child” for transformation, particularly in its employment of existing and new technologies in innovative ways to bring new combat power to bear. However, taking full advantage of this order-of-magnitude increase in power available from a single platform will require new command and control methods, as an imaginary but realistic vignette will illustrate. That said, however, even rather minor modifications to existing command and control

architecture—a negotiated mission-prioritization matrix defining multiple simultaneous operational control relationships—would produce a revolutionary advance over existing methods.

### SSGN: TRANSFORMATION'S POSTER CHILD

*Transformation is a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people and organizations that exploit our nation's advantages and protect against our asymmetric vulnerabilities to sustain our strategic position, which helps underpin peace and stability in the world.*

SECRETARY OF DEFENSE, TRANSFORMATION PLANNING GUIDANCE, 2003

The SSGN is the first weapons platform to represent in itself a truly transformational, order-of-magnitude advance. Why? After all, the submarine is not the only asset capable of multiple missions. In fact, the services today build every platform with an eye toward mission versatility. Most naval assets (unlike those of other services that must routinely return to an operating base for re-arming or retraining for new missions) deploy with the equipment and training to fulfill multiple roles. So what makes the SSGN unique in this way?

The first aspect of the SSGN's order-of-magnitude transformational ability stems from its "presence ratio," the fraction of time it will operate forward deployed and fulfilling requirements of operational commanders. Its presence ratio is the best in the business: the four converted *Ohio*-class submarines leverage the logistics infrastructure of the Trident ships to achieve a forward presence of 2.65 with only four boats.<sup>1</sup> That is, an average of 2.65 of these four submarines will be on the job at any given moment, a rate no other platform can match for prolonged periods. The SSGN achieves this astonishing ratio by capitalizing upon an earlier transformational change, one made decades ago at the onset of the ballistic-missile submarine (SSBN) program. It will use a modification of the SSBN blue-crew/gold-crew patrol cycle—the progenitor of today's Sea Swap (crew rotation to extend the forward presence of deployed ships).<sup>2</sup>

The SSGN's enormous potential is what drove the conversion of excess Trident submarines into cruise-missile arsenal ships, despite opposition from notable defense analysts.<sup>3</sup> The president himself advocated the idea: "President George W. Bush's statements on transformation of the U.S. military rarely are associated with specific programs, with two exceptions—the Global Hawk unmanned aerial vehicle and the conversion of *Ohio* (SSBN 726)-class ballistic missile submarines to conventionally armed guided-missile submarines."<sup>4</sup>

Similarly, the Department of Defense *Annual Report to the President and Congress* for 2003 highlights only the SSGN and two other platforms (the CVN-21 aircraft carrier and UCAV-45, an unmanned combat aerial vehicle) as examples of progress toward the transformative operational goals specified in the 2001 Quadrennial Defense Review.<sup>5</sup> Even before the internal report, the National Defense Panel, congressionally chartered to provide a second opinion on the 1997 Quadrennial Defense Review, specifically advocated only two new programs in its report, and one of them was the SSGN (the other was CVX, an advanced aircraft-carrier design).<sup>6</sup> The panel also reaffirmed the urgency of the need to pursue transformation, which had been introduced in the 1997 Defense Reform Initiative and was then a topic of academic debate in connection with the concept of a “revolution in military affairs.”<sup>7</sup> Since then, many decision makers have firmly associated the SSGN with transformation. Now that the administration’s recent departure from the two-major-theater-war force structure has freed up resources to finance transformation, the Defense Department, the Navy, and especially submariners can ill afford for the cruise-missile submarine to be anything but a complete success when it reaches initial operational capability in 2007.<sup>8</sup>

In what sense, though, is the SSGN transformative? The idea of “transformation,” a frequent buzzword in today’s defense circles, is all too likely to be misunderstood. One common misunderstanding is that “legacy systems . . . are suspect if not anathema.”<sup>9</sup> The extract from *Transformation Planning Guidance* above is a useful operative definition, but since it was President Bush who ignited the fires of transformation in the Defense Department by making it a major and early goal, his own words shortly after taking office are relevant: “We’re witnessing a revolution in the technology of war, powers increasingly defined not by size, but by mobility and swiftness. Advantage increasingly comes from information. . . . Safety is gained in stealth and forces projected on the long arc of precision-guided weapons. The best way to keep the peace is to redefine war on our terms.”<sup>10</sup>

The ultimate goal of transformation is to make technological leaps in order to revolutionize warfare. Submarines have made such leaps on several occasions, particularly during World War II, as Under Secretary of Defense for Intelligence Stephen A. Cambone explains:

After all, submarine warfare has been about transformation for over 100 years—its birth was difficult as it struggled against the naval establishment’s view of warfare, and it wrestled with the constraints of physics and the limits of technology. . . . The submarine assault on the Imperial Japanese Navy and the blockade of Japan, came at the cost of 52 submarines and more than 3,500 valiant men. But it dealt a crippling blow to Imperial ambition.<sup>11</sup>

In the postwar years the submarine force continued its reputation for change; ultimately nuclear power and the ballistic missile submarine were vital in winning the Cold War.<sup>12</sup> The submarine has always been about transformation; some have argued that the only reason the U.S. military today is able to focus almost exclusively on projecting power ashore is that “nuclear submarines, space based and sea based ocean sensors, the communications links to couple them . . . give the United States an asymmetric advantage (another aspect of Transformation) that assures that the use of the high seas by others depends upon American forbearance.”<sup>13</sup>

We are speaking here of the kind of transformation—marked by a great technological leap, the “big jump”—specifically envisioned by the Defense Department’s official transformation strategy.<sup>14</sup> But the cruise-missile submarine is not leap-ahead technology, and it “won’t necessarily have a lot of new capabilities, other than being able to deliver more missions from a stealthy platform.”<sup>15</sup> Further, most of the real value the SSGN modification will bring to the combat equation—compared, say, to the installation of the vertical launch system in *Los Angeles*-class submarines—is a direct result of size. Whereas the improved *Los Angeles* can carry up to forty Tomahawk land-attack missiles (if it has no other torpedo-tube-launched weapons), the SSGN in maximum-strike configuration will have 154. Alternatively, the SSGN, deploying with slightly fewer (126) missiles, will be large enough to carry two Naval Special Warfare delivery mechanisms—dry-deck shelters or Advanced SEAL Delivery Systems, or one of each—together with sixty-six men and equipment (up to 102 men for short durations).<sup>16</sup> Current fast attack submarines (SSNs) carry only one of these systems and lack facilities to keep large numbers of SEALs on board for long periods.

If, however, the submarine is not revolutionary from a technological perspective, it is thoroughly transformational in two other specific ways associated with warfighting platforms, both involving “exploratory medium jumps.”<sup>17</sup> The first involves developing future warfighting capability. The *Transformation Planning Guidance* calls this “concept development and experimentation” and identifies it as one of four pillars of transformation.<sup>18</sup> Here the SSGN excels; in fact, one of the missions envisioned for the conversion is “future payload experimentation,” an important aspect of the Navy’s Sea Trial program, itself a key component of the Sea Power 21 vision.<sup>19</sup> Such payloads, deployed from a vertical missile tube, lockout chamber, torpedo tube, or dry-deck shelter, will be tested on each patrol as operations permit.

The second variety of “medium jump” is the application of new doctrine and of new tactics, techniques, and procedures to existing or even antiquated technology. The horse-mounted special operations personnel in Afghanistan who called in precision attacks from the venerable B-52 bomber to achieve

spectacular successes against al-Qa'ida and the Taliban were an example. Of this kind of change Dr. Paul Wolfowitz, formerly deputy secretary of defense, has said, "Transformation can mean using old things in new ways—a natural result of creative innovation." Here too the SSGN can excel by virtue of its increased volume, almost quadrupling the weapon inventory of earlier types and permitting manning at levels that should allow it to carry out operations with a simultaneity and at a rate that will maximize "shock and awe."

One has to look no farther than *Joint Vision 2020* to understand this second medium jump—transformational ideas can be "innovative and form a vision for integrating doctrine, tactics, training, supporting activities, and technology into new operational capabilities."<sup>20</sup> That Joint Staff roadmap for the future also declares that "faster operations tempos, increased choices among weapons and effects, and greater weapons ranges will require continuous, *simultaneous planning and execution at all levels.*"<sup>21</sup>

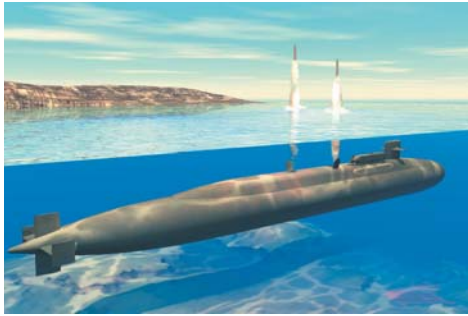
The Defense Department and the U.S. Navy have done a great deal of groundwork in preparation for the SSGN's advent, producing a draft *Standard Operations and Regulations Manual* as well as an *SSGN Concept of Operations*.<sup>22</sup> Commander, Naval Submarine Forces (ComNavSubFor) has formed four working groups to address operational, manning, and logistics issues.<sup>23</sup> Finally, ComNavSubFor has issued a contract to study SSGN command and control issues.<sup>24</sup> Under the rubric of the Navy's Concept Development and Evaluation program, ComNavSubFor has submitted a proposal for an SSGN command and control (C2) war game, with as one of its objectives the determination of the number and types of taskings an SSGN crew could perform simultaneously.<sup>25</sup>

What could possibly be missing? The answer lies within ComNavSubFor's war-game proposal:

With such a wide variety of capabilities—and the more fluid command structures envisioned in a progressively more joint military—it is almost inevitable that multiple command structures (e.g. Strategic Command [StratCom], Theater Strike Commander, Joint Forces Commander) will at some points simultaneously require mission support from the same SSGN. . . . Managing these command and control relationships is critical to optimizing the utility of the SSGN's capabilities and resources.<sup>26</sup>

If staffs solve this C2 dilemma, the cruise-missile submarine will indeed be a forerunner of a new breed of transformational platforms. The SSGN will be a force multiplier unto itself—if those in uniform, particularly Navy uniforms, push ahead the doctrinal, tactical, and procedural changes required.

With this challenge in mind, consider the following hypothetical situation, in which we can see the SSGN as a "hypertactical" asset, performing a variety of missions simultaneously on behalf of multiple operational masters.



### AN “INTERESTING WATCH” IN 2008

It is Thanksgiving in the Strait of Hormuz, and for two hours Lieutenant Barik has been Operations Watch Officer (OWO) in the Battle Management Center (BatCen) aboard USS *Florida* (SSGN 728).<sup>27</sup>

The ship is at communications depth on a moonless night. Barik is reviewing the new “launch baskets” for the updated standing U.S. Central Command (USCentCom) strike package he’d received over the

Global Broadcasting System at the start of his watch. He listens on an open mike to the internal communications circuit from the submarine’s nearby control stand, where the officer of the deck (OOD) monitors through the periscope merchant traffic in the strait.

Barik would soon hear the signal that means the SEALs are safe. This signal, a brief burst of noise designed to mimic natural biological sounds, would indicate that the SEALs are approaching *Florida* in order to couple their ASDS minisub, the Advanced SEAL Delivery System, to the hatch of the number-one missile tube of the giant submarine. Naturally, Barik is not the only one waiting for the signal. War is building in Korea, and the Joint Special Operations Component Commander in the Mediterranean is dual-hatting for the USCentCom Standing Joint Force Headquarters in Qatar; that staff is just as interested as he in knowing the SEALs are safe.

The submarine has been in a UHF emissions-control (EMCON) posture—restricted from ultra-high-frequency transmissions—since the special warfare operations began three days before; until it is lifted, the ship can use only extremely high-frequency (EHF) circuits for outgoing message traffic. Lieutenant Barik has come to appreciate the expansion of the military’s satellite bandwidth driven by ForceNet, the Navy’s communications piece of network-centric warfare.

The transmission restrictions are a necessary evil, of course. The current mission matrix—the table that tells *Florida*, the nation’s first hypertactical asset, which of its missions takes priority, should they conflict—has indicated that special-warfare operations are job one. That means that the crew cannot permit anyone or anything to detect the submarine, since detection would jeopardize the SEALs’ mission, perhaps even their lives. After all, the special operations forces are on a highly classified task. Until this morning, Barik knew only that it involved a country adjoining the strait. At that point, the Office of Naval Intelligence representative within the embarked Intelligence, Surveillance, and Reconnaissance Cell revealed that the objective is to determine the real-time



whereabouts of Sheik Abdul Omar al-Tarabulus, operational mastermind of al-Qa'ida since the demise of Osama Bin Laden.

Barik envies the OOD, Lieutenant Commander Roark. The lucky Roark, the ship's engineer officer, is acoustically tracking the progress of the merchant vessel *Lady Juleema*, which the watch team identified by classified techniques from the full spectrum of its electronic and acoustic emissions. The ship is a designated terrorist "Tier Alfa" vessel—meaning that the CentCom Joint Intelligence Center has confirmed that it had smuggled terrorist personnel or equipment. Weather during the last week and other demands on "overhead" reconnaissance left the *Lady Juleema* unlocated for almost five days, when satellite imagery last confirmed the ship in Chabahar, an Iranian port outside the strait on the Gulf of Oman.

The fact that the submarine found the vessel under way when all other search assets failed would be worthy of a mention in the ship's patrol report and might even earn the boat an "attaboy" on the next High Interest Vessel Locator message. Ever since the North Korean incursion began the previous month, the Gulf has been a ghost town, as far as American naval forces go; the USS *Ronald Reagan* (CVN 76) carrier strike group departed three weeks ago, taking with it one of *Florida's* operational masters. The submarine now works for only two bosses, besides USCentCom: a joint operations command center (JOCC) under Special Operations Command, for special-warfare operations, and U.S. Strategic Command (USStratCom) for cruise-missile attacks under the Global Strike operational doctrine. For the time being, in fact, Barik and his shipmates constitute the only American naval presence in the Gulf—and they hope that no one but selected staff members at their various commanders' headquarters know that. If there seemed to be no U.S. forces around to notice, the terrorists might be tempted to act recklessly.

So Lieutenant Commander Roark, taking his turn "dancing with the one-eyed lady," would probably get the first periscope sighting of *Lady Juleema*. Sure, Barik would like to be the one to see the vessel first, but that job is behind him; he now enjoys a new sense of excitement as the OWO, a certified tactical Tomahawk targeteer, qualified to convert targeting information into a strike mission right on board. He brings to the task the experience he gained ashore during his rotation crew's off-time as a watch officer in the USCentCom operations center.

An excited cry interrupts his thoughts: "Got her!" comes the OOD's shout over the open mike from the conn into BatCen. Selecting the periscope infrared video on his own monitor, Barik studies the silhouetted vessel's characteristic superstructure—all of it that is visible over the horizon. Mast-kingpost-funnel,



with the kingpost of the “teepee” variety . . . probably the *Lady*, but they’ll know for sure soon enough.

Barik starts at a sudden shrill tweeting from the acoustic-intercept receiver. The alarm might indicate the intercept of any of a variety of signals, but he hopes it is the one he has been waiting for. Barik hears on his speaker when the executive officer (XO) pushes the rubber-jacketed button on his phone circuit to the captain; there is no sound on the planet more obnoxious than the buzzer on U.S. submarines for this most private of lines between the periscope stand, radio, the CO, and the wardroom, and it will jar the skipper awake. “Captain—” the XO begins, only to be interrupted by the planesman shouting, “Captain’s on the conn!”

Captain Rievers’s voice comes over the open mike, “XO, you know I can’t sleep when the SEALs are out . . . not that I don’t trust you, of course. I heard it on the open mike. Good job, Mr. Roark. Now show me some submarining!”

Barik smiles. Roark will have his work cut out for him now. The SEALs are on the way back, but the merchant is, as luck would have it, bearing directly down on *Florida*. The constraints of territorial waters, the steady course the submarine



will have to steer to recover the ASDS, and the merchant’s heading approaching the Arabian Gulf from the Gulf of Oman, add up to quite a challenge. At any other time, the watch team would relish the chance to record up close the suspect ship’s electromagnetic, acoustic, and visual characteristics, giving the onboard ONI cell an opportunity to look for changes. Just last month this very merchant vessel was renamed and repainted in an effort to mask its illicit activities; Barik took pride in the fact that it

was his first submarine, *Toledo*, that videoed the vessel’s transformation and departure from a Southeast Asian dock. But now they are in for some fun.

Barik picks up the phone and punches Radio. “Petty Officer Berke, line up to transmit EHF back to the JOCC. Prepare the ‘SEALs recovered, all’s well’ message I sent you earlier. When we get into secure acoustic communications range of the ASDS and receive the ‘all’s well’ pro-word, advise the Officer of the Deck you are ready to send the message.”

“Aye, sir,” the young electronics technician replies.

The OWO sets his monitor to display the Global Information Grid and studies the Tomahawk launch baskets highlighted in red in the CentCom standing strike package. Barik needs to get these missile missions ready for the captain to review before the end of his watch; he has two more to prepare. The requirements to keep the strike package up to date are very strict; after all, you never know when StratCom will, as the *Florida* officers like to say, “reach out and

touch you,” and order a strike package. As an SSGN in CentCom, *Florida* is the most timely strike asset available, especially when in “cocked” readiness posture—continuously receiving both digital and voice data. As Barik clicks the send button to transmit the missions to the captain for approval, he picks up the phone and punches up the conn: “Officer of the Deck, Operations Watch Officer. Request you notify the skipper that the strike missions are ready for his review.”

“Very well, Ops. You know, there is only one way this watch could get more interesting—,” Roark was saying, when sure enough, an excited voice from the ISR cell in the BatCen behind him claims his attention: “Sir! Ops! We have an intercept! Looks like it’s from the *Lady*! A cell phone call, sir.”

“Very well,” Barik replies, and addresses the radioman once again. “I know this is high priority, but it doesn’t warrant breaking UHF EMCON. Petty Officer Berke, get it over EHF to our NSA reach-back as soon as the Officer of the Deck can manage.” The “reach-back” cell at the National Security Agency complex in Maryland is a direct, full-time player in this operation. “Do we still have an EHF data uplink?”

“Yes. I’ll coordinate with ISR to get the recording uplinked if you get me the antenna,” the radioman replies.

The officer of the deck cuts in, “Ops, I caught all that. We’re lucky right now, and I don’t have any merchants too close other than the *Lady*. I can give you the HDR mast if you can get your message transmitted inside fifteen minutes.” The high-data-rate antenna will get the report off in the least possible time. “The *Lady* will be too close after that to have an extra mast up and risk the radar exposure.”

“Understand. By the way, I think you just jinxed yourself—the watch just got more interesting.”

The OWO spends the next few minutes coordinating the activities of ISR and radio. The intercept recording is so long that they barely make the OOD’s transmission deadline. Barik takes advantage of the opportunity to send the SEALs’ “all’s well” message to USCentCom.

Once the HDR mast is housed again, Barik returns his attention to the tactical display, noting that the OOD has skillfully moved the sub away from the merchant’s track and is steering the recovery course for the ASDS. In fact, as the sonar display shows, the tiny, battery-powered sub is already angling in from astern, only two hundred yards away.

The staccato chirp of a Priority Tasking Alert sounds over the open mike. There are only two reasons for that alarm—real or exercise Global Strike tasking. Barik turns to his BYG-1 remote console and scans the alert area for the cause of the alarm. There it is, “a VLF Priority Task Alert.” The cryptic message means

that they received by very-low-frequency radio a message with urgent strike tasking from StratCom.

Once again, Captain Rievers was listening alertly to the open mike. Before Barik can inform the OOD, the captain's voice comes over the circuit: "Officer of the Deck, station the missile strike party. Send a brief message to StratCom to tell them we'll be ready to execute strike tasking in two hours. Get those SEALs on board, stand down the ISR cell, and make best speed to the international waters of the Gulf of Oman. Once there, re-man the ISR cell, secure from UHF EMCON, and prepare for Global Strike tasking. Call me when you're ready for periscope depth again. I'm going to BatCen to approve the missions."

As the CO enters the Battle Management Center, Barik asks, "Captain, the action's in the Yellow Sea. Why would we get tasking from StratCom rather than CentCom?"

Captain Rievers shrugs. "I don't know, Mr. Barik. My guess is the SEALs' mission paid off and the source of the tasking is too time-sensitive to go through CentCom. Of course," the skipper smiles, "it could be just an exercise . . ."

As the CO bends over the BYG-1 console and calls up the strike missions, the phone circuit howls again. Sighing, the OWO grabs the handset. "BatCen, Ops."

The junior radioman on the other end can't quite keep the excitement out of his voice. "Ops, we're getting Flash-precedence traffic on VLF. I patched it to your monitor."

"What now?" Barik laments to himself, striding over to the computer and reading the message at the low data rate to which the very-low-frequency broadcast is limited. He whistles.

"Are you keeping secrets, Mr. Barik?" the skipper asks.

"Sir, it's from Cent. It says, 'CentCom notified of Global Strike tasking. NSA confirms BOUNCED CHECK on *Lady Juleema*. As soon as strike operations are complete, you are directed to destroy the *Lady Juleema*. ROE'"—the rules of engagement that would govern the engagement—"and formal tasking to follow. Sensitive background information sent Eyes-Only."



Barik turns away from the monitor, winces, and asks, "Captain, 'BOUNCED CHECK,' doesn't that mean the ship is carrying WMD? It must have been the cell phone intercept."

In his characteristic manner, Captain Rievers only purses his lips and nods as he grabs a handset and calls the OOD: "Officer of the Deck, turn around and head for the Arabian Gulf. We'll execute the strike from there, then man the torpedo attack party and kill the *Juleema*."

## COMMAND AND CONTROL PROBLEMS

*The development of effective joint command and control for the future requires rigorous and wide-ranging experimentation, focused especially on organizational innovation and doctrinal change.*

JOINT VISION 2020

Realistic? Certainly. Melodramatic? Perhaps. Achievable? Unfortunately, not—today. Under existing command and control doctrine, the *Florida* could not work for multiple operational masters in such a way. Current doctrine, tactics, techniques, and procedures would not meet the postulated situation. Consider the array of command and control problems evident in this scene-setting scenario. It may be unlikely that circumstances would so coincide as to require simultaneous tactical action, but it would be unwise to keep in place a C2 architecture incapable of handling such an eventuality. Furthermore, U.S. Special Operations Command (USSoCom) advocates SEAL operations from submarines to develop data ashore, data that the submarine would then use to strike targets. Given this concept, a need to support SEALs while executing a strike is likely to arise sometime during the Global War on Terror. In fact, the GIANT SHADOW exercise of January 2003 involved a complex variant of this mission—two instrumented land-attack Tomahawks fired to demonstrate not just the targeting scenario but also the Multiple All-Up-Round Canister that would hold the missiles inside one Trident tube.<sup>28</sup>

In the scenario above, the *Florida* receives tasking from several commanders. USSoCom directs the Naval Special Warfare operation in progress through a joint operations command center and, certainly, with a joint task force between the SSGN and the JOCC. In the past, Special Operations Forces missions were always conducted under the regional combatant commander,\* with USSoCom as a supporting commander.<sup>29</sup> A change in 2002 to the Unified Command Plan, however, empowered USSoCom to act as a “supported commander”—that is, with the regional commander supporting him.<sup>30</sup> Presumably, this arrangement would be made in accordance with the provision of *Unified Actions Armed Forces* that when one combatant commander must conduct operations in one or more (different) regional combatant commanders’ area of responsibility, a joint task force is to be formed, approved by the president, and assigned a joint operations area.<sup>31</sup>

Regardless of the command setup for the NSW mission, no strike tasking is likely to be conducted at the direction of Special Operations Command. In the

\* Functional combatant commanders (USSoCom, USStratCom, and the U.S. Transportation Command) perform specialized tasks worldwide. The geographic combatant commanders (U.S. Central, European, Pacific, Northern, and Southern Commands) pursue broad warfighting responsibilities within defined regions.

scenario, U.S. Strategic Command, in its Global Strike role, directs the missile launch. Some might argue that the strike should have been the prerogative of Central Command. The Global Strike concept of operations is still under development, but there seem to be two cases in which USStratCom operational control would be appropriate for an SSGN, both of them in the absence of declared hostilities in the target country. (Of course, presidential approval of the strike would be required.) The first case would be a target of a strategic nature—the destruction of which, for example, the U.S. political leadership believes would deter a conflict. A second case would arise for a highly time-sensitive target, such as a terrorist leadership site or a facility or launcher for weapons of mass destruction. Since USStratCom's Cruise Missile Support Activity might have to develop the target parameters, timeliness (and hence the likelihood of success) could be improved if that command also orders the missile attack. *Florida's* strike fits both criteria.

Whatever the reason that USStratCom exercises operational control of a strike, the attack could be conducted using C2 analogous to that of NSW. *Florida*, for instance, would have a task-unit designation as a member of the joint forces assigned to Commander, Task Force–Global Strike, with a joint operations area defined either by the terrain of the current Global Strike target set (and possibly changing with target package updates) or by relatively fixed boundaries.

With the two unconventional missions covered, one might think the remaining tasks are straightforward. One of these, however—intelligence, surveillance, and reconnaissance—is not as simple as it seems, because the information obtained is of interest to two masters. Clearly, USCentCom's intelligence directorate will receive the submarine's ISR output. USSoCom will also be a "customer," however; one of *Florida's* main tasks while the SEALs were away would have been "indications and warning," scouring tactical frequencies for signs of enemy discovery of the mission. This might be an unusual pairing of consumers of the ship's intelligence, but procedures already exist to disseminate the data to concerned parties for ISR missions; after all, submarines have been performing these tasks for decades.

The last mission area involving tactical action represented in the scenario is antisurface warfare. It uses the most conventional command and control mechanism—the regional combatant commander exercises operational control through the theater joint forces maritime component commander, and any defined subordinates, to order the submarine to attack the *Lady Juleema*. There are, of course, additional submarine mission areas, such as mine warfare, that the vignette does not stress, but they would all fall under conventional C2 with the regional combatant commander.

One significant SSGN operating profile is not brought out by the scenario. The *SSGN Concept of Operations* envisions several situations where the cruise-missile boat might operate with SSNs in consort, carrying in the Battle

Management Center an officer in tactical command “dual-hatted” as a joint task force commander. If such a situation developed rapidly, however, it might be impractical for the SSGN to board such a staff. The cruise-missile submarine’s commander would become the officer in tactical command of the task group or force—perhaps as a submerged battle group, as has been suggested.<sup>32</sup> Existing doctrine should be sufficient to support the concept, although it may be prudent to consider additional tactics and procedures.<sup>33</sup>

Once the C2 methods that the functional combatant commanders would use to conduct operations in a geographic combatant commander’s area of responsibility have been promulgated, tested, and understood, none of the individual actions involved in the various mission areas are challenging in themselves. Fast attack submarines have been executing these missions for many years. However, the methods they now use fail to address the major command and control problem. Currently, there is no doctrine, tactics, or procedure to support multiple combatant commanders exercising simultaneous operational control over the same unit. In fact, many might consider multiple “OpCon” contrary to joint doctrine.

But is it? Does joint doctrine prohibit more than one commander’s exercising operational (or tactical) control over a task unit? Surprisingly, there are no explicit prohibitions in the relevant joint doctrine publications against multiple command and control chains.<sup>34</sup> In fact, when units deploy, they always have two different chains of command, operational and administrative.<sup>35</sup> However, the Joint Staff’s *United Action Armed Forces (UNAAF, or Joint Publication 0-2)*, by drawing attention to these two parallel chains of command—operational and “other” (administrative)—implies that there is only one operational chain of command, an idea most strongly associated with unity of command. *UNAAF* explains, “Unity of command means all forces operate under a single commander with the requisite authority to direct all forces employed in pursuit of a common purpose.”<sup>36</sup> With the exception of strike, individual mission areas can satisfy that criterion, since only one commander exercises responsibility for each. Even in strike warfare, if one factors in the type of strike—that is, strategic or time-sensitive, as opposed to operational, “fires” (that is, strikes considered in terms of weapon effects)—unity of command can still be achieved.<sup>37</sup> Given that unity of command can be achieved in each mission area, then, is there a way to solve the multiple OpCon problem?

## CURRENT COMMAND AND CONTROL SHORTFALLS

*As the nature of military operations evolves, there is a need to evaluate continually the nature of command and control organizations, mechanisms, systems, and tools. There are two major issues to address in this evaluation—command structures and processes.*

*JOINT VISION 2020*



Before answering the question, it may be useful to review why existing submarine arrangements will not meet the command and control conundrum. First, submariners may point out that exercising operational control in another regional commander's area of responsibility is nothing new. After all, throughout the history of the nuclear submarine, deployed boats have shifted to the operational control of the chairman of the Joint Chiefs of Staff to perform sensitive, presidentially directed intelligence, surveillance, and reconnaissance missions. Furthermore, the *UNAAF* already provides a mechanism to deal with the situation of one commander directing operations in another's area of responsibility, as detailed above. Still, this does little to solve the problem at hand.

Submariners might also insist that multiple command arrangements are not unprecedented for fast attack submarines. The Submarine Operating Authority who assigns waterspace (that is, volumes of ocean bounded in three dimensions so as to avoid mutual interference) to submarines is almost never the commander exercising tactical control, if a boat is attached to a carrier or expeditionary strike group. This is certainly a valid argument, and it may well turn out that submariners will experience no difficulty in working for multiple commanders.

If, then, submariners can already come to terms with the idea of working for numerous masters, what is there about current SSN command and control that will not work for the SSGN? After all, the missions are the same. But in fact the operational constructs are different in one important mission, Global Strike. In planning strategic or highly time-sensitive operational fires, U.S. Strategic Command must be able to establish with certainty when the attack will take place. Furthermore, it may have to vary the time frame, for reasons having to do with targets under consideration as well as the world political climate. The problem is that SSNs go as long as twenty-four hours (twelve is more typical) between periods near enough to the surface to communicate by radio, especially when transiting at high speed and great depth. In the worst case, it could be forty-eight hours before a submarine crew could discover and execute tasking. The tactical commander can shorten this communications "window," but the procedures for doing so are burdensome and generally not intuitive to nonsubmariners.<sup>38</sup> Furthermore, making the submarine available for communications too frequently may make it difficult or impossible for it to pursue other missions.

Fortunately, there are "bellringer" procedures that can convey brief, pre-arranged orders to a submarine below communications depth. One system, recently slated for decommissioning, relied upon extremely low-frequency transmitters. While the details are classified, this method permitted a submarine to operate in the lower half of its depth-speed profile and to receive (not transmit) in thirty minutes or less a trigraph, or three-character code group. This method's advantages were that the command center did not need to know the



submarine's location and could continuously transmit the signal until the boat acknowledged. Another family of bellringer methods uses acoustic transmission. These signals, though again rudimentary, are generally not affected by the submarine's depth and can be received at higher speeds; however, they require either an aircraft (usually a P-3 long-range maritime patrol aircraft) or surface ship to transmit them, because the signaling platform must be within acoustic range of the submarine.

It is thus possible to develop a communication architecture that would support Global Strike timing requirements by specifying a communications window for the submarine. All that would be needed to make this work is some way to tell the crew what these windows will be. This approach is similar in concept to alert statuses of ballistic missile submarines; however, there is no good reason to limit the possibilities to the three stages (alert, modified alert, and nonalert) that SSBNs utilize. In fact, as will be demonstrated below, it would be easy to incorporate a continuously variable communications readiness posture in the overall C2 instructions given to a submarine.

Executing the tasking in the *Lady Juleema* scenario using current command and control procedures would require rapid shifts of operational and tactical control among the commanders cited above, together with frequent redefinitions of which commanders were "supported" and which "supporting." At the pace at which the scene-setting scenario unfolded, that would be problematic at best. The command and control "overhead" would inevitably distract the crew from the tactical issues (not the least of which, in the vignette, is safety of ship in one of the world's busiest straits). Imagine the message traffic or e-mail between the command centers needed continually to lash together arrangements as the situation progressed—arrangements that would be ad hoc and of no value for the next set of circumstances. It would be better to make in advance the necessary arrangements to share operational and tactical control. To do this I propose a concept that might be called "deconflicted and prioritized OpCon and TaCon" (which, if adopted, submariners would likely refer to as DAPOT, "day-poe") and a mission matrix through which to implement it.

## THE MISSION MATRIX SOLUTION

*To accomplish assigned missions, an adaptive joint force will be capable of conducting rapidly executable, globally and operationally distributed, simultaneous and sequential operations.*

CHAIRMAN OF THE JOINT CHIEFS OF STAFF, *JOINT OPERATIONS CONCEPTS*, 2003

There is a mental antacid that may be useful in trying to digest the concept of DAPOT. First of all, in a recent informal poll of ten senior submariners, only one

expressed any reservations, and all were confident the submarine crew would be left in no doubt as to what to do.<sup>39</sup> It may also help to recognize that the proposal is not very different from concerned commands' sending their orders to individual task units. In fact, the matrix deliberately reinforces that similarity, by giving each combination of mission and commander a unique task unit designation. Obviously, though, the devil in the details has his pitchfork planted squarely in the fact that the single platform expected to fulfill these multiple tasks may find it impossible to complete some of them due to circumstances of the moment. This central truth entails a host of implementation issues.

Any solution to multiple operational control, then, must address several points. The first is which mission and commander has priority in the event of a conflict. The matrix solves this problem by specifying a priority for each combination of mission and commander; the highest-priority mission would be completed first, followed by lower-priority ones. The submarine's commanding officer, who may be the only person with the complete tactical picture, would advise his masters as soon as feasible of such conflicts and of estimated execution times. To improve situational awareness, orders from any commander on the matrix would be addressed for information to all the others, and they would assess their tasking's effect on the boat's other missions.

Of course, wider theater developments known to the combatant commander might influence mission prioritization, and it would be critical for the joint operations command center or task force commander to keep the submarine apprised of such factors. The submarine's Battle Management Center would have as one of its primary tasks (and would be staffed accordingly) to examine events outside the ship's sensor envelope to ensure that such information is factored into planning and execution.

The second point involves the effect of the submarine's tactical situation upon its ability to execute a given mission. Of course, this is an issue even without shared OpCon, but multiplicity of missions and masters compounds the problem. If a tactical situation developed that precluded the submarine from completing any mission in the required time, its commanding officer would have to send a message detailing the situation and the reaction times that resulted.

The third point is perhaps the most important from an implementation perspective, for it concerns who is responsible for issuing the mission matrix and keeping it up to date. Naturally, this would be the same authority who adjudicated any disagreements among the commanders. The matrix would have to specify the command exercising primary operational control. Depending upon circumstances, this could be either the commander with the highest-priority mission or the geographic commander in whose area of responsibility the SSGN operated. Should the submarine's commanding officer or any of the authorities

exercising operational or tactical control believe a change to the matrix necessary, they would coordinate with the primary OpCon authority, who would work out any incompatibilities and promulgate the revised matrix.

Required reaction time is the fourth issue. A column in the matrix would indicate for each mission the maximum allowable time from the issuance of an order until completion of the action. That entry would account for communications delay, as well as any planning the crew must perform. Related to reaction time is readiness posture; to address it the matrix would list for each mission both a message-connectivity window and, optionally, a bellringer window. The submarine would have to meet the most restrictive of these.

The final point is weapon control. A matrix column would list the minimum weapons that must be onboard to meet the commander's requirements for a given mission. The figure would be a composite requirement. That is, should the weapon inventory fall below the required total, any weapons expenditure would have to be approved by the primary OpCon authority in advance, unless a specific tasking relaxed a weapons requirement (for instance, Strategic Command might write an execution order so as to reduce its weapon requirement by the number of weapons the order employs, thus keeping the total weapon requirement at or below the sub's remaining weapons after execution). The submarine would, of course, keep all commands advised of weapons casualties or other changes in inventory.

The table shows the resulting DAPOT instrument as it might be constructed for the future USS *Florida*. Notwithstanding the groundwork that staffs would have to perform in reaching agreement on scenarios, this is a workable approach. Happily, the only doctrinal change required would be a provision that, in certain circumstances—such as when necessary to improve execution tempo and so deprive the enemy of decision and reaction time—and with the approval of the secretary of defense in advance, more than one combatant commander might exercise operational control and more than one subordinate command might exercise tactical control. It would be necessary to arrange and “deconflict” such shared arrangements in advance.

## OPERATIONAL EVANGELISM

*Commanders will need a broad understanding of new operational capabilities . . . in order to be capable of flexible, adaptive coordination and direction of both forces and sensors. The staffs that support commanders must be organized and trained to take advantage of new capabilities.*

JOINT VISION 2020

**FLORIDA MISSION MATRIX**

Primary OpCon: USCentCom				Date: 10 October 2008			
Mission	Priority	Task Unit Designation	OpCon	TaCon	Comms (Traffic/Bell)	Weapons (Missile/Torpedo)	Readiness
Global Strike	2		StratCom	CTF 144	10 hours/ 1 hour	50/ 0	6 hours
Oper Fires	4		CentCom	CTF 54	12 hours/ 6 hours	40/ 0	24 hours
NSW	1		SoCom	JOCC/ Cent	Contin./ n/a	10/ 4	16 hours
ASUW	6		CentCom	CTF 54	24 hours/ 1 hour	0/ 10	3 hours
USW	5		CentCom	CTF 54	24 hours/ 1 hour	0/ 4	12 hours
Anti-mining	as directed						
ISR	3		CentCom	CTF 54	24 hours/ 6 hours	0/ 0	as reqd
CSAR	7		CentCom	CTF 54	12 hours/ 4 hours	0/ 2	trans + 2 hours

NSW = naval special warfare; ASUW = antisurface warfare; USW = undersea warfare; ISR = intelligence, surveillance, and reconnaissance; CSAR = combat search and rescue; CTF = Commander Task Force

Whatever command and control arrangements it ultimately makes, the submarine force should consider training for the staffs of the commands that will exercise operational and, if appropriate, tactical control over SSGNs. Submarine operations are too often a mystery outside the “silent service”: “Invariably, attempts to employ submarines by commanders not familiar with their capabilities and limitations are severely limited in their effectiveness by paradigms that fit surface and air assets.”<sup>40</sup>

There are at least two reasons to consider staff training specifically for the SSGN. First, the mission matrix or any similar solution to the SSGN command and control problem will surely be uncharted territory for commanders and staffs. Second, the core staffs of the Standing Joint Force Headquarters being stood up in Central Command will likely be dealing with cruise-missile submarines. A biannual training “road trip” through these headquarters—an exercise in “operational evangelism”—would pay dividends in the proper employment of this unfamiliar asset. In any case, these staffs create and maintain operational and concept plans for their combatant commander; such training would help ensure that they factor submarines into that planning.

*Our response involves far more than instant retaliation and isolated strikes. Americans should not expect one battle, but a lengthy campaign, unlike any other we have ever seen. It may include dramatic strikes, visible on TV, and covert operations, secret even in success. . . . From this day forward, any nation that continues to harbor or support terrorism will be regarded by the United States as a hostile regime.*

PRESIDENT GEORGE W. BUSH, 20 SEPTEMBER 2001

The full potential of the SSGN cannot be fulfilled until Navy and joint leaders decide how to solve the problem of simultaneous operational control. This is precisely the kind of doctrinal transformation that will maximize the combat power available to the president and regional combatant commanders, particularly in the early, high-risk stages of conflict. Even as the nation shifts from the two-major-theater-war force structure, deployed forces ready to exercise asymmetric capabilities may be enough to deter. If deterrence fails, such hypertactical platforms could prepare the battle space for follow-on forces. The SSGN will be, for the foreseeable future, the nation's only asset that can deliver significant and immediate deep strikes without relying upon (and having to refuel) land-based aircraft—thus the urgency of solving the multiple and simultaneous OpCon problem.

The mission matrix, with its underlying concept as outlined here, is a possible solution, one requiring minimal change to joint doctrine. Adopting, as much as possible, existing command and control methods minimizes the burden of new tactics, techniques, and procedures. Once the naval and joint staffs put some such tool in place, operational evangelism by the submarine force can bring battle staffs up to speed with the new procedures and the capabilities and limitations of the SSGN itself. Completing these steps prior to the first cruise-missile submarine deployment will make its success all the more certain and conspicuous, a new chapter in the submarine force's long tradition of transformation.

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#### NOTES

The SSGN images are U.S. Navy artists' concepts. The dry-deck shelter is visible behind the sail in each image.

1. Commander, Fleet Forces Command, SSGN *Concept of Operations*, draft version 0.3 (Washington, D.C.: n.d.), p. 2.
2. See, for a general introduction, [www.globalsecurity.org/military/ops/sea-swap.htm](http://www.globalsecurity.org/military/ops/sea-swap.htm).
3. A prominent example is Norman Polmar. Mr. Polmar received a request from the late

Admiral Jeremy M. Boorda (Chief of Naval Operations 1994–96) for an opinion on the idea of a submerged arsenal ship, the surface arsenal-ship program, Admiral Boorda's brainchild, having been canceled (Norman Polmar, "The Submarine Arsenal Ship," *Submarine Review* [January 1997], pp. 7–9). Mr. Polmar replied in a letter advocating adding a hull section to 688-class submarines rather than converting Tridents, citing higher costs for the latter. His relative cost estimate turned

out to be inaccurate, but Mr. Polmar cannot be blamed, because the non-START-accountable method would have been prohibitively expensive. Mr. Polmar later wrote another article opposing the SSGN (“Submarine for All Seasons?” U.S. Naval Institute *Proceedings* [August 1999], pp. 87–88). One of his arguments this time was that only four SSGNs would not provide a presence on which combatant commanders could rely. For some reason, he did not consider the obvious solution of operating the SSGNs with two crews, like SSBNs. He also cited concerns about the boat’s ability to remain stealthy in the intense communication environment of strike operations. While this would be a concern for any submarine, the solution is simply to move to a location where counterdetection either will not occur or would be of no concern. His other arguments, such as that the Trident’s size would make littoral operations more challenging, are not compelling.

4. James H. Patton, Jr., “Make the SSGN Truly Transformational,” U.S. Naval Institute *Proceedings* (August 2002), pp. 65–67.
5. Secretary of Defense, *Annual Report to the President and Congress* (Washington, D.C.: 14 May 2003), p. 9, and *Quadrennial Defense Review Report* (Washington, D.C.: 30 September 2001), p. 30.
6. National Defense Panel, *Transforming Defense: National Security in the 21st Century* (Washington, D.C.: Department of Defense, December 1997), p. 49.
7. Secretary of Defense, *Defense Reform Initiative Report* (Washington, D.C.: November 1997).
8. For the genesis of the departure, see the 2001 *Quadrennial Defense Review Report*, p. 17. For an explanation of why the Defense Department made the change and of its application to transformation, see Senate Armed Services Committee, prepared statement by Deputy Secretary of Defense Paul Wolfowitz for hearing on military transformation, 107th Cong., 2d sess., 9 April 2002, available at [www.defenselink.mil/speeches/2002/s20020409-depsecdef2.html](http://www.defenselink.mil/speeches/2002/s20020409-depsecdef2.html).
9. W. J. Holland [RAdm., USN (Ret.)], “Submarines in Transformation,” *Submarine Review* (April 2004), pp. 39–45.
10. President George W. Bush, “Remarks by the President to the Troops and Personnel,” Naval Air Station Norfolk, Virginia, 13 February 2001, available at [www.whitehouse.gov/news/releases/2001/02/20010213-1.html](http://www.whitehouse.gov/news/releases/2001/02/20010213-1.html). While President Bush made transformation one of his administration’s main priorities, the effort had begun shortly after the Cold War, as an offshoot of the “revolution in military affairs” and a derivative Defense Reform Initiative.
11. Dr. Stephen A. Cambone, Under Secretary of Defense for Intelligence, “Transformation of the Submarine Community,” speech at the 103d Anniversary of the Submarine Force, 26 April 2003, Washington, D.C., available at [www.defenselink.mil/news/May2003/b05092003\\_bt314-03.html](http://www.defenselink.mil/news/May2003/b05092003_bt314-03.html).
12. For an assessment of the innovativeness of the U.S. submarine force in those years, see Owen R. Cote, Jr., *The Third Battle: Innovation in the U.S. Navy’s Silent Cold War Struggle with Soviet Submarines*, Newport Paper 16 (Newport, R.I.: Naval War College Press, 2003), available at [www.nwc.navy.mil/press/npapers/np16/NewportPaper16.pdf](http://www.nwc.navy.mil/press/npapers/np16/NewportPaper16.pdf).
13. Holland, “Submarines in Transformation,” p. 43.
14. Secretary of Defense, *Military Transformation: A Strategic Approach* (Washington, D.C.: Fall 2003), p. 9.
15. Lisa Toshinsky, “Navy Gets Foot into Transformation through Fiscal 2003 Budget,” *Navy News & Undersea Technology*, 4 February 2002, p. 1.
16. Robert Aronson [Cdr., USN], “SSGN: A ‘Second Career’ for the Boomer Force,” *Undersea Warfare 2* (Winter 1999), p. 2, and “SSGN: A Transformational Force for the U.S. Navy,” *Undersea Warfare 4* (Fall 2001), p. 1.
17. Secretary of Defense, *Military Transformation*, p. 8. There is actually, of course, a third category of transformation—the continuous, small, incremental improvements to existing core missions. This type of transformation can undoubtedly be expected as a result of the SSGN.
18. Secretary of Defense, *Transformation Planning Guidance* (Washington, D.C.: April 2003), p. 17.
19. Commander, Fleet Forces Command, *SSGN Concept of Operations*, p. 9.

20. Chairman of the Joint Chiefs of Staff, *Joint Vision 2020* (Washington, D.C.: U.S. Government Printing Office, June 2000), p. 10.
21. *Ibid.*, 32 [emphasis supplied].
22. Commander Second Fleet message, subject “ConOps Development in Support of Sea Strike and Sea Basing,” date-time group ComSecondFlt 191531Z Apr 04.
23. Cdr. Steven A. Dreiss, “RE: Scene Setter,” e-mail to the author, 24 May 2004. The working groups are Maintenance and Modernization, headed by Commander Naval Submarine Force N4, looking at issues surrounding overseas crew turnovers (during crew voyage repair periods) and of maintaining the ship in a modified Trident maintenance plan; Training and Certification (N7), training/certification for crews during their off-periods to enable the crews to report overseas ready for strike/special-operations missions and with some proficiency in other areas; Concept of Operations (N3), working with Second Fleet to flesh out what fleets can expect to get, or should ask for, from SSGNs under their operational control; and Experimentation (N8), examining other potential payloads and equipment to expand the SSGN’s capabilities.
24. Ryan Peugh, “SSGN Concept Paper Tasks (Rev 1),” e-mail to the author et al., 21 May 2004. SPA has three tasks.
  - Task 1: To examine SSGN-SOF Strike Group command and control arrangements, to include potential operational-control and tactical-command arrangements between StratCom, joint task force commanders, expeditionary strike forces, and joint force maritime, land, and air component commanders. To investigate challenges arising from these multiple command relations and propose new doctrine changes or command relationships to address them.
  - Task 2: To examine theater and strategic roles and missions for the SSGN-SOF Strike Group and their impact on C2 relationships.
  - Task 3: To develop a white paper report.
25. Brad Kratovil [Capt., USN (Ret.)], “SSGN Command and Control,” Sea Trial Information Management System (database), 23 December 2003.
26. *Ibid.*, in the “Purpose” block of the form.
27. None of the events in this scenario are factual or intended to reveal actual tactics, techniques, or procedures the submarine force employs in the Global War on Terror. The personal names are fictional, and capabilities represented come from unclassified sources. The scenario, while fictional, is intended to convey the command and control challenges an SSGN might actually face.
28. David Nagle [Chief Journalist (JOC), USN], “Charting the Course of the Future Navy: Giant Shadow Showcases Potential Future Capabilities,” *Undersea Warfare* 5 (Spring 2003), p. 3.
29. See Joint Chiefs of Staff, *Unified Action Armed Forces [UNAAF]*, Joint Publication 0-2 (Washington, D.C.: 10 July 2001), available at [www.dtic.mil/doctrine/jel/new\\_pubs/jp1\\_02.pdf](http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf), for definitions of “combatant command,” “supported commander,” and “supporting commander.”
30. House and Senate Armed Services Committees, *FY 2005 Defense Budget Testimony*, prepared statement by Secretary of Defense Donald Rumsfeld, 108th Cong., 2d sess., 4 February 2004.
31. *UNAAF*, p. V-1.
32. William R. Merz [Cdr., USN], “The Submerged Battle Group: A Synergistic Capability for the Joint Operational Commander,” *Submarine Review* (January 2004), pp. 18–35.
33. The significance of the SSGN mission (especially in comparison to that of *Ticonderoga*-class cruisers) may in itself warrant major-command status; consort operations, if frequent, reinforce the notion.
34. The three most relevant joint publications are: *UNAAF*; Joint Chiefs of Staff, *Doctrine for Joint Operations*, Joint Pub 3-0 (Washington, D.C.: 10 September 2001); and Joint Chiefs of Staff, *Joint Warfare of the Armed Forces of the United States*, Joint Pub 1 (Washington, D.C.: 14 November 2000).
35. *UNAAF*, p. I-6.
36. *Ibid.*, p. III-1.
37. The author interprets “operational fires” to include those applied not only outside the factor space of the JOA but any applied outside any factor from the main combat action



(see Milan N. Vego, *Operational Warfare* [Newport, R.I.: Naval War College, Joint Military Operations Department, 2000], pp. 239–40). Thus fires that are designed to achieve a decisive impact on the outcome of a campaign or major operation and that use forces other than those of the main action or fires executed in the battlespace preparation period can be considered “operational.”

38. This is generally done by changing a field in the submarine’s SubNote, a formatted message that limits the waterspace in which a submarine may operate.

39. The single dissenter believed the combatant commanders would never be able to overcome the “turf issues” arising from sharing OpCon.

40. Merz, “The Submerged Battle Group.”