Naval War College Review

Volume 44
Number 4 *Autumn*

Article 4

1991

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IN THE PERSIAN GULF WAR, the Soviet military has seen the future—and it works. According to representatives of the General Staff Academy, the Gulf War was a "technological operation" and therefore a prototype of future war. As a result, the development of the Soviet armed forces will now be envisioned "through the prism of the Persian Gulf." The Soviet military has been quick to link the coalition's victory to the achievement of surprise and air superiority at the outset of war. Military experts have thus begun to argue that the Gulf War dictates significant changes in Moscow's defensive doctrine.

In late February 1991, the General Staff established a Special Operations Group to monitor the course of the Gulf War and study the impact of modern weapons and command-and-control systems. In addition, the General Staff Academy has conducted several military-scientific conferences to discuss the implications of the conflict.

The Soviet approach to future war provides Soviet analysts with insights into the real advantages that allowed the coalition to neutralize Iraqi forces. In Soviet military thought, the armed forces must be structured according to the nature of future war. Soviet military doctrine is accordingly riveted to *future* military capabilities and environments even in the era of "new thinking" and *perestroika*. While the Soviet military establishment has undergone substantial changes under President Mikhail Gorbachev, mainstream views on future war reflect the focus on emerging military technologies that Marshal N.V. Ogarkov initiated in the early 1980s. Despite a noticeable degree of civil-military divergence regarding the future of the Soviet armed forces, the civilian leadership has not sought to impede the development of those technologies perceived to be at the heart of future Soviet military capabilities: advanced conventional munitions,

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directed-energy weapons, and space-based systems. Convinced that the wide-scale deployment of these weapons was inevitable, the Soviet military had developed a comprehensive and revolutionary vision of future war long before the Persian Gulf conflict.

This article will first describe the Soviet image of future war as it existed before the Gulf conflict. It will then document initial Soviet commentary on the impact of the Gulf War upon critical elements of this vision: the role of advanced non-nuclear weapons and the systems used to integrate them, the roles of offense and defense, the roles of surprise and the initial period, and the kind of force structure dictated by future war. Finally, the article will examine the state of Soviet military research and development (R&D) for future war.

Soviet perceptions of "lessons learned" from the Gulf War must be attended by certain caveats. First, prominent military scientists have advised that final Soviet assessments will appear only after the military has incorporated Western analyses of the war. Second, initial Soviet commentary is characterized by vivid contradictions that stem from the budgetary and parochial considerations endemic in any military organization. Third, Soviet analyses of the Gulf War are inevitably caught up in the domestic political struggle currently underway in the Soviet Union. Both reformers and conservatives will use "lessons" from the Gulf War as political capital to support their respective positions. Finally, Soviet statements on the performance of weaponry in the war are necessarily colored by the need to maintain Soviet arms sales to Third World countries. These cautions aside, early Soviet commentary has in fact highlighted several significant lessons from the Gulf War that either substantiate or invalidate key aspects of the Soviet image of future war as it had developed. According to military scientists, these lessons cover "the entire spectrum" of military affairs.

The Military-Technical "Revolution"

In the early 1980s, Marshal Ogarkov and others began to stress that the emergence of advanced non-nuclear technologies was engendering a new "revolution" in military affairs.[1] Ogarkov argued that in modernizing military theory and practice "stagnation and a delayed 'perestroika' of views . . . are fraught with the most severe consequences."[2] Throughout the 1970s and 1980s, he lobbied persistently for a timely incorporation of the new non-nuclear technologies into Soviet military art and force structure, contending that principal weapons systems are now being replaced every ten to twelve years.[3] A review of Soviet writings from 1980 to the present, moreover, reveals no evidence of a dispute on this issue between Ogarkov and the rest of the military leadership.

During his own tenure as chief of the General Staff, Ogarkov stimulated a renaissance of military theory and its application that included development of

strategic operations and establishment of high commands in theaters of military action (TVDs), a growing emphasis on the role of space and defensive operations in modern warfare, reorganization of the air force and air defense forces, experimentation with corps and brigade structures, and streamlining command-and-control structures.[4] These efforts have continued apace since the accession of Gorbachev, and the military leadership has continued to stress the need for appropriate "technological equipping" of the armed forces to meet the demands of future war.[5] Indeed the Soviet military now concentrates primarily on the projected impact of ongoing technological trends. Prompted by the dictates of a high-technology conventional battlefield, the current re-examination of military art promises dramatic changes in the force structure and combat employment of the Soviet armed forces.[6]

Soviet military theorists have focused since the early 1980s on technologies associated with automated decision-support systems, microelectronics, telecommunications, lasers, and enhanced munitions lethality. In general, these technologies comprise "high-precision weapons" (advanced conventional munitions) and "weapons based on new physical principles." More specifically, the Soviets have focused on the combat potential of kinetic energy weapons (e.g., magnetic rail guns and hypervelocity projectiles), particle-beam weapons, laser weapons, electromagnetic pulse (microwave) weapons, and third-generation nuclear weapons (both separate weapons systems as well as means for supplying power to other systems, e.g., the nuclear-pumped x-ray laser).

Soviet theorists are more visionary than those in the West when assessing the potential application of these technologies to military science. They argue that under current conditions, wherein the intervals between new generations of weapons systems are sharply reduced, military art must be based on existing military technology but especially on a forecast of its possible development.[7] While these theorists rarely give a specific time horizon for implementing the revolutionary changes, they are convinced that a future war *will* be waged in a high-technology environment. The basic scientific research has been completed, and the mass deployment of these systems is viewed as a foregone conclusion.

Current military-technological forecasting covers two general periods. The Soviets expect to see between 1990 and the year 2000 the development and fielding of long-range surveillance, target acquisition, and weapons delivery systems, and low-observable aircraft and missiles. Between 2000 and 2010 or 2015 they expect the deployment of directed-energy weapons, new families of explosives, earth-penetrating weapons, and advanced robotics. According to Marshal Ogarkov and others, however, "as long as new weapons and military technology are used in limited quantities, they will most often simply be adapted to existing methods of armed combat or at best they will introduce only certain partial corrections."[8]

The upshot of these technological trends has been a new premium on "quality" over "quantity" in future military development. Theorists argue that while the arms race was formerly "qualitative-quantitative," today it is a rivalry in which success goes to the side that develops new design concepts and prototypes more rapidly. "In contemporary conditions, as a result of the military-technical revolution, advantage in the area of technical equipping of the armed forces accrues not only to the side that has a larger store of military materiel, but first of all to the side that is the leader in the development and introduction into the forces of qualitatively new systems."[9]

The Soviet military further believes that conventional weaponry will be the chief beneficiary of technological advancements. As Colonel Bondarenko wrote in 1986, "if in the recent past, strategic nuclear-missile weapons were the main area in which the newest scientific ideas were used, then at the present time these ideas are being actively used in the development and creation of conventional types of armament, increasing to a significant degree the combat effectiveness, reliability, and other characteristics of these weapons."[10]

Another recurrent theme associated with the military-technical "revolution" is the Soviet accusation that the United States and Nato seek, through the so-called "competitive strategy," to deprive the Soviet Union of its superpower status. Such luminaries as Defense Minister Yazov and Chief of the General Staff Moiseyev charge that the West is striving to exhaust the Soviets economically by forcing a qualitative arms race in emerging technologies.[11] The West is said to be developing over 150 types of new military technologies (not counting radioelectronics), eighty percent of which will have entered the inventory by the year 2000.[12] Western military planners supposedly believe that microelectronics and computer technology are becoming the key factors in the qualitative development of weaponry and hence in the achievement of decisive superiority over the Soviet Union.[13] The United States plans to achieve such superiority with "non-nuclear strategic (global)" weapons systems. Superiority in airborne systems, for example, will be achieved by increasing the combat potential of strike aircraft, remotely piloted vehicles, and long-range conventionally-armed "high-precision" missiles.[14]

In late 1990, the General Staff journal *Military Thought* warned that the Pentagon's "competitive strategy" exploits U.S. technological superiority in specific areas of weapons system development, information science, communications, optics, etc. The United States would accordingly be constantly in a state of "qualitative spurt" in the scientific-technical revolution—leaving Soviet weapons systems behind. The Pentagon, in this view, assigns priority to development of conventionally-armed cruise and ballistic missiles, systems using stealth technology, and battle management, reconnaissance, and electronic warfare systems.[15] In addition, the Soviet military frequently charges that the United States orients weapons development in directions that ensure not only

military superiority but also the economic exhaustion of the Soviet Union, by requiring Moscow to shift resources away from civilian and into military spheres.[16]

Finally, the Soviet military argues (notwithstanding an implicit contradiction with their charges of a specifically American technological "conspiracy") that the military-technical revolution is occurring in all the most developed countries and that the technologies involved are universal rather than country-specific. According to a 1991 article by Colonel Yu. Alekseyev, military-technological modernization, just like scientific thought itself, cannot be stopped.[17] Moiseyev and others stress accordingly that military science must be focused on solving problems of the *long-term* future.[18]

Soviet Views on Future War

The Soviet military has consistently held that military art and force structure must accord with the nature of a future war. The Soviets have also long subscribed to Lenin's dictum that it is criminal not to possess all the weapons possessed by the opponent. Defense Minister Yazov has stressed that the Soviet Union is compelled to prepare for whatever war the aggressor prepares.[19] In the early 1980s a consensus began to form in authoritative Soviet military writings (as also in the West) that a future war between Nato and the Warsaw Pact would be a protracted conventional war involving several continental and maritime TVDs. Despite budgetary constraints and the new defensive doctrine, this consensus has persisted to the present.

In a 1988 *Military Thought* article, for example, General of the Army G.I. Salmanov, then head of the General Staff Academy, warned that while the Soviet Union and Warsaw Pact must be prepared for all types of wars, they must focus primarily on a protracted world war. There are grounds for assuming, he continued, that "the belligerents will strive to achieve their strategic and political objectives using only conventional means of destruction."[20] Such a war would be characterized, however, by a constant threat that the opponent would use nuclear weapons. Captain First Rank Galkovskiy warned in a 1990 *Military Thought* article that the United States plans to achieve "decisive strategic objectives" in the course of a protracted (six-month) war waged with advanced non-nuclear technologies in several areas of the world simultaneously.[21]

Military Thought published a special edition in late 1990 that articulated both the draft Soviet military doctrine for the 1990s and the draft Ministry of Defense ten-year military reform plan. According to the draft doctrine, a nuclear war would be global and catastrophic for all mankind. There would be no victors in such a war, and assumptions limiting it to a single region or TVD are groundless. A conventional war, on the other hand, *might* be global and protracted. Modern conventional weapons systems—especially advanced conventional munitions

(ACMs)—will become the "basic means of warfare."[22] Both drafts note that the situation in the Third World is fraught with the threat that local wars will develop into global war and that the great powers will be directly involved.[23]

The nature of the weaponry that will be employed is a major factor in Soviet views on future war. In the early 1980s, Ogarkov began to focus special attention on "developing methods of combat action under conditions where the opponent uses precision combat complexes, new means of reconnaissance and radioelectronic combat, and automated systems of guiding weapons and commanding troops."[24]

With the development of the Air-Land Battle and Follow-On Forces Attack concepts incorporating these new conventional means, Moscow perceived that the West was gaining an edge in the qualitative arms race. In late 1990, *Military Thought* explained that the "Air-Land Battle/Future" concept is based on: highly effective ground, air, and space-based reconnaissance, surveillance, and target acquisition systems; powerful weapons of great precision, range, and destructiveness; and automated command, control, and communications systems that allow strikes in real time. The concept is closely entwined with the Maritime Strategy,[25] which assigns a special role to naval operations in sea and ocean TVDs; these would be conducted according to the concept of the "Air-Naval Operation." Soviet theorists also note that since 1987, the United States has been developing the unified concept of an "Air-Land-Naval Operation."[26]

Since a future war is expected to be global in any case, the Soviets stress that control of space will be decisive for operations aimed at controlling large sections of the earth. Indeed, the Soviets claim that the main focus of the Strategic Defense Initiative (SDI) is not anti-ballistic missile defense but development of fundamentally new types of weapons even more effective than nuclear. When deployed in space, these weapons would replace nuclear weapons and assume a global significance. Thus, a central objective of the Soviet military is the establishment of a deeply echeloned global defense with a space component that will ultimately become dominant for both offensive and defensive purposes.

In addition to advanced non-nuclear technologies, the new Soviet vision of future war projects the emergence and combat employment of "third-generation" nuclear weapons. General-Major F. Gontar', for example, warns that the United States is developing these weapons (x-ray lasers with nuclear excitation, nuclear microwave and kinetic weapons, etc.) within the framework of SDI.[27] According to General of the Army V. Shabanov, deputy minister of defense for armaments, the new varieties of third-generation nuclear weapons that the United States is developing may be the chief danger of a potential arms race in the qualitative sphere.[28] They are effective not only against space targets but also against terrestrial targets. However, global pollution from third-generation weapons will be a hundred to a thousand times less than from existing ones.

According to General-Major V.G. Slipchenko, head of the Scientific Research Department of the General Staff Academy, the main reason for the decline of second-generation nuclear weapons is the so-called "nuclear impasse:" the destructiveness of these weapons negates their utility for achieving any military or political objectives. Third-generation nuclear weapons, however, because they are ecologically "clean," could realistically be used to destroy the opponent's ground-based infrastructure. As a result, nuclear warfare is no longer excluded and could even become the basic instrument of policy in the future. These weapons would be primarily sea and space-based. Again, the technologies are already available, but the weapons must be accumulated in sufficient numbers.[29]

According to Marshal S.F. Akhromeyev, third-generation nuclear weapons are meant primarily for implementing the SDI program. These weapons are small in size and yield and can be used in space to hit missiles in flight. Akhromeyev warns that with such a system, the Americans can destroy the nuclear weapons of the other side on a mass scale. "Then they will possess the same strike capacity as we do," he argues, "and at the same time will protect themselves completely—or at least with a very high level of reliability—against our strike. Then the sides will be in a completely unequal position."[30]

Space-based reconnaissance, surveillance, and target acquisition systems linked in real time to long-range strike means would give substance to the Soviet vision of global non-nuclear war. These so-called "reconnaissance-strike complexes" are viewed as the nucleus of warfare in the twenty-first century.[31] To understand the fundamental changes in the nature of warfare generated by qualitatively new weapons and their combat employment, it is important to take account of the integration of reconnaissance, electronic warfare, weapon control, and command-and-control equipment into unified systems at the formation and strategic levels. Reconnaissance-strike and reconnaissance-fire complexes (referred to generically as RUKs) can be viewed as such systems.[32]

Integration of weapons, reconnaissance equipment, and automated command-and-control systems greatly increases combat capabilities, expands the range of missions possible, and shortens the time required. Soviet analysts cite the testimony of "foreign military specialists" that employment of future RUKs will permit the destruction of a significant number of enemy targets and force groupings before contact with them and before commitment of friendly forces. These combat systems are generating changes in the nature of warfare and dictating the development of fundamentally new ways and methods of employing the armed forces.[33] According to *Military Thought*, the forces created by such systems acquire qualitatively new properties, and warfare becomes a process in which complex organizational-technical systems—"combat systems"—mutually influence each other.[34]

Finally, the new Soviet vision of future war focuses on the dramatic changes engendered by information sciences—the enhanced effectiveness of weaponry

resulting from its "intellectualization."[35] *Military Thought*, for example, believes that "Nato military specialists" are implementing a "Strategic Computer Initiative," whose primary objective is to make all new conventional weapons "intelligent" to support decision-making in real time.[36] "Intellectualizing methods" permit control of the weapon not merely up to the moment of fire, but throughout its entire function. This produces an almost hundred-percent probability of kill, and frequently reduces requirements for projectile speed and weight. The control factor becomes determining; increasing speed and weight degrades control and, therefore, effectiveness. The key, say the Soviets, in the competition between offensive and defensive systems is, increasingly, the control factor: the more controllable and maneuverable weapon will win. The ideal design would be a flying air cushion disc that can move easily in all directions and is armed with a variety of missiles;[37] a missile is therefore superior in all respects to a tank.

According to Soviet experts, even the very first phase of "intellectualization" should lead to a radical transformation of weapons system design and use. The next phase, automation of decision-making processes, could generate radical organizational changes in the armed forces themselves. It will "robotize" the battlefield, requiring armed forces that are dramatically smaller but much more highly trained than at present. Changes in the structure and functions of different service branches will probably result.

Soviet experts note further that in the "intellectualization" arms race, competition might be expressed not in quantitative accumulation but in increased capacity for programmable weapon system performance. The arms race is moving into the sphere of software: the richer the variety of possible system behavior or of preprogrammed alternative logic branches available to a force, the more effective the force or system is. As a result, say the Soviets, the application of information sciences to the military sphere will not merely change the performance characteristics of weapons but will create a radically new military-political situation.[38]

Prominent military scientists predict, based on the development of nuclear and non-nuclear strategic offensive forces, a near-term shift toward an "essentially new type of war—the aero-space war."[39] Such a war would massively involve cutting-edge technologies: ballistic missiles with maneuvering warheads; long-range cruise missiles; advanced conventional munitions; reconnaissance-strike complexes; orbital aircraft; stealth; and directed-energy, space-based strike, and third-generation nuclear weapons. According to General-Major Slipchenko, by the year 2000 the space-based layer alone will be capable of destroying thirty to fifty percent of an opponent's retaliatory potential.[40]

Integrating all such analyses, Soviet military theorists envision a future war whose politico-military objectives are achieved not by seizing territory but by destroying an opponent's military capabilities and infrastructure. General

Slipchenko gives as the three criteria for achieving victory, first, destruction of the opponent's armed forces; second, destruction of the opponent's military-economic potential; and third, overthrow of the opponent's political system. In the past, achieving these objectives was said to be impossible without capturing and occupying his territory. But with ACMs alone, it is now possible to achieve the first two objectives. As a result, the political system will not survive.[41]

While warfare has been described for decades as "three-dimensional," limitations (on the global scale) on the operational scope of submarines and the altitude and endurance of aircraft have meant that the vertical axis has been dwarfed—both physically and effectively—by the longitudinal and latitudinal. The Soviets assert, however, that a new generation of airborne and space-based systems is at last giving warfare a true third dimension. The Soviets assert that while they lack sufficient quantities, they have already developed the technologies required to wage such a war: air and sea-launched cruise missiles, remotely piloted vehicles, and space-based support. They predict that by 2000 both sides will have accumulated such systems in sufficient numbers to conduct the aero-space war. Warfare in the ongoing transition period will resemble that conducted in the Persian Gulf, with a declining role for piloted aircraft and a growing one for air, sea, and space-based directed-energy weapons.[42]

"Through the Prism of the Persian Gulf"

For the Soviets, the operations in the Persian Gulf represent the first concrete example of "intellectualized" warfare. General-Major Slipchenko sees that conflict as a clash between two concepts of war: that of the past (Iraq) and of the future (the U.S.-led coalition). The coalition forces won because they were fighting in the future, and Iraq lost because it was fighting in the past. The Soviets view the war as a "transition between old and new," inasmuch as the effect of air attack weapons was the basis of victory. Marshal Ogarkov's prescient demands for rapid incorporation of emerging technologies into Soviet military theory and praxis have now been vindicated.

The Soviet military's evaluations of its own doctrine and strategy in light of the Gulf War cover a spectrum ranging from "obsolete" to "prophetic." Colonel A. Tsalko, for example, observed that the crushing defeat of the Iraqi army demonstrated the obsolescence not only of Soviet military doctrine but also the entire Soviet model of military development.[43] Speakers before the Moscow City Council argued that the war demonstrated that Soviet doctrine and its principles of military development had "considerable drawbacks" and that prevailing Soviet views on modern war had become "outdated."[44] Marshal V. Kulikov, former commander in chief of the Warsaw Pact, has acknowledged that the Gulf operations "modified the ideas we had on the nature of modern

military operations. . . . The Soviet Armed Forces will have to take a closer look at the quality of their weapons, their equipment, and their strategy."[45]

On the other hand, some prominent Soviet military scientists see in the impressive performance of high-technology weaponry in the Gulf the realization of the qualitative revolution that Ogarkov forecast nearly a decade ago. All of the developments that Ogarkov had highlighted in the early 1980s were used in the Gulf War, including for instance the "automated search-and-destroy" or "reconnaissance-strike" complex in the form of the Joint Surveillance and Target Attack Radar System (JSTARS) in combination with the Multiple Launch Rocket System (MLRS).

Soviet military experts have stressed repeatedly that the coalition won so quickly and with minimal losses because of its "overwhelming superiority in contemporary methods of warfare: in aviation, advanced conventional munitions, and means of reconnaissance, communication, command and control, and electronic warfare."[46] Also telling was the coalition's superiority in strategy and tactics, the skillful combination of fire and maneuver, and coordination among tank, motorized infantry, artillery, aviation, and marine units. The centerpiece, however, according to most analysts, was in the rapid allied achievement of surprise and "command of the air." General-Lieutenant V. Gorbachev, for example, believes that the outcome was preordained by the coalition forces' use of surprise to seize the initiative and achieve command of the air at the outset.[47]

Prominent military scientists such as Colonel M. Ponomarev have described the allied air operation as a contemporary version of Douhet's strategy of command of the air, applied in this case to create an "aerial blitzkrieg."[48] According to General-Lieutenant A. Malyukov, the coalition's strategy was conceived from the outset as an attempt by means of air strikes to wear out the opponent, disorganize his command and control systems, destroy his air defenses, and weaken the offensive power of his ground forces. In terms of choice of objectives, it was therefore more a classical air offensive than an air-land battle.[49]

The Gulf War, writes General Slipchenko, is the "original prototype of the air war."[50] The United States had used the "air war" theory against Japan, but the air attack assets of that era were inadequate for the purpose. Today, however, these capabilities have grown immeasurably, to the point where air-war theory can be realized. In such a war, say the Soviets, tens of thousands of long-range precision-guided cruise missiles are used simultaneously to destroy thousands of targets. The air war can involve tens and even hundreds of massed strikes by advanced conventional munitions from a variety of axes, with pinpoint ACM re-strikes against surviving targets. Destruction of perhaps fifty percent of the most important economic, logistical, and military point targets could plunge even the Soviet Union or the United States into a crisis situation. Air war operations would be supported by ground and air-based electronic warfare

systems (to blind enemy air defenses) and by space-based reconnaissance, communication, and (eventually) strike assets.

Slipchenko sees the Gulf War also as the prototype of a "technological operation," massively employing advanced technologies. Remotely piloted vehicles, robotics, and electronic reconnaissance and deception would be widely employed in such an operation. Long-range weapons systems with "artificial intelligence" guidance, which are now appearing, would be involved.

Soviet experts argue that the upshot of all this is a radical change in the nature of future war. Large groupings of ground troops will not be employed but, rather, massive strikes delivered by remotely-piloted precision-guided weapons that are part of reconnaissance-strike systems capable of "automatically finding and destroying the target to any depth of the opponent's territory." For example, strategic aviation and naval platforms will conduct global, strategic, offensive operations using intercontinental, conventionally-armed cruise missiles. An entire country subjected to precision strikes will become the battlefield in a war without lines or flanks. The "front" versus "rear" distinction will be replaced by that between "subject" and "not subject" to strikes, between targets and non-targets. It will be possible to achieve with "conventional" assets not only "operational-strategic" but also purely strategic objectives. In fact, in such a war, the Soviets say, the bounds between tactics, operational art, and strategy disappear. The war can begin and end with one powerful strike by precision-guided weapons—painstakingly planned and precisely executed within a very short period of time.

High-Technology Weaponry in the Gulf. According to General-Major N. Kutsenko, deputy chief of staff of the General Staff's Center for Operational-Strategic Studies, the Nato leadership exploited the Gulf War as an opportunity for testing the latest weapons systems and military technologies, many of which have already entered the arsenals of Nato armies.[51] These include the F-117A stealth fighter-bomber, the Patriot air defense complex with its "anti-missile missiles," the E-3A with its ground reconnaissance and target designation radar system, reconnaissance-strike complexes, air and sea-launched cruise missiles, laser-guided bombs, and new armored equipment. Equipped with targeting lasers, the Patriot and Hawk missiles were highly protected against interference: "This is very promising weaponry the Americans have. . . ."[52] But Kutsenko also observes that the desert terrain and climate revealed serious deficiencies in coalition equipment,[53] and General-Major S. Bogdanov has noted that the war was waged against an opponent who could not field appropriate counter-measures.[54]

In the view of Rear Admiral A. Pauk, the sea-based Tomahawk cruise missile demonstrated a high degree of combat effectiveness against ground targets. U.S. ships launched about a hundred of these missiles in the first days of the air

operation alone. The launches were coordinated with carrier-based and other tactical aviation, while computer-generated trajectories allowed the missiles to approach heavily defended targets from different directions. Tomahawk targets included Iraqi armed forces and air defense command posts, administrative and industrial structures, electrical stations, and the communications system.[55] Rear Admiral Pauk also praised the performance of sea-based remotely piloted vehicles, which performed such tasks as final pre-strike target reconnaissance, artillery fire adjustment, and damage assessment.[56]

The Soviet military has pointed out the role not only of ACMs but also of space-based systems in the allied victory. According to General-Major Kutsenko, allied forces of battalion size and higher utilized space-based communications systems, while allied staffs used satellite reconnaissance to monitor developments along the front.[57] In fact, the first *Military Thought* article to examine Gulf operations focused on the performance of space-based systems. According to its authors, these systems constituted "the basis of all technical reconnaissance" in the war.[58] With a resolution of about half a meter, electro-optical means provided the capability swiftly and reliably to detect changes in the operational configuration of Iraqi armed forces.

In addition, the United States is said to have experimented with ways of expanding the application of space-based reconnaissance means. For example, space-based systems proved effective in detecting ballistic missile launches, increasing warning time from one to five minutes. They were also effective in correcting the trajectories of airborne coalition cruise missiles. These systems functioned usefully at all levels of coalition forces, including the tactical. Because the Iraqis lacked radioelectronic countermeasures, space-based systems ensured uninterrupted and undetected command and control of troops and weapons.[59] On the other hand, these authors note that the effectiveness of space-based systems was reduced by the use of decoys, disinformation and operational *maskirovka* (cover, concealment, and deception), dispersal of equipment and supplies, and poor meteorological conditions. The war is said to have refuted the previous assertions of "American specialists" that space-based systems could detect dug-in targets.[60]

The performance of coalition weaponry in the Gulf War also has broader implications which concern the Soviet military as a whole; specifically, according to the Soviet military, the Gulf War demonstrated the obsolescence of current formulas for U.S.-Soviet arms control. If the Gulf War has demonstrated that a qualitative future in warfare has replaced the quantitative past, current arms control treaties are said to belong to the past. On one hand, the Soviets charge that it took only this one conflict in the Third World to halt U.S. and Nato plans for further arms reductions, which undermines all arms control progress of the recent past.[61] On the other hand, General of the Army V.N. Lobov has warned that U.S. combat testing of advanced weapons such as cruise missiles

and stealth aircraft could "disturb the qualitative parity in the weapons sector and have serious consequences for the future."[62] Marshal Akhromeyev, among others, has pinpointed the performance of stealth technology, ACMs, cruise missiles, laser-guided aviation bombs, and automated command, control, communications, and intelligence (C^3I) systems.[63]

Roles of Electronic Warfare and C^3I. The new Soviet vision of future war also includes a focus on the growing role of electronic warfare (EW) in modern combat operations. In a 1990 *Military Thought* article, General-Major Vorob'yev noted that the dialectic of the offensive and defensive is assuming new forms; now it is invading the spheres of command and weapon control in the form of a "struggle over the airwaves."[64] Other theorists stress that the electronic suppression of reconnaissance and fire control electronics is now a central factor in fire superiority.[65]

Soviet military assessments of the Gulf War have focused on the significant role of electronic warfare in the coalition's victory. The General Staff Academy assesses, in fact, that the United States employed EW as an integral part of air-land battle, not merely in its support.[66] For example, General-Major Zhivista of the General Staff's Center for Operational-Strategic Studies gave major credit for allied successes to the comprehensive use of ground and air-based electronic countermeasures in the air operation.[67] Even surprise was not in itself the main reason for the allied victory: the Iraqi air defense system was paralyzed by powerful EW devices, after which air strikes were delivered which overwhelmed troop control within the first few minutes.[68] Air Defense Forces (PVO) authorities observe that "if we do not work in advance to counter EW systems, they can nullify some air defense systems entirely."[69]

According to *Military Thought*, many military specialists believe that intelligence and EW should be organizationally combined in a single functional system. "U.S. military theorists" are said to argue that EW equipment should be used just as widely as traditional combat arms—artillery, armor, air, etc. Intelligence and EW are potentially "an independent component of the operation or battle: an independent form of combat operations."[70] The Gulf War is held to have demonstrated that if personnel manning electronic sensors of all kinds fail to collect intelligence on airborne adversaries at any altitude and to transmit that information to command posts, then it is virtually impossible to organize air defense; the role and importance of these troops is therefore constantly increasing.[71]

In fact *Military Thought* concludes that command, control, and communications, and information generally, are becoming the most important factors in the new "information combat."[72] The Soviets further conclude that the present military-technical revolution has dictated both a re-examination of their C^3I systems and also a quest to develop an automated control system to optimize

employment of forces. Senior officers, for instance, are calling for a unified state-level information system that would include radar and radiotechnical assets of all armed forces branches and national agencies. This system would supply command posts, air traffic control organs, and the Soviet leadership with intelligence, radar, and combat information.[73]

The logical result of revolutionary EW and C^3I advances will be changes in the methods of armed combat in favor of flexibility and maneuverability, and a return to the "blitzkrieg" concept. The "intellectualization" of weapons will magnify the ability of warring armies to concentrate their forces or use them selectively and precisely. This ability will be achieved by "intellectualization" of all levels of command and control, from self-contained weapons systems to decision-making systems on all levels.[74]

Initial Soviet commentary has also stressed the role of automated C^3I systems in facilitating the coalition's immediate seizure of air superiority. As combat multipliers, these systems are said to have negated the Iraqi quantitative superiority in tanks and radically shifted the correlation of forces in favor of the coalition.[75] Specifically, air-ground coordination and deconfliction reflected an advanced level of coalition command and control. For example, Colonel General Ye. Shaposhnikov, commander in chief of the Soviet Air Force, notes that the Gulf War demonstrated good coordination of coalition forces and systems, especially EW systems.[76] Similarly, General-Lieutenant Gorbachev has observed that the coalition's C^3I reflected "a high degree of professionalism."[77]

Since the Gulf War, authoritative Soviet analyses have in fact begun to call for a total centralization of "fire destruction," not only at army and front levels but also at the TVD level. Prominent experts have gone so far as to declare that automated C^3I is now as important as the *entire correlation of forces and weapons.*

Roles of Offense and Defense. According to the Soviet military, both nuclear weapons and ACMs have blurred the boundary between offense and defense in modern war. In a riveting 1980 article, General-Major Vorob'yev noted that the victor in the competition between attack and defense in World War I was the defense, but in World War II, the offense. Under the impact of both nuclear weapons and ACMs, however, the offense and the defense now use the same types of combat systems to achieve their objectives. The incorporation of new weapons increases both the offensive and defensive potentials of troops.[78]

According to the Soviets, one of the particular features of the modern firepower competition between offense and defense is the expansion of combat over great ranges. The attacker tries to achieve a simultaneous effect over the entire depth of the defender's combat deployment; the defender for his part can now strike the attacker as he prepares to attack or even earlier: "*herein lies the new quality of the defense.*" In previous wars the defender could not achieve the same decisive objectives as the offense.[79] In practice there appears to be a certain

"leveling" of offensive and defensive actions.[80] In modern operations, say the Soviets, offensive or defensive operations will no longer exist in their "pure form."[81]

In fact the future battlefield is now described as a high-tempo, lethal arena where the meeting engagement—that form of combat wherein both sides meet on the offensive—is predominant.[82] Military theorists such as General-Lieutenant N.G. Popov have stressed the growing role of initial mass strikes with long-range weapons systems in meeting engagements.[83] It is noteworthy that with the development of nuclear weapons, Soviet military art had similarly stressed the replacement of the strategic offense and defense by the so-called "meeting strike."[84]

In 1987, however, the Warsaw Pact announced a new "military doctrine" for conventional armed forces in Europe. Soviet military doctrine has always been defined as having two aspects, the "socio-political" and the "military-technical." Since the early 1980s, the "socio-political" side of doctrine was "defensive" in that the Soviet Union would never commit aggression against any nation. Because it called for eliminating the capability to launch surprise strikes or to mount "offensive operations in general," the "military-technical" side of doctrine was now termed defensive as well by the politico-military leadership. From the outset, however, the Soviet military's interpretation of the "defensive doctrine" failed to converge with that of Gorbachev and the civilian defense experts.

In clarifying the defensive doctrine, for example, Soviet military spokesmen asserted that the Soviet Union would conduct defensive operations for about twenty days before shifting to a counter-offensive.[85] The military continued to call for decisive counter-offensive capabilities within the defensive doctrine, and to maintain that an ultimate transition to the offense is mandatory for the total defeat of the opponent. The military also called for "offensive-defensive" restructuring measures. Here it was said to be necessary to focus special attention on gaining "fire superiority and command of the air" at the very outset of the war.[86] In addition, the Soviet military continually stressed the importance of achieving surprise in any future war fought with ACMs. The 1989 edition of the *Dictionary of Military Terms* still maintained that the offense is "the basic form of military action" for defeating an opponent.[87]

According to Soviet military scientists, however, the Gulf War dictates significant changes in Moscow's declaratory defensive doctrine. The Gulf War demonstrated for the Soviets that not only the nature of the offensive but also the nature of war has essentially changed. Heretofore the Soviets had long focused on "stereotypes:" at the outset of war, after an offensive air operation lasting three to five days, the opponent would have to invade with ground troops, and it was this invasion that was considered "the main content of war." Hence the need for a strategic defensive operation in the European theater. But today

it is possible to escape this stereotype; the opponent need initiate and conduct only an air war.[88]

Military experts believe, however, that it would be a mistake to consider that the concepts of "offense" and "defense" as now understood are entirely obsolete. A ground offense or defense is possible even in the future "aero-space war," but only in the course of the war (most probably in its concluding stage) and not at its outset as previously believed. Since the Gulf conflict, Soviet statements about "strictly defensive actions" at the outset of war have accordingly been replaced by the concept of "adequate response:" those "forms and methods . . . which correspond to the existing situation and ensure the achievement of decisive superiority over the opponent . . . [and which] would not be defined ahead of time."[89] General-Major Vorob'yev severely criticized in *Red Star* the "one-sidedness" and "rigidity" of the 1990 draft military doctrine. Vorob'yev argued that military doctrine "cannot and should not" assign to military art an arbitrary focus regarding the employment of any one type of military action.[90]

In compelling the Soviet military to conduct only defensive operations to repel aggression, Gorbachev's doctrine is thus "extremely dangerous" for both the armed forces and the Soviet Union. Instead, the armed forces must be fully prepared to conduct all types of combat actions: "the defensive doctrine does not mean a defensive strategy."[91] Colonel General I.N. Rodionov, head of the General Staff Academy, argued in *Military Thought* after the Gulf War that the defensive doctrine "by no means signifies a rejection of the counter-offensive and offensive."[92] Among others, Colonel General A.A. Galkin has explained that "we naturally do not plan to be restricted to defensive operations, because it is irrational to yield the initiative to the enemy. Having adopted a defensive doctrine, we have assumed the obligation not to attack first—that is the essence of it."[93] Even Defense Minister Yazov has joined the new offensive against the defensive doctrine. What is a defensive doctrine? he asked in March 1991. It means that "we have no intention of attacking anybody."[94] Such statements constitute both a rejection of the 1987 doctrine, which redefined the "military-technical" side of doctrine, and a reversion to the doctrine's earlier socio-political language of "defensiveness."

Roles of Surprise and the Initial Period of a War. According to the Soviet military, ACMs have enhanced the role of surprise in modern warfare. For example, General-Major Vorob'yev has noted that, in the past, mainly passive methods were used to achieve surprise—all types of *maskirovka*, decoy targets, demonstrations, smoke screens, etc. Today, however, active measures are more important, and include surprise maneuvers on land and in the air, unexpected offensives and non-standard battle formations, and systematic destruction by fire. Automated reconnaissance and computer-based homing munitions are now used to disrupt the opponent's troop and weapon control. The idea is to "blind"

the opponent before the onset of action by a massive use of EW against his reconnaissance, warning, and command and control systems.[95]

Vorob'yev writes further that ACMs facilitate the use of surprise on a much wider scale than before. Even before the Gulf War, General Lobov thus asserted that surprise ACM strikes can ensure not only the operational-tactical but also the strategic initiative on the future battlefield.[96] He went so far as to argue that the use of ACMs "raises the issue of achieving surprise in both the *defense* and the offense."[97]

According to *Foreign Military Review*, the coalition used the factor of surprise to suppress Iraq's air defense, disrupt its military command and control, disable nuclear and chemical centers, achieve overwhelming command of the air, and seize the initiative.[98] Before the Gulf War, writes General Slipchenko, achieving surprise was not a realistic possibility because of the need to mass large ground forces and also the lack of sufficient ACMs. But the Gulf War demonstrates that achieving surprise with ACMs is now a realistic possibility. For the first time in non-nuclear warfare, surprise is now said to be "decisive for the course and outcome of the war."[99] The best means of deterring the temptation to launch a surprise strike, the Soviets say, is to ensure that the armed forces of both sides are fully prepared to fight such a war—in other words, to ensure parity in non-nuclear strategic offensive forces.

Coincidentally with the U.S. adoption of the Air-Land Battle concept, Soviet military writers began to link the importance of a future war's initial period with the combat characteristics of ACMs. Writing in late 1985, for example, General-Lieutenant A.I. Yevseyev asserted that if a war begins with ACMs, the initial period can exert an "enormous influence on the subsequent course of military actions."[100] By 1988, however, prominent military scientists argued that an initial period involving ACMs could exert a "*decisive* influence on the course *and outcome*" of the war.[101] Long before the Gulf War, the Soviets were already viewing a high-technology initial period as the decisive factor in victory.

General Yevseyev also made a statement unprecedented for Soviet military thought. In contrast to past wars, he wrote, "the main content of the initial period in present-day conditions can be the delivery by the belligerents of nuclear strikes or *strikes with conventional means of destruction* . . . for achieving the war's *main* objectives."[102] By Soviet definition, a war's main objectives consist in destroying the opponent's war-fighting potential and war economy. In the past, therefore, only an initial period with nuclear weapons was said to achieve these "main" objectives. But since 1985, Soviet military thought has explicitly acknowledged the potential of ACMs to accomplish these nuclear tasks in a future war.[103] For all practical purposes, the achievement of these objectives signifies victory.

The Gulf War is held to have demonstrated that future warfare will involve a massive use of technology and will be over quickly. The war can begin and

end with a powerful strike by ACMs—painstakingly planned and precisely executed in the initial period. In fact, say the Soviets, the Gulf War showed that a war's "course" and "outcome" are now "a *single* phenomenon." According to General-Major Slipchenko, the initial period has become "essentially the *only* period in future war."[104]

Changing Force Structure

Since the mid-1980s, the Soviet General Staff has asserted that the structure of the armed forces could change in the future. While their numbers will gradually decrease, their quality will rise as the result of saturation with new types of non-nuclear weapons.[105] According to the Soviet image of future war that existed prior to the Gulf War, the declining role of ground forces would be accompanied by an enhanced role for naval and air forces. Military theorists predicted that navies will play a central role in future warfare. They argued that this enhanced role proceeds especially from the nature of advanced non-nuclear technologies: the critical strike potential of conventionally-armed submarine-launched cruise missiles and shipborne directed-energy weapons, and the continuing integration of naval platforms with space-based systems. Even non-naval military spokesmen, such as the former Warsaw Pact commander in chief, General of the Army P. Lushev, asserted that the United States and Nato, counting on the surprise unleashing of war, are devoting special attention to the development of such powerful strike means as naval forces and aircraft, which are being maintained at a higher state of combat readiness than the ground forces.[106] Even before the Gulf War, *Foreign Military Review* observed that the air force was the only branch of the U.S. armed forces capable of concentrating its efforts on the scale required for a future war waged with cutting-edge technologies.

In general, initial Soviet commentary on the Gulf War has confirmed earlier predictions of a declining role for ground forces and growing roles for air, air defense, and naval forces. But this commentary in particular is clearly influenced by the parochial and budgetary factors characteristic of any military organization. Soviet experts have also praised the unification and standardization of the coalition's entire support infrastructure, implying that the Soviet armed forces require a similar capability.

Ground Forces. Soviet military assessments of the impact of Gulf operations on the role of ground forces span a predictably wide spectrum. According to Colonel Tsalko, for example, it is "sheer madness" to believe, as "some military authorities" in the Soviet Union continue to do, that "the outcome of a war is determined by a clash of huge masses of ground troops." The Gulf War clearly demonstrates that "the Iraqi army was simply overwhelmed by airstrikes and the

troops had to keep their noses buried in the sand." Tsalko went so far as to argue that the main lesson of the war is that huge amounts of tanks, armored vehicles, and artillery pieces were "absolutely useless."[107]

On the other hand, the head of the Armor Troops Military Academy insists that the Gulf War demonstrates the impossibility of accomplishing all missions without a large-scale use of ground forces.[108] In addition, General Bogdanov has asserted that the Gulf War graphically shows the "determining role" of ground forces in achieving ultimate objectives.[109] According to General-Major V. Chepurnoi, the ground troops will continue to constitute the foundation of forces on the main axes and to ensure an effective strategic defense for the state. But this in no way means a declining role for the other branches of the armed forces: the Gulf War demonstrated their growing significance.[110] General Galkin notes that as a result of the Gulf War, primary Soviet efforts will be concentrated on preserving the capability of the ground troops for rapid deployment in the event of an increased military threat.[111]

Air Defense Forces. Defense Minister Yazov admitted in remarks to the Supreme Soviet that the allied victory in the Gulf War had prompted the Ministry of Defense to reexamine its air defense capability. He warned that while the Soviet Union is currently capable of repelling attacks, this might not be true in two or three years. Yazov even acknowledged that Soviet air defense systems already have "weak spots."[112] Colonel General R. Akchurin was equally direct: "today our anti-aircraft defenses are capable of repelling the attacks of any air targets," but, he warned, "the echo of missile thunder in the desert must put us on our guard."[113]

According to PVO officials, the allies employed several new means of avoiding air defenses: space-based reconnaissance systems, pervasive use of EW systems, preventive cruise missile strikes, and the Harm anti-radar missile. Allied air power exceeded the Iraqi air defense potential tenfold.[114] These experts have highlighted the lack of automated fire control as the main reason for the relatively low level of Iraqi air defense activity. They argue that modern battle management is impossible without automated systems, and that this shortcoming alone probably reduced Iraqi air defense capability by about forty percent.[115]

PVO officers maintain that the role of air and space attack forces will keep growing, which makes Soviet air defenses an extremely important factor. They argue that since the Pentagon plans to have tens of thousands of strategic and tactical supersonic missiles by the year 2000, only the most modern weapons and air defense technology will be able to withstand the massive strikes expected at the outset of a war.[116] Soviet military authorities state that their air defense badly needs to be upgraded with the most advanced systems; obsolete models of weapons should be retired, as the Gulf War demonstrated that they accomplish little. It is clear that while ground troops are reduced, air defense power should

increase and its combat deployment be made denser.[117] Different types of surface-to-air missile and radar systems are required, as well as a high degree of automation in battle management, reconnaissance, and weapons guidance.

Naval Forces. Rear Admiral Pauk writes that the coalition accomplished the following basic naval missions: gaining and maintaining command of the sea in the Persian Gulf; participating in the air offensive operation with sea-based Tomahawk cruise missiles and carrier-based aviation; participating in the air-land offensive operation to destroy Iraq's armed forces; and minesweeping and ensuring the safety of shipping in the Persian Gulf.[118] Soviet experts have noted that the virtual absence of Iraqi naval forces was a serious vulnerability for that nation. They have also emphasized that U.S. naval forces must no longer be excluded from arms control reductions.

Air Forces. Soviet experts from all the service branches hold that the Gulf War demonstrates, as has been noted, that future military operations will begin with a massive use of air power. On the whole, however, these analyses conclude that air power alone was insufficient to accomplish all of the war's final objectives.

According to General-Lieutenant Malyukov, the Gulf War demonstrated that having modern aviation is not enough—operational, material, and technical support must also be present. From the first days of the war, it was clear that this was a war of modern high-technology systems: "He who does not realize this runs the risk of falling hopelessly behind in the qualitative improvement of aviation equipment—with all the ensuing consequences."[119] General Bogdanov states that apparent trends in modern warfare "really do predetermine to a certain degree the priority of aircraft as the most long-range and maneuverable means of combat."[120] As a result, General Malyukov has insisted that "major investments" are necessary to keep up with high-technology U.S. air power.[121]

Recruitment. The Soviet military press has devoted increasing attention to the debate over whether the Soviet armed forces should shift to a professional, all-volunteer basis or maintain the current "mixed system" with universal conscription. Predictably, the Gulf War has provided new arguments for advocates of both positions. According to General-Major Chepurnoi, for example, a professional army is suitable for conducting local wars and conflicts when combat does not result in large losses. But even in the Gulf War, it was necessary to call up significant contingents of trained reserves, especially former active-duty servicemen.[122] General Bogdanov argues that the results of the Gulf War do not contain any convincing arguments to support a switch of the Soviet armed forces to full professional manning.[123]

Speakers at a conference of the Moscow City Council, however, contended that the Gulf War demonstrated the advantages of a highly professional army

over a mass army based on universal military service.[124] Soviet analyses note that Iraqi conscripts broke while Iraqi regulars fought. According to some civilian analysts, the Gulf War proved that "we have nowhere to hide from the creation of a professional army."[125] S. Blagovolin notes that the Gulf War showed that high-technology weapons "cannot be used with great efficiency without an adequate level of preparation of personnel, and they will also demand a new kind of commander."[126] Marshal Kulikov and others have highlighted the "human factor" as largely responsible for the Iraqi defeat in the war. They stress that the "human factor" is always the decisive element in the success or failure of any weapons systems.[127]

According to the Soviets, the whole war bore the imprint mainly of the air forces, the marine corps, and naval aviation, which "should vividly show us what lies in store in the near future in local clashes or any other potential combat operations."[128] According to General Slipchenko, the forces of the future are the Soviet strategic rocket forces, air force, navy, and air defense forces. The Soviets had discussed the diminishing role of ground forces for years, "but now we have proof."[129] On the other hand, General-Major Chepurnoi argues that in the future the Soviet armed forces should consist of three branches: "Aero-Space Forces," the navy, and the ground troops.[130]

Soviet Military Research and Development

The Soviet defense ministry states that its armed forces now possess weapons similar to most of a those used by U.S. forces in the Gulf.[131] General Chepurnoi, however, stresses that the Gulf War demonstrated the necessity of "technically re-equipping" the armed forces on the basis of the latest weaponry.[132] Indeed, the new Soviet vision of future war, with its focus on ACMs, directed-energy weapons, and space-based systems, is clearly reflected in past, present, and projected research and development, or R&D. Despite galloping domestic economic difficulties, the Soviets continue to fund expensive military R&D activities.

A significant degree of civil-military convergence proceeds from the inter-dependence of the military-technical and scientific-technical "revolutions." In early 1985, for example, the Politburo approved a state-wide program to develop and utilize computer technology and automated systems up to the year 2000. Not long after his accession to power in March 1985, Gorbachev stressed that "machine-building plays the dominant, key role in implementing the scientific and technological revolution. . . . Microelectronics, computer technology, instrument-making, and the entire informatics industry are the catalysts of progress. They require accelerated development."[133] In late 1989, he argued further that underrating the scientific-technical "revolution" was the greatest mistake made by his predecessors. Indeed the official Communist Party journal,

Kommunist, has warned that if an information technology program is not implemented in the near future, then the Soviet Union will find itself "outside the bounds of modern civilization."[134]

The foregoing requirements for implementing the civilian scientific-technical "revolution" are identical to the military's needs for a new military-technical revolution.[135] As Colonel N. Goryachev notes, "in the struggle for improving the technical equipping of the military, it is difficult to over-estimate the basic trends of scientific-technical progress: the further priority development of machine-building—especially machine-tool manufacturing, robotics, computer technology, instrument-making, and microelectronics. It is precisely these trends which are today the basic catalysts of military-technical progress."[136] Other military spokesmen have called for development in the field of automated systems technology and software, along the lines of military robotics, artificial intelligence systems, distributed and multi-function processing, personal computers, and multi-purpose networks.[137]

Inspired by the new military-technical revolution and galvanized by Gorbachev's defense cuts, the Soviet military's vision of military restructuring is quality enhancement across the board. The stated objective is to "upgrade not only the material and technical foundation of the Army and Navy, but also the system of manning and training, as well as military art and science in general," in order to "boost performance *by an order of magnitude.*"[138] To overcome their current technological lag, the Soviets are actively researching air-breathing propulsion, biotechnology materials and processes, composite materials, data fusion, passive sensors, photonics, and signal processing. They are on a par with the United States in the critical technology areas of high-energy, high-density materials and hypervelocity projectiles. They are significantly ahead of the United States in the area of pulsed power, necessary for development and production of directed-energy weapons, kinetic energy weapons, target identification, and surveillance systems. These technologies have significant applications in the field of anti-satellite weaponry. Their direct military application is in the areas of high-power microwaves, electrothermal guns, electromagnetic launchers, neutral particle-beam systems, a variety of lasers, charged particle beams, and ultra-wide band radars.[139]

According to authoritative Soviet analyses, the application of existing and cutting-edge technologies will result not only in modernization of current systems but also, and especially, in the development of "principally new weapons systems." Indeed the main task consists in shifting from the "evolutionary path" of modernization to "a path characterized by qualitative leaps, whereby weapons acquire principally new combat characteristics."[140] Soviet science must discover and apply "as yet unknown properties of matter, natural laws, and phenomena that would generate a qualitative leap in developing new types of weapons."[141] Addressing the Supreme Soviet in late 1990, Gorbachev himself vowed to treat

militarily significant R&D "like a peasant treats seed: he himself might be dying of hunger, but he protects the seed of next year's harvest."[142] Writing in early 1991, General Lobov stressed that the Soviet Union must achieve "*not only equality with the probable opponent in the qualitative development of armaments and military technology, but also superiority over him.*"[143]

The future of Soviet military R&D appeared strong in late 1990, but the military message of the Persian Gulf War can only fortify it further. The high-technology conventional battlefield has arrived: "we have entered a new phase." In order to catch up, Soviet military industry must undergo major changes: the "mass production of tanks must give way to investment in high technology."[144] According to Colonel General Akchurin, the Gulf War will only accelerate the West's development of advanced technologies, "and the money for this will be found—there is no doubt."[145]

Whither the Soviet Military?

The Gulf War dictates several specific directions, the Soviets acknowledge, for the qualitative improvement of their armed forces. These include development of a rapid deployment capability for the ground troops, major investments in high technology air power, a review of the national air defense network and systems, a higher degree of automation in C^3I and weapons guidance, and an overall "technical re-equipping" of the Soviet armed forces.

In addition, authoritative Soviet analyses have highlighted the impact of the Gulf War on specific dimensions of future warfare. First, military experts assert that the war portends a new type of arms race: a race in capabilities for strategic mobilization and deployment in theaters remote from the homeland. Observers have stressed the U.S. ability to move a sizeable force and conduct an impressive logistical build-up in a distant region that lacked a well-developed communications infrastructure.

Second, Soviet military assessments of the Gulf War focus on the role of surprise as the "decisive" factor in determining both the "course and outcome" of the war. Indeed the course and outcome of war are now held to be "a single phenomenon." As a result, the war's initial period is now said to be in effect the *only* period in future warfare.

Soviet military experts have also declared that the Gulf War is the prototype of the so-called "technological operation." Such a war, characterized by a massive use of technology, will be short. Because advanced non-nuclear technologies are said to accomplish all of the missions previously reserved to strategic nuclear forces, these systems will achieve all of the objectives once envisioned for a nuclear war—and without occupation of the opponent's territory. In addition, these objectives will be achieved without the collateral damage and political complications associated with nuclear weapons use.

Finally, initial Soviet commentary has highlighted several larger and more long-term lessons of the Gulf War. First, the war is said to have confirmed Marshal Ogarkov's forecasts on the nature of future war. Second, the war is declared to have invalidated Moscow's 1987 "defensive doctrine," which military men now view as "extremely dangerous" for both the armed forces and the country. In 1987, the "military-technical" side of military doctrine became "defensive" for the first time: the Soviet armed forces would eliminate the structural capability to launch surprise attacks and mount "offensive operations in general." But since the Gulf War, the Soviet military has pressed for a redefinition of the defensive doctrine to include only the "socio-political" side; the defensive doctrine, they argue, does not mean a defensive *strategy*.

While the military's interpretation of the defensive doctrine had never fully converged with that of Gorbachev and the civilian experts, the current divergence signifies an open offensive against the nucleus of Gorbachev's "new thinking." The defensive doctrine was largely responsible for the most dramatic shift in the politico-military landscape of Europe in the postwar period. Its demise could send no small shudder through the "common house" that Gorbachev has sought to build.

Third, the Gulf War has prompted the Soviet military to redefine the whole concept of "deterrence." While nuclear parity remains the linchpin of strategic stability, the performance of ACMs in the Gulf War is said to prove that the new non-nuclear technologies are threatening the old strategic equation. Deterrence is now said to require not only nuclear parity but also parity in high-technology non-nuclear forces.

Finally, the Gulf War has generated serious Soviet concerns over the future of U.S.-Soviet arms control negotiations. The crushing impact of advanced technologies in combat confirmed that these weapons and the systems employed to integrate them could negate the more traditional measures of military power, and revolutionize combined-arms concepts. The arms control process must therefore include such critical elements of future warfare as electronic warfare systems and automated C^3I systems. In short, the Gulf War is said to have demonstrated that a qualitative future has replaced the quantitative past of warfare. And, according to Soviet military experts, the heart of current arms control treaties belongs to that past.

Notes

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Ψ

When, without strategem,
But in plain shock and even play of battle,
Was ever known so great and little loss
On one part and on th'other?

William Shakespeare
Henry V (Act IV, 8)

"Everything that can be invented has been invented."

Charles H. Duell,
Director of U.S. Patent Office, 1899

In war, the defensive exists mainly that the offensive may act more freely.

Naval Strategy
A.T. Mahan (1911)
Little, Brown (1918), p.150