A Framework for Precision Conventional Strike in Post–Cold War Military Strategy

John Birkler
Myron Hura
David Shlapak
David Frelinger
Gary McLeod
Glenn Kent
John Matsumura
James Chiesa
Bruce Davis

Approved for public release; distribution unlimited

NATIONAL DEFENSE RESEARCH INSTITUTE

RAND

Prepared for the Commission on Roles & Missions of The Armed Forces

The research described in this report was sponsored by the Commission on Roles and Missions of the Armed Forces (CRMAF), under RAND's National Defense Research Institute, a federally funded research and development center supported by the Office of the Secretary of Defense, the Joint Staff, and the defense agencies, Contract No. DASW01-95-C-00059.

Library of Congress Cataloging in Publication Data

A framework for precision conventional strike in post-Cold War military strategy / John Birkler ... [et al.].
p. cm.
"National Defense Research Institute."
"MR-743-CRMAF."
ISBN 0-8330-2386-1 (alk. paper)
1. Precision guided munitions—United States. 2. World politics—1989– I. Birkler, J. L., 1944– . II. National Defense Research Institute (U.S.). III. RAND Corporation.
UF513.F73 1996
358.1'7'097309049—dc20 96-19537
CIP

RAND is a nonprofit institution that helps improve public policy through research and analysis. RAND's publications do not necessarily reflect the opinions or policies of its research sponsors.

Published 1996 by RAND
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
RAND URL: http://www.rand.org/
To order RAND documents or to obtain additional information, contact
Distribution Services: Telephone: (310) 451-7002;
Fax: (310) 451-6915; Internet: order@rand.org

SUMMARY

Precision conventional strike (PCS) is the practice of attacking selected targets with sufficient accuracy for high probability of kill and low collateral damage. Today's precision-conventional-strike weapons were developed for the primary purpose of fighting a major war against the Soviet Union. *What value do they have in future military strategies?* The answer to this question will help to shape the roles of these weapons in future U.S. military campaigns and will have a bearing on whether some campaigns may even be undertaken. In this report, we present a methodology to assist in arriving at an answer and draw some preliminary lessons from illustrative applications of that approach.

KEY FINDINGS

We found that:

- Existing weapons provide fairly robust capabilities against soft and semihardened fixed structures, stationary mobile targets, and some targets moving with predictable direction and speed.
- However, the effectiveness of existing weapons may be limited by weather, by availability of intelligence on targets and on routes to targets, and by enemy countermeasures such as navigation signal jamming.
- Furthermore, where terminal air defenses have not been suppressed and air superiority has not been established, existing weapons cannot be effectively delivered against hardened targets and armor unless stealth aircraft are employed.

- As a result of these limitations, PCS weapons today cannot always make major contributions to achieving campaign objectives as diverse as suppressing war-supporting infrastructure and halting invading armies.

We emphasize the preliminary, illustrative nature of our exercise and its reliance on previous studies. Clearly, much can be derived from more-comprehensive, systematic implementation of the methodology, supported by new analyses of weapon and delivery platform capabilities, including intelligence support and other infrastructural elements. Nonetheless, we drew from our first-cut analyses of PCS capabilities and shortcomings some potentially useful inferences regarding possible avenues for the investment of system development and acquisition dollars:

- Over the near term, system development dollars should be directed toward alleviating the limitations of weather, intelligence support, and jamming.
- Progress on new antitank weapons should be carefully monitored. If these weapons perform as advertised, they could contribute mightily to the campaign objective of halting advancing armies, and sufficient numbers should be procured as a matter of high priority.

We did not attempt within the limited scope of our study to rank the benefits or assess the costs of the potential solution directions we considered. These, too, are important issues for further research. Let us now elaborate on the framework and its ramifications.

CONTEXT, EFFECTIVENESS, SHORTCOMINGS

Our approach to assessing the value of PCS in future military strategy accounts for the fact that various scenario-related factors—collateral-damage constraints, weather, enemy action, intelligence preparation—influence the appropriateness of PCS weapons for targets designated for destruction. These factors can also interact with each other to make PCS infeasible. For urban targets, collateral-damage constraints may weigh against the use of all but the most-accurate weapons, e.g., laser-guided bombs. But bad weather can prevent the use of such weapons. (Of course, bad weather can also

inhibit platform operation.) A robust enemy air defense system can have a similar effect on nonstealthy delivery aircraft, since laser-guided bombs (and certain other PCS weapons) must be released in the vicinity of the target. The enemy can also decrease the effectiveness of GPS-guided standoff weapons by jamming the GPS signal frequencies. Finally, the applicability of PCS systems also depends on the availability of intelligence about the target. All PCS weapons require accurate data on target location and other characteristics; autonomous weapons may also require special target imagery and information about the path to the target.

Although PCS effectiveness depends on the weapon, context, target, and scenario, some generalizations are possible. Existing weapons provide fairly robust capabilities against soft and semihardened fixed structures, stationary mobile targets, and some targets moving with predictable direction and speed. By providing the capability to conduct precise, effective strikes against critical targets, these weapons can increase the effectiveness of military operations. For example, air-delivered PCS weapons can reduce the exposure of flight crews to enemy defenses by permitting higher delivery profiles, by allowing greater standoff, and by reducing the number of sorties required. Exposure reduction and sortie reduction will result in cost savings, as will the need to transport a lesser weight of ordnance into or near the theater. Such savings should be deducted from the well-known high unit cost of PCS weapons when assessing their true costliness. But the issue of costliness raises another question with ramifications for all the preceding benefits: Are current stocks of PCS systems of various types sufficient to achieve campaign objectives within reasonable time constraints? We do not address force structure in this report, except in very general terms when considering long-term force evolution. Weapon stocks thus represent another topic that would have to be part of a more comprehensive investigation of the value of PCS in future strategy.

What are the shortcomings of current and planned PCS systems? Contextual limitations—weather, enemy countermeasures—have already been mentioned. Aside from those, PCS systems lack the capability to destroy a substantial number of very hard targets and deeply buried targets. Air-launched PCS weapons with sufficient standoff range to avoid terminal defenses are ineffective against armor, so those defenses must be suppressed before tanks and other

armored vehicles can be attacked effectively with low risk. Soft targets moving with uncertain direction and speed are also problematic, because of the difficulty of identifying and tracking such vehicles long enough to hit them with a standoff weapon. As mentioned above, even fixed-target attack places a substantial burden on intelligence collection and analysis assets if autonomous weapons such as cruise missiles are to be used. Furthermore, the high cost of many PCS systems restricts the numbers that can be acquired and focuses their use on a limited number of targets of high individual value.

These generalizations about targets can in turn be translated into first-order lessons about the contributions of PCS systems to various tasks needed to achieve operational objectives. We addressed a broad range of such tasks, for example, attacking enemy air defenses, disrupting electric-power production, providing long-range supporting fires. As might be expected from the preceding paragraphs, this exercise suggests that care be taken not to overestimate the leverage gained from PCS. For example, while the United States achieved its objective of suppressing the enemy's war-supporting infrastructure in Operation Desert Storm, achieving the same objective where weather is a more serious limiting factor could be problematic. Halting an invading army with PCS weapons could also be difficult if mobile air defense units moved with tank columns, since current standoff weapons are not very effective against moving armor.

IMPLICATIONS FOR SYSTEM DEVELOPMENT AND ACQUISITION

Can system development dollars be directed to overcome such limitations? To some extent, this is already being done. DoD is making a significant investment in the development of PCS weapon/submunition combinations intended to kill tanks, e.g., Sensor-Fuzed Weapons (SFWs) using Wind-Corrected Munition Dispensers (WCMDs), the Joint Standoff Weapon (JSOW) with SFW submunitions, and the Army Tactical Missile System with Brilliant Antiarmor Submunitions. It will be important for decisionmakers to closely monitor these developments to ensure that these systems work as advertised. Meanwhile, DoD already has a system—the GBU-28—that is effective against hard targets and buried targets. However, there are very few in the inventory and air defenses must

be suppressed for low-risk delivery, because the only aircraft that can deliver the GBU-28 are not stealthy. If such targets are to be attacked, procurement of additional GBU-28s is a near-term option; for the farther term, options include developing a standoff weapon. Additional priorities include the development of an all-weather, high-accuracy PCS weapon; reduction of vulnerability to GPS jamming; and the development of a more-effective intelligence support infrastructure.

But even if those issues can be addressed, the utility of PCS systems will still be limited by their high unit cost, particularly if current budgetary limitations persist.[1] If technological advances permit the development of weapons that can be produced inexpensively and delivered very accurately (the Joint Direct Attack Munition, JSOW, and WCMD are steps in this direction), different, expanded roles for PCS systems might emerge. Such roles could be facilitated by the evolution of new concepts of operations, e.g., in-flight reprogramming of stealth platforms and separation of PCS hunter and killer functions.

Those last two possibilities in particular raise once again the question of Service roles and functions. Who will "own" the PCS forces of the future? We opt for a joint perspective. We propose a new framework to make informed choices among promising new weapon concepts—choices based on the merits of cases, unhampered by preconceived notions of which roles and functions are "assigned" to a particular Service. Specifically, we propose dissolving the current Service-oriented marriage of platform, weapon, and munition and allowing, for example, the Air Force to supply a munition that might equip a Navy weapon adapted for launch from an Army platform.

CONCLUSION

DoD is supporting a number of development efforts that might generate large payoffs in the future. However, any commitment of large

[1]In referring to the consequences of "high unit costs," we are observing that large numbers of weapons with high budgetary costs are unlikely to be bought. As mentioned above, true cost comparisons should balance the value of lower attrition, a reduced logistics tail, and other factors not normally counted in procurement costs. Also, high-cost systems may be more economical than lower-cost systems if their benefits are proportionately higher or unachievable by less-expensive systems.

amounts of resources to PCS systems should be accompanied by a wide-ranging, thorough analysis of the potential costs and benefits of various PCS alternatives—and alternatives to PCS. Such analysis should be carried out in light of possible long-term trends in the use of U.S. forces and in the reaction of U.S. adversaries to the persistent U.S. search for technological advantage—and in recognition of the political goals that U.S. forces are meant to achieve. On these last two points, for example, it is important to recognize the ways in which evolution of enemy countermeasures over the long term might be able to limit the potential of PCS systems. It is also important to recognize that certain objectives, e.g., changing the behavior of high-level enemy political and military leaders, cannot reliably be achieved with any conventional weapon, regardless of how accurate.