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*Assumption Based Planning
and Force XXI*

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Assumption-Based Planning and Force XXI

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*Prepared for the
United States Army*

Arroyo Center

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PREFACE

This work continues RAND efforts dating back to 1987 aimed at improving the way the Army does long-range planning. The primary contribution during that period has been a planning tool called Assumption-Based Planning (ABP). RAND developed ABP to assist the Army in thinking about and planning for the future and to help it insure against the risks inherent in its plans and concepts.

The current work was prompted by the concerns of MG John Ellerson, then Director of Strategy, Plans and Policy, ODCSOPS, about the ability of the Army's Force XXI concept to address the uncertainties of the post-Cold War world. General Ellerson asked RAND to use ABP to test the robustness of Force XXI to potential changes 15-20 years in the future.

Because of the high-level interest in defense planning in general and in Force XXI in particular, this report takes some pains to describe the methods used to test Force XXI and how to put those methods into the larger context of the post-Cold War world's altered planning environment. The specific intent of this work was to test the Army's concept for its operations in the early 21st century. Because of the broader questions it addresses, however, it should be of interest to defense planners in general.

The research was conducted in the Strategy and Doctrine Program of RAND's Arroyo Center, a federally funded research and development center sponsored by the United States Army.

CONTENTS

Preface	iii
Summary	vii
Acknowledgments	xiii
ASSUMPTION-BASED PLANNING AND FORCE XXI	1
Appendix	
A. LIST OF ASSUMPTIONS AND COMMENTS	31
B. INSTRUCTIONS TO ARMY RESPONDENTS	91
C. GLOSSARY OF TERMS	97

SUMMARY

In 1995, MG John Ellerson, then Director of Strategy, Plans and Policy, Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), asked RAND to help assess the risks inherent in Force XXI, the Army's concept for the evolution of Army operations for the early 21st century. The specific request was for RAND to use Assumption-Based Planning (ABP) to identify the important assumptions underlying Force XXI that are vulnerable to change in the coming 15–20 years. Assumption-Based Planning is a planning tool developed at RAND. Because this work only partially applied the ABP methodology, it is important to discuss the entire methodology in order to put this work into its larger planning context.

ASSUMPTION-BASED PLANNING

Published RAND research describes the Assumption-Based Planning process.¹ The basic idea of ABP starts with what can be known—the important assumptions upon which current concepts or plans are based. As assumption is important if its negation would lead to significant changes in those concepts or plans.

One can then identify which of these assumptions could become vulnerable out to some planning horizon. This horizon is important because it sets the limits on the vulnerability of an assumption. Events that could plausibly take place within the planning horizon and that could overturn the assumption or cause it to be false establish its vulnerability.

From these vulnerable assumptions one can develop signposts indicating changes in the vulnerability of an assumption. Signposts are critical to ABP, which is driven by the notion that the best approach in an uncertain planning environment is to do what needs doing now and to watch for changes that will resolve the uncertainties.

Shaping and hedging actions are actions taken today to guard against the uncertainties. Shaping actions are taken to prevent an assumption from breaking (or, in some cases, to hasten the breaking of an undesirable assumption). Hedging actions are taken to prepare the organization in

¹*Assumption-Based Planning: A Planning Tool for Very Uncertain Times*, Santa Monica, CA: RAND, MR-114-A, 1993.

case an assumption fails. Hedging actions require the contemplation of a world in which a given assumption has failed and the identification of actions that should be taken today to prepare the organization to face that kind of world.

One of the characteristics of ABP is that it requires a plan or concept from which to identify assumptions. This can be a drawback for a brand new organization. On the other hand, this characteristic allows ABP to be used to update and strengthen an established organization's current operations or tentative plans. It is in this role that ABP was used to test the Force XXI concept.

A PARTIAL APPLICATION OF ASSUMPTION-BASED PLANNING TO FORCE XXI

The Force XXI concept is most completely described in TRADOC PAM 525-5, *Force XXI Operations: A Concept for the Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty-First Century*, (1 August 1994). While we relied heavily on PAM 525-5, we also analyzed two other Force XXI documents—*Army Focus 94* and the Louisiana Maneuvers Force XXI document—and consulted both the primary author of PAM 525-5 and the TRADOC office responsible for maintaining and updating the Force XXI concept (Deputy Chief of Staff for Doctrine [DCSDOC]).

The Force XXI concept is intended to be a living document. In practical terms, this means that it is not a completely developed concept at this point. So before we could identify the assumptions underlying Force XXI, we had to add a step to the process—one of “rationalizing” the current concept.

Rationalizing Force XXI

A typical strategic plan is written in two sections: one describing the (largely uncontrollable) world and one describing what actions the organization plans to take. In this format it is easy to check the completeness and logical consistency of both the future world and the organization's actions. This format is not good, however, for connecting actions to the aspect of the future they address. It was these “assumption-therefore-action” connections that were of interest to us. Once we put PAM 525-5 in this connected format, it was possible to check for responsiveness (does every assumption have responsive actions associated with it) and traceability (is every action being taken because of a stated assumption about the world).

Assumptions with no connected responses are indicative of work yet to be done by the concept developers. Decisions must be made about actions before it is possible to assess the importance of these assumptions to the plan. That is, depending on the action decision, an assumption can be made to lie anywhere between very important and irrelevant to the resulting plan. These unconnected assumptions, while of crucial concern to the concept developers, are of interest to the ABP process only when the decisions about actions have been taken.

Actions that have no clear connection with assumptions about the world, on the other hand, are very interesting to ABP. Such actions are rarely taken without reason, but to the extent that the reasoning is not made explicit, the assumptions that underlie those actions may hide vulnerabilities that could jeopardize the entire plan. It is in identifying such implicit assumptions and examining them for their importance and vulnerability that ABP provides its greatest contribution to strategic planning.

The rationalizing process also identifies explicit assumptions with solid, responsive recommended actions. In fact, the more rationalized the plan, the more well-connected, explicit assumptions there will be. Nonetheless, these assumptions should be tested for their importance and vulnerability as well.

Assumptions that are explicitly stated, but whose actions are not entirely responsive to the concerns they raise, are also of interest to this research. These weakly-connected assumptions behave like unconnected assumptions in that there remain important decisions to be made.

Identifying the Important, Vulnerable Assumptions Underlying Force XXI

The rationalization process yielded unconnected or weakly-connected assumptions, well-connected explicit assumptions, and implicit assumptions from unconnected actions. We generated further implicit assumptions from general impressions after having read the Force XXI documentation. All of the implicit assumptions were checked with the authors and maintainers of Force XXI to ensure that they, indeed, underlay the concept. The full set of generated assumptions was then sent out to Army Staff and Major Command planners. On the unconnected and weakly-connected assumptions, we asked for speculation on their importance. On the explicit and implicit assumptions, we asked for assessments of their importance and vulnerability. Appendix A contains

all of the identified assumptions and the responses from Army planners, catalogued by assumption.

This assessment of the important and vulnerable assumptions underlying the Force XXI concept was the primary intent of the research. The results now go to the planners in the Army's Strategic Plans and Policy Division (DAMO-SSP) for the remainder of the Assumption-Based Planning steps.

That said, there are several general themes evident in the assumptions and the comments from Army planners that are worth recounting:

- The most significant theme to emerge surrounds OOTW. In the current Force XXI concept, OOTW will be handled by giving well-trained and disciplined troops sufficient time and training to transition to OOTW missions—although the documents we studied express doubts that this will solve the problem. Further, Army planners, in discussing implicit assumptions underlying Force XXI, repeatedly pointed to aspects of OOTW actions significantly different from those called out by the concept. These concerns demonstrate that much serious work is required to make the Force XXI concept viable for OOTW missions it could face in the coming 15–20 years.
- Several of the implicit assumptions generated by RAND and reviewed by Army planners were judged to be important and vulnerable. These should be of particular interest to the planners in DAMO-SSP as important areas for shaping and hedging actions, or for significant replanning.
- A large number of implicit assumptions were also generated by Army planners. These are provocative and potentially important, but require additional review by the Force XXI developers to ensure that they are assumptions underlying the concept.
- There is a small set of unconnected assumptions that are important in the sense that they have been presumed for decades in Army planning. They also are potentially vulnerable to changes in the next 10–15 years and deserve serious study in the broader context of how warfare itself could change.

In addition, we have identified a variety of assumptions for which no specific actions have been identified. Until the Force XXI concept developers have identified the actions required by those assumptions, it cannot be determined how important those assumptions are to the Army, and therefore how much any vulnerabilities might affect the Force XXI concept. These assumptions are of importance for the developers of Force

XXI because they represent areas where further concept development must take place.

CONCLUSIONS

As indicated above, **vulnerabilities abound in addressing the Army's role in future operations other than war.** This is a problem well known to the Army, but it emerges as the single most significant vulnerability of Force XXI.

Filling out the "holes" or unaddressed assumptions should be a priority of the concept developers because the manner in which they are addressed could produce further vulnerabilities.

Beyond that, the concept appears fairly robust. That is, most of the remaining vulnerabilities are minor. They should be the target of shaping and hedging actions and signposts, but they appear to be more tractable in general than the OOTW and unaddressed assumptions issues.

ACKNOWLEDGMENTS

This work has benefited from the wisdom and insights of a variety of people. COL Thomas Leney, then director of DAMO-SSP, focused our thinking and saw the grander scheme into which this work should fit. MG John Ellerson, then Director of Strategy, Plans and Policy, (ODCSOPS), requested the specific concentration on Force XXI and sponsored the work. COL Gary Griffin, one of the principal authors of TRADOC PAM 525-5, and COL Michael Starry, then responsible for the maintenance and development of Force XXI, were especially helpful. Both were crucial to our understanding of the thinking behind Force XXI and were very generous with their time for a project that was in a completely different Army "stovepipe" from their normal duties.

COL Thomas Molino, current director of DAMO-SSP, has been a beacon of assistance and good humor through the myriad of briefings that have been given in the Army, Joint Staff, and OSD. LTC Timothy Daniel deserves particular mention for two reasons. His understanding of and enthusiasm for ABP have made the project work go very smoothly. In addition, his development of an updated Army planning system based on ABP caused us to think carefully about the foundations of the ABP methodology and how it best serves the goals of good strategic planning.

The support of LTG Paul Blackwell, DCSOPS, was critical in soliciting responses from Army planners. The encouragement of GEN Ronald Griffith, VCSA, was the primary impetus for carrying this briefing to both the Joint Staff and OSD.

Special thanks is due RAND colleagues Thomas McNaugher, program director, and James Quinlivan, director of the Arroyo Center, for their unfailing support of this work. Both acted more like co-authors than administrators, and their insights and comprehensive knowledge of the Army are spread throughout this work.

Finally, the acknowledgments would not be complete without serious thanks to Laurie Rennie for her careful preparation of the manuscript and her unfailing support of the researchers.

Assumption-Based Planning and Force XXI

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The primary purpose of this briefing is to present the results of a partial application of Assumption-Based Planning (ABP) to test the robustness of the Army's Force XXI operational concept for its future forces. In addition, however, it will describe ABP, how it fits into the changed long-range planning environment of the post-Cold War era, and how it can be modified to better deal with Force XXI.

Current Work Uses Assumption-Based Planning to Evaluate Force XXI

- **ODCSOPS was concerned about Force XXI's robustness in light of current uncertainties**
- **This continues a long association with Army long-range planning**
 - **1987 work on Army 21**
 - **Development of ABP**
 - **Work on updating long-range planning system**
 - **Work on the changing planning environment**

ARROYO CENTER #2

RAND

Our current work was suggested by MG John Ellerson, then Director of Strategy, Plans and Policy, Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS). He was concerned about whether the Force XXI concept could handle the many uncertainties the nation and its Army faced in the years ahead. This concern led him to ask RAND to use the first two steps of Assumption-Based Planning to test the robustness of Force XXI out to 2010. The bulk of this presentation will report on that work, but it is useful to digress briefly to describe the longer history and context of that specific project.

The Force XXI work continues an association between RAND and Army long-range planning that dates back to 1987. At that time RAND helped the Training and Doctrine Command (TRADOC) with Army 21—the long-range planning effort looking 30 years into the Army's future. Army 21 was based on trend extrapolations, which even at that time seemed of dubious merit in looking 30 years forward. RAND's role was to think about other approaches to planning at distant time horizons, and the result was a planning tool that came to be known as Assumption-Based Planning (ABP). Later we will describe ABP in more detail, but for now it is sufficient to know that it is both a means for planning in very uncertain times as well as a means for testing plans or concepts for their robustness in the face of great uncertainty.

The collapse of the Soviet Union in 1989 helped create a healthy demand for planning approaches that dealt with very uncertain times (regardless

of specific time horizon), and the Strategic Plans and Policy Division (DAMO-SSP) became very interested in ABP. Since 1990 we have been helping that office adapt and adopt ABP as a way to do its planning work. It currently forms the backbone of a redesign for the Army Long-Range Planning System.

Finally, long-range planning work since 1989 has taken place in a dramatically different planning environment. RAND has done work on the important ways this environment differs from that of the Cold War, and it is useful to describe that work briefly to put ABP—as a planning tool—into perspective in the post-Cold War planning environment.

ABP Strengths Are Compatible With the Changed Planning Climate

- Popular Cold War planning approaches are less appropriate today
 - Trend extrapolation (most likely future)
 - Worst-case planning
 - Parallel programming
- The new environment requires a new planning mindset
 - Refocusing (vision)
 - Multiple-scenario analysis
 - Assumption-Based Planning

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The stability of the Cold War world created an artificial planning environment. We have argued¹ that not only has the planning environment changed, three of the most common planning approaches of the Cold War world are less apt today.

- Trend extrapolation (or most-likely-futures planning) was a common approach in the stability of the Cold War world. Long-range planning scenarios were based on projected technologies (and stable geopolitical trends) using standard extrapolation techniques. In this much less stable geopolitical world, technology is no longer the primary engine of change, and trend extrapolation is useful only in the short term.
- Worst-case planning encapsulates uncertainty by making all other situations lesser-included cases. Strategic Cold War planning had, as its worst-case scenario, a war in Central Europe that would escalate to a homeland exchange of nuclear weapons between the superpowers. All other conflicts were presumed to be handled if we could handle the worst-case one. While this turned out to have questionable validity even during the Cold War, it is much harder to argue that there is any threat today so all-encompassing as was the threat to national survival.

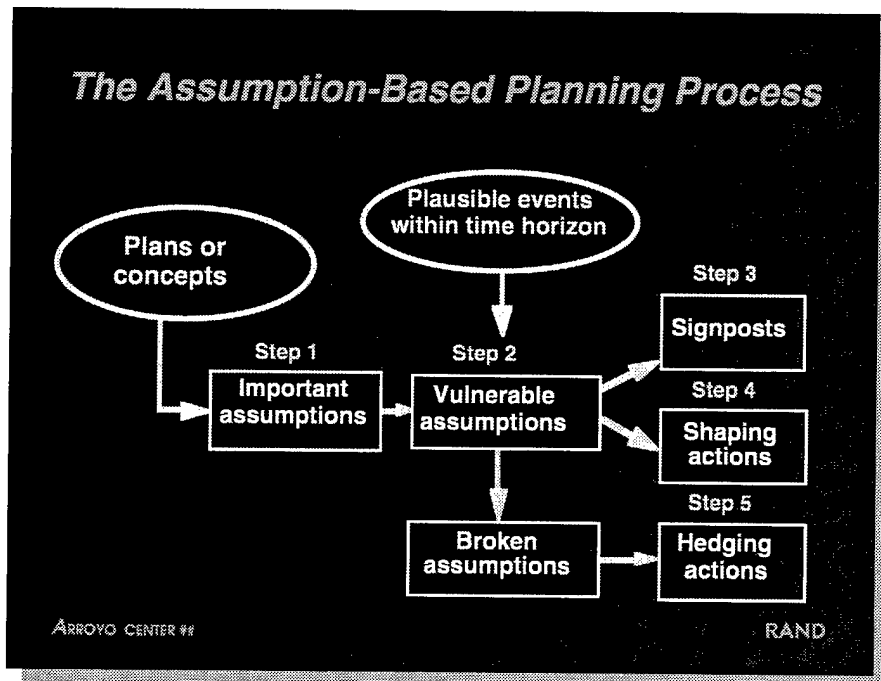
¹In "A Time for Planning: If Not Now, When?" *Parameters*, Summer 1994.

- The parallel programming approach deals with uncertainties by programming for all alternatives. During World War II the country employed three different approaches to making an atomic bomb (one with plutonium, the other two with uranium). In the presence of great urgency and uncertainty, all three became completely funded programs. The strategic triad and the development of ballistic missiles are other examples of parallel programming. In times of severely reduced budgets and urgency, this approach has only limited application.

We have argued that a new planning mindset is necessary in today's more uncertain geopolitical situation. Two planning methods from the Cold War era still appear to have utility in the new planning environment.

- The goal of refocusing (or vision) is to change the approach to a problem in such a way that its major uncertainties are ameliorated. George Kennan's approach to countering the expansionist Soviet Union was not to tackle the uncertainties of how to carry the fight to the USSR, if necessary, but to refocus strategic planning on containment. This had the effect of making those attack uncertainties irrelevant to the new focus. "Fortress America" is another example. It refocuses our attention on the current environment in such a way that many of the uncertainties about readiness and logistics are irrelevant. But not all refocusing or visions are good or worthwhile; while visions are easy to create, *quality* visions are difficult to develop, although very powerful.
- Assumption-Based Planning (ABP) is a specific method from the broader class of multiple-scenario analysis. This class deliberately programs against uncertainty through warning and hedging actions. Strategic bomber survivability depended on potential emerging threats that could be monitored, shaped, and hedged against. Multiple-scenario analysis can be thought of as what to do in uncertain times if a quality vision is absent.

A description of Assumption-Based Planning follows.



Previously published RAND research describes the Assumption-Based Planning tool.² The basic idea of ABP starts with what can be known—the important assumptions upon which current concepts or plans are based. An assumption is an assertion about some characteristic of the world (today and for some time in the future) that underlies an organization's current concepts or plans. An assumption is important if its negation would lead to significant changes in those concepts or plans.

One can then identify which of these assumptions could become vulnerable. To do this requires a planning time horizon that is the farthest point out that a given planning effort will consider. This horizon is important because it sets the limits on the vulnerability of an assumption. Events that could plausibly take place within the planning horizon and that could overturn the assumption or cause it to be false establish the vulnerability of that assumption.

From these vulnerable assumptions one can develop signposts indicating changes in the vulnerability of an assumption. Signposts are critical to ABP, which is driven by the notion that the best approach in an uncertain planning environment is to do what needs doing now and to watch for changes that will resolve the uncertainties. Signposts are the mechanism for monitoring the uncertainties in the organization's future.

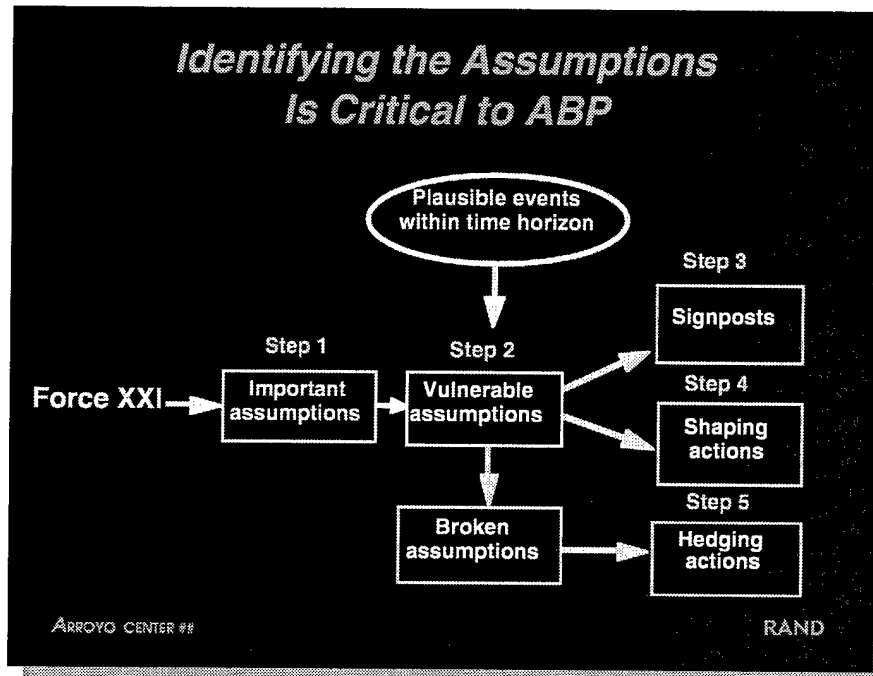
²*Assumption-Based Planning: A Planning Tool for Very Uncertain Times*, Santa Monica, CA: RAND, MR-114-A, 1993.

Shaping and hedging actions are actions taken today to guard against the uncertainties. Shaping actions are taken to prevent an assumption from breaking (or, in some cases, to hasten the breaking of an undesirable assumption). Hedging actions are taken to prepare the organization in case an assumption fails. Hedging actions require the contemplation of a world in which a given assumption has failed and the identification of actions that should be taken today in order to prepare the organization to face that kind of world.

One of the reasons Army audiences grasp the concept of ABP so readily is that the Army already does ABP-like thinking in its tactical planning. This tactical thinking also provides a good example of the ABP process in action. In planning tactical defensive operations, Army personnel strive to meet an advancing army on the most favorable terms possible. Any given draft of a plan assumes a specific enemy avenue of approach. The plan implicitly assumes that the enemy will not use other avenues of approach. The planners then do ABP-like thinking:

- In rare cases there is only one serious avenue of approach. Even then there are likely to be other plausible avenues (such as the German advance around the French Maginot Line through the Ardennes Forest). These plausible alternative avenues of approach are analogous to vulnerabilities in the assumed approach.
- For each alternative avenue of approach the tactical planner sets up named and targeted areas of interest. These "signposts" are physical locations that are monitored. They are such that activity in the area would be an indication that the enemy is using an alternative avenue.
- Shaping actions are actions taken to try to "channelize" the enemy onto the preferred (and planned for) avenue of approach. These are actions intended to reinforce the plan's assumption about the enemy route.
- Hedging actions are intended to prepare the defense in case, despite the shaping actions, the enemy takes an unanticipated avenue of approach. These are contingency plans intended to prepare the defense for the failure of assumptions in the plan about the enemy approach.

In times of great uncertainty, a multiple-scenario approach such as Assumption-Based Planning is more resilient to a wide variety of potential changes in the world, and its outputs should help produce more robust plans. The challenges in this approach are to identify the critical assumptions underlying an organization's thinking and then to understand which ones might become vulnerable, and how.



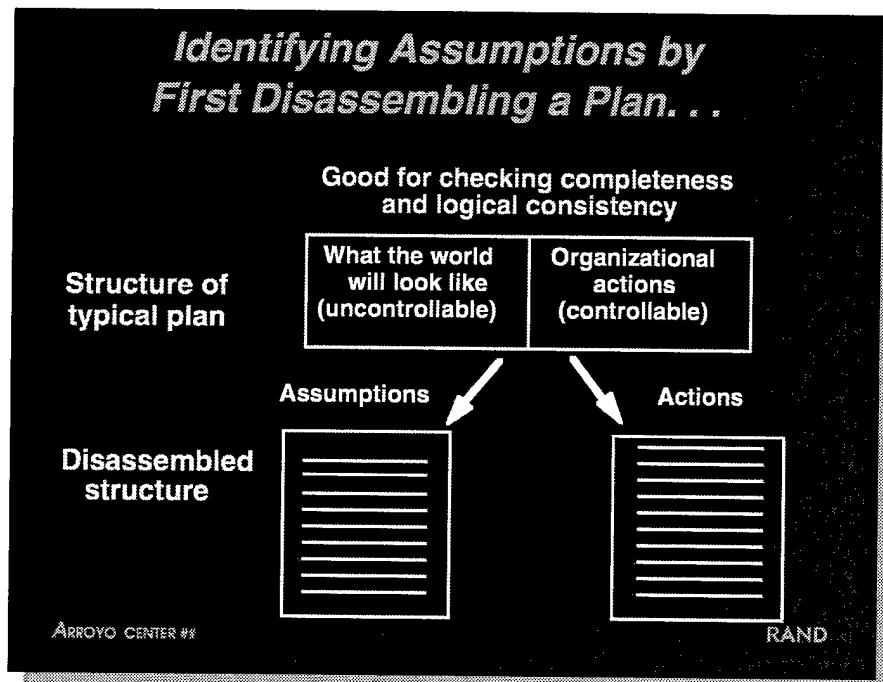
In this case, then, we fed Force XXI into the Assumption-Based Planning process with the intent of carrying out the first two steps. The remaining steps were to be the responsibility of DAMO-SSP.

Our primary source for Force XXI definition and information was TRADOC PAM 525-5, *Force XXI Operations: A Concept for the Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty-First Century* (1 August 1994). We also analyzed two other Force XXI documents—*Army Focus 94* and the Louisiana Maneuvers Force XXI document. In addition, we discussed our assumptions with the primary author of PAM 525-5 and with the TRADOC office responsible for maintaining and updating the Force XXI concept (Deputy Chief of Staff for Doctrine [DCSDOC]).

TRADOC PAM 525-5 is a “living document.” That is, it is acknowledged to be incomplete in that not all major decisions about the future Army have been made. In terms of ABP, this means that there are likely to be statements in PAM 525-5 about the future for which no associated Army actions have been determined. This is problematic for ABP because it is only in deciding about actions that one truly reveals one’s assumptions. For example, suppose one avers that Russia could emerge as a superpower again within the planning horizon. Deciding to take no action because of that possibility reveals a different assumption about the likelihood of Russia reemerging than does taking prompt and continuing

budgetary action to maintain heavy forces, nuclear weapons, and a forward presence in Europe.

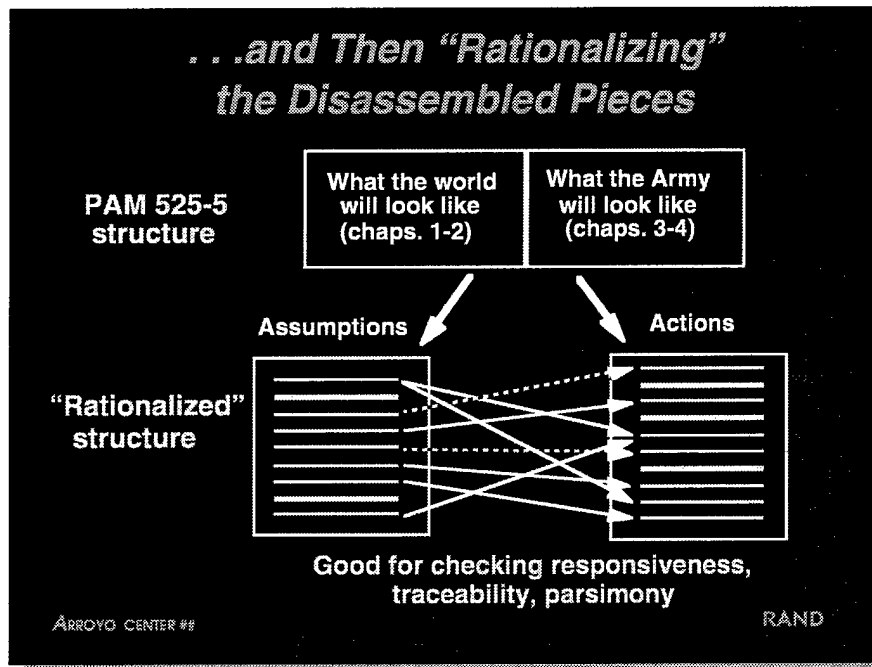
As we discuss later, in this case it was particularly important to separate assumptions that had no associated actions from those that had. This lack of completeness in the plan, however, is common with most plans and concepts, and the method we use is applicable to most planning documents. Applying this method can be thought of as a prestep or "Step 0" in the ABP process.



Every written plan has a structure. The typical military structure (including that of PAM 525-5) lumps most of the assumptions about the world into one part and most of the actions into a separate part. This structure is well suited to checking the logical consistency and completeness of the future world and of the organization's planned actions. It is ill suited, however, to checking the responsiveness of the organizational actions to assumptions about the world or the traceability of organizational actions back to the assumptions about the world that drive them. It is in this latter form that we would be able to determine which Force XXI assumptions had been specifically addressed and which had not.

To check these aspects of the plan, we first disassembled or separated the document into its assumptions about the world and the actions the Army was planning to take. The specific approach used arose from the Army tendency to present both information about the world and Army actions in sentences containing the word *will*. That is, each document we looked at talks both about what the future *will* be like and what the Army *will* do or be like in that world. Remaining information about both can be picked up in the few sentences that contain words such as *can*, *may*, and (for Army actions) *therefore* and *must*.

After disassembling the documents about Force XXI, we then set about "rationalizing" the disassembled parts.



The "rationalizing" process consists of trying to connect assumptions about the world with "therefores" and Army actions. In this format, it is easy to see the actions responsive to any assumption and to trace the assumptions that drive any action.

For everything worth mentioning about the world, we looked for one or more actions the Army planned to take because of it. We were aided in this process by long discussions with both the primary author of PAM 525-5 and with people at TRADOC responsible for maintaining and updating the Force XXI concept.

While this rationalizing process is a worthwhile exercise in any case, we used it because of its ability to help us identify assumptions of various types. The rationalizing process produced four different types of connections, each related to assumptions in some way:

- **Well-connected assumption-actions** (solid arrows). These are assumptions about the future for which there are clearly responsive Army actions.
- **Weakly-connected assumptions** (dotted arrows). Army actions can be associated with these assumptions, but are judged not completely responsive to the assumption.
- **Unconnected assumptions** (thick assumption lines in the illustration). For these assumptions we could find no actions that appeared

responsive. (In other words, these assumptions fail the responsiveness test.)

- **Unconnected actions** (thick action lines). These are Army actions for which there did not appear to be a specific assumption about the world to which the action was responsive. (In other words, these actions fail the traceability test.)

Of greatest interest to us were the unconnected assumptions and the unconnected actions. These unconnected pieces are either extraneous (failing the “parsimony” test) or they each lead to assumptions that deserve serious attention. Examples of both are detailed in the next two slides.

Unconnected Assumptions May Indicate Decisions Pending

Assumption: OOTW will be manpower intensive
Action: ?
Decision pending: *Allies? Multi-component forces?*
(Inconsistent with substituting technology
for people?)

Assumption: Downward trend in the size of the force
will stabilize toward the end of the century
Action: ?
Decision pending: *Reorganize after force is stabilized?*
(Not really a concern at this level; fails
parsimony test?)

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As discussed earlier, unconnected assumptions are indicative of decisions about actions that have not yet been made. These assumptions are quite useful for the developers of the concept because they indicate where additional conceptual work needs to be done. They are relatively less useful for ABP because the actions eventually taken are an important indication of the importance and vulnerability of the assumption. Consider, for example, the assumption that OOTW will be manpower intensive. If the Army decides that no action is necessary, it is making the implicit assumption that it has sufficient forces to handle manpower-intensive OOTW missions. This then becomes an important or critical assumption, and one can question whether it is vulnerable.

On the other hand, if the Army were to significantly redesign the force structure in order to handle both conventional war and manpower-intensive OOTW operations, the situation is different. In this case, the assumption is not important because the Army is prepared for all contingencies, and the vulnerability of the assumption is less interesting.

The actions taken by the organization because of a given assumption, then, affect whether or not that assumption is important to their plans. Unconnected assumptions do not reveal their importance in the organization's plans.

For the two assumptions shown in the chart (which come directly from PAM 525-5), we were unable to find, in the sections on what the Army

would look like, specific actions the Army would take because of them. In talking with the Force XXI experts, we received confirmation that although these assumptions had been discussed, specific actions to handle them had not yet been chosen.

For the first assumption, Army planners said that several discussions had been held about how to handle manpower-intensive OOTW but that no decisions had yet been made on the best solution. Part of the problem here might be that the assumption is in conflict with the more general notion that Force XXI is a way of substituting information technology for people. The "rationalization" process can, thus, also aid the check for logical consistency.

For the second assumption, everyone seemed to agree that the assumption was true, but it wasn't clear what the Army should do about it specifically. There has been some talk that reorganization of the force shouldn't take place in earnest until the budget situation has stabilized, but it's not clear that any specific Army action is necessary. In that case, the assumption, while widely accepted, would be superfluous or at least inappropriate to deal with in the Army planning process.

Unconnected Army Actions Reveal Implicit Assumptions

Assumption: ?

Action: All acquisition systems will have sensor-to-shooter fusion links to direct, indirect, and joint attack assets

Implicit assumption: *The shorter the sense-to-shoot time, the better*

Assumption: ?

Action: Improved measures to prevent fratricide must be developed

Implicit assumption: *Identifying friend or foe will increasingly be a problem on the 'empty' battlefield*

Public tolerance for friendly casualties will be lower

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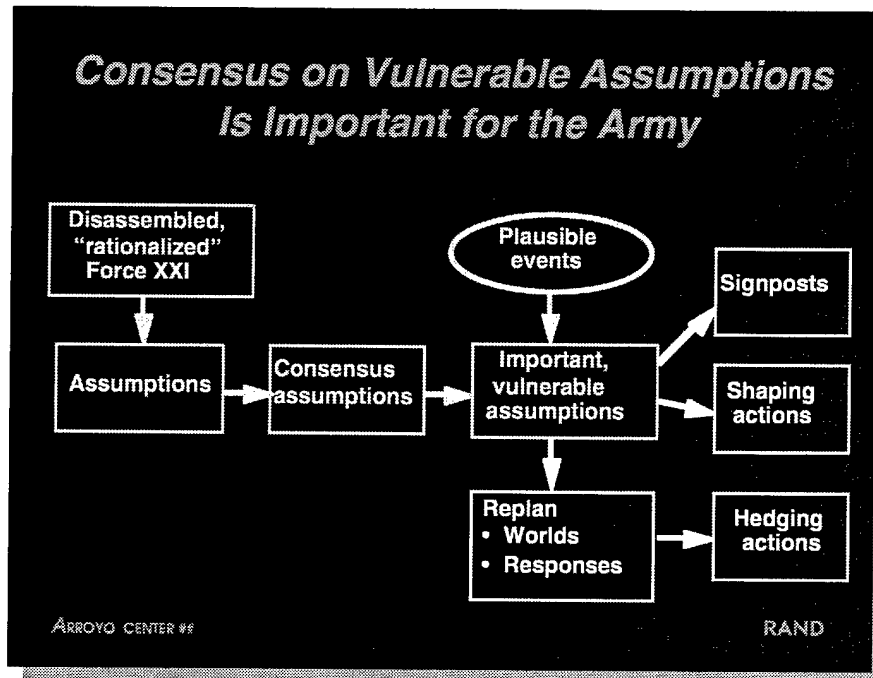
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The Army was prepared to take several actions in PAM 525-5 that were linked to no discernible assumptions about the world. While some such actions may indeed fail the parsimony test (that is, are unnecessary actions), most are expected to be the result of reasonable assumptions not explicitly stated. It is very useful for planning purposes to make these implicit assumptions explicit.

In some instances, the implicit assumption may be obvious. It is still useful to write it out explicitly. In the first example shown above, *if the implicit assumption is correct*, it is possible that, with information technology, we could get to the point where the sense-to-shoot time is so short that it starts to interfere with IFF (identify friend or foe) procedures and starts causing more problems than it solves.

The second example is also interesting. In some cases the actions to be taken by the Army are to solve long-standing problems. This would seem to be the case here, but it is also true that the Force XXI concept itself may be working to exacerbate the problem. In that case it is very useful to call out explicitly that part of the implicit assumption.

Getting the implicit assumptions right is the most powerful part of the ABP process—it is the unexamined implicit assumptions that tend to harbor the unwelcome surprises of a plan.



MG Ellerson was particularly concerned that there be a consensus on the assumptions that were identified in Force XXI. That is, he believed that the assumptions underlying Force XXI not only should be made explicit, but also agreed upon by Army planners.

Toward that end, we identified some 51 explicit assumptions (primarily from PAM 525-5) and another 21 implicit ones. LTG Paul Blackwell, DCSOPS, then sent those assumptions out to all the Major Command and Army Staff planners asking for their thoughts on the importance and vulnerability of those assumptions. Responses were received from over 80 percent of the Army planners.

Both the Army responses and the resulting list of most important/vulnerable assumptions were important grist for assessing the robustness of the Force XXI concept. In addition, however, they are of value to the planners in DAMO-SSP who will carry on the ABP process on the assumptions identified. For this reason, they are documented here. The list of most important and vulnerable assumptions is reproduced in the concluding section below, and Appendix A contains all of the identified assumptions and all the responses from Army planners, catalogued by assumption.

At this point, then, the ABP process on Force XXI is only partially complete. On the other hand, there are some interesting themes that

emerged in looking across all the assumptions and responses. Themes can be seen among three types of assumptions:

- Unconnected or weakly-connected assumptions
- Vulnerable, well-connected explicit assumptions and Army actions
- Implicit assumptions

In addition, one general area of assumptions stood out from the others in its importance and vulnerability. In what follows, we discuss each of these themes in turn.

Many of the Areas for Further Work Are Familiar

- Army will not be able to meet the requirements of the NMS without the reserve components
 - Army CSS and CS units are usually the major theater land force operators in war and OOTW
 - OOTW will be manpower-intensive
 - Preindustrial and nonnation threats are likely to engage in protracted guerrilla or terrorist-like operations
 - Downward trend in the size of the force will stabilize toward the end of the century
-
- The region that will require most attention is Asia (reject)

ARROYO CENTER #1

RAND

The rationalization process makes it clear that unconnected or weakly-connected assumptions form an important set of potentially important and vulnerable assumptions. Again, they are only potentially important and vulnerable in ABP terminology because until decisions are made about the proper actions to be taken, the importance the organization places on that assumption is not revealed.

Within these unconnected or weakly-connected assumptions, two themes emerged: one related to the assumptions that generated the most comment from Army planners, and the other to the most abstract of the vulnerable assumptions.

Several of the unconnected assumptions generated wide comment from the Army planning community. The first five examples here are indicative of the assumptions in this category. The first two have to do with active-reserve force issues, the third and fourth with OOTW, and the fifth with budgets. In general, the controversial assumptions were familiar to the writers of PAM 525-5. They deal with issues that have been debated throughout the Army community for months (sometimes years), yet no definitive actions have been identified. The most noteworthy of the unconnected assumptions, then, are quite familiar to the TRADOC community responsible for PAM 525-5, so this approach generated little of surprise for the concept developers. Nonetheless, they were interested to see the results both because of the systematic nature of our inquiry and

because of some of the lesser unconnected assumptions generated by this approach.

The last assumption above is an interesting case in point. It comes directly from PAM 525-5, yet it was widely rejected by Army planners. The writers of PAM 525-5 said this particular assumption was suggested for inclusion by a specific individual in the form of a comment (without recommendations for actions) on the draft. The process of identifying unconnected assumptions and discussing them in a wider community of planners led to the rejection of an assumption somewhat arbitrarily introduced by an individual. This ability to highlight assumptions for discussion and to reject unwarranted ones is a clear step toward sound planning.

Some Areas Require Serious Strategic Thinking

- **Types of crises and conflicts we have experienced since end of Cold War will continue. Battle between mechanized forces will be similar to armored operations of the past three decades**
- **Nation states will continue to be the world's primary political unit (though they are under attack). Nationalism will be the leading cause of interstate and intrastate conflict**
- **Well-trained and disciplined units, provided with sufficient time and resources to train, can transition to OOTW missions as required**

ARROYO CENTER #2

RAND

The second theme related to unconnected and weakly-connected assumptions that emerged concerned those vulnerable assumptions that were most abstract and speculative. There were three such assumptions, as shown above. As to vulnerability, one of the comments from the Army planners invoked the longbow at Crecy and Agincourt as an example of the kind of surprise that could upset the first assumption shown above. Modern pundits argue that brilliant munitions could have a similar transforming effect on the battlefield in the next 20 years. The second assumption was stated in PAM 525-5 to be vulnerable to plausible events in the coming years, and the third was posited as potentially unfounded even today.

These are the kind of assumptions that are usually left implicit in planning documents. They aren't addressed explicitly in PAM 525-5 in the sense that specific actions are recommended because of them. On the other hand, these are well-established assumptions from the past upon which current force structures, doctrine, etc. are based, and it seems clear that if any of them were to fail, significant changes to the Army would be mandatory or essential. They are load-bearing assumptions in a very broad sense. Because they are so fundamental to the kind of Army we have today and because they are vulnerable in these times of great change, these assumptions deserve a more thoughtful and philosophical review by military planners (and perhaps historians). Their broader focus suggests that they are more appropriate for specific long-range planners who concentrate on the entire Army, such as those in DAMO-SSP and TRADOC DCSDOC.

Force XXI Works the Most Obvious Vulnerabilities

- Developments in information technology will revolutionize how nations, organizations, and people interact
- Ability to manipulate, isolate, or negate portions of the electromagnetic spectrum will be a key element of future military operations
- Combat involving advanced, complex, adaptive armies will transform the battlefield. Formations will be more dispersed
- Information technology will greatly increase the volume, accuracy, and speed of battlefield information [that could be] available to commanders
- The commander brings the requisite ability, experience, and wisdom to convert information to battlespace knowledge
- Horizontal insertion of digital electronics will increase lethality, survivability and tempo across the force

ARROYO CENTER #2

RAND

To the credit of the Force XXI concept, there are many explicit assumptions for which specific responsive actions are called out. Said another way, a great deal of the Force XXI concept is already well rationalized. Responses from Army planners pointed to very few of the explicit assumptions that were vulnerable within the 20-year planning horizon. Of those that were mentioned as vulnerable, most had to do with the impact of internetted information on the battlefield.

This is not particularly surprising. Former Army Chief of Staff General Gordon Sullivan, in his earliest writings on Force XXI, admitted that the impact of vastly increased information on the battlefield, while potentially revolutionary, was not well understood. He called for extensive experimentation and testing of any such concepts, and indeed the Battle Labs, Louisiana Maneuvers, and the Advanced Warfighting Experiments were set up to do just that. Thus, in this case, well-connected and explicit assumptions represent vulnerabilities the Army is well aware of and already dealing with.

This helps make the broader point that being explicit about one's assumptions and the actions to be taken in light of them seems naturally to invite questioning of the vulnerabilities of those assumptions. That is, it seems that the more explicit one is about one's assumptions and actions, the more naturally this leads to ABP-like thinking in questioning assumption vulnerability and in developing appropriate risk-reducing actions.

Implicit Assumptions Are Controversial, Provocative

- Adversaries will be technologically sophisticated, although not to the same degree as US, and thus vulnerable to the tactics and strategies of knowledge-based operations
- The Army will continue to attract, develop, and retain fundamentally competent people for its officer ranks
- Host nation support will be forthcoming
- The shorter the sense-to-shoot time, the better
- The Army can successfully substitute capital (technology) for labor
- The Army will be able to afford Force XXI

ARROYO CENTER #8

RAND

There is a variety of implicit assumptions that we and others have drawn from a reading of the Force XXI documents. It is useful to reemphasize that the assumptions shown above do not come directly from PAM 525-5. We generated the first four either in response to an unconnected action or from a general reading of the Force XXI concept. The last two are among the three dozen or so generated by Army planners in response to our request for implicit assumptions we might have left out.

The most important general question to ask about these implicit assumptions is "do they underlie the Force XXI concept?" The most direct method for determining this is to talk with the developers of the concept. The implicit assumptions generated by RAND all passed this test—generally by acknowledgment from both the primary author of PAM 525-5 and from those responsible for maintaining and further developing the concept. In fact, these sources also added some implicit assumptions of their own.

Implicit assumptions that are acknowledged to underlie the Force XXI concept can be subjected to tests for importance and vulnerability. Many of the implicit assumptions of this type were subsequently deemed both important and vulnerable by Army planners. These form an important set of assumptions for Army planners because their (heretofore) implicitness makes them potential sources of surprise.

The second set of assumptions above is part of a larger set that have not been explicitly acknowledged by the developers of the Force XXI concept as fundamental to their thinking. Several of them have been deemed important and vulnerable by Army planners, but the crucial step of verifying that they underlie the Force XXI concept has not yet been taken. There is further work to be done, then, in establishing that connection. Those for which the connection can be made are candidates for implicit assumptions that are important and vulnerable.

The Biggest Area for Further Work is OOTW

- **Visible in unconnected assumptions**
 - OOTW will be manpower-intensive
 - Well-trained and disciplined units, provided with sufficient time and resources to train, can transition to OOTW missions as required
- **and in comments from Army planners**
 - lack of center of gravity
 - inability to force the enemy to engage
 - lack of clearly defined objectives
 - inability to substitute capital for labor

ARROYO CENTER #2

RAND

If there is one message that comes across clearly in the review that we've done, it's that the major area where serious planning work remains is in operations other than war.

As mentioned earlier, there are unconnected assumptions related to OOTW, and the one about the ability of well-trained, disciplined units to transition to OOTW missions is fundamental and admittedly vulnerable.³

More interestingly, the differences between Force XXI operations (as spelled out in PAM 525-5) and OOTW came across most clearly in the responses from the Army planners to several of the implicit assumptions we generated. On six different implicit assumptions, we received specific comments that the assumptions may be true for general war, but were not true for OOTW:

- The Army can always force the enemy to accept engagement
- Operations will have clearly defined objectives achievable by classical military means
- The Army can successfully substitute capital (technology) for labor

³From PAM 525-5: "Although we envision achieving success in OOTW through training, the possibility of tailoring forces based on unique requirements of OOTW should be explored."

- The enemy will have identifiable, targetable centers of gravity
- Changes in conduct of warfare won't invalidate the precepts of war
- The first battle paradigm is still valid

This strong consensus indicates how significantly different OOTW may be from the type of general warfare that Force XXI appears to address.

These last few charts lead to some general comments on the robustness of Force XXI in the face of uncertainties 15–20 years on, and some specific comments on the most important and vulnerable assumptions underlying the Force XXI concept.

THE ROBUSTNESS OF FORCE XXI

If a concept is to be robust, the assumptions underlying it should at a minimum be either soundly connected to affordable actions or well shaped or hedged against by affordable programs. There are few shaping or hedging actions in evidence in the current Force XXI concept, and there are assumptions that are either unconnected or only weakly connected to any specified actions. The Force XXI concept in its current form is, therefore, not robust in light of future uncertainties.

That said, even with a clearer understanding of the assumptions underlying the concept and of the areas where decisions are still pending, it is difficult to assign an overall robustness score. We have highlighted several aspects of the vulnerabilities of Force XXI. **The greatest vulnerability is in the area of OOTW.** In the current Force XXI concept, OOTW is intended to be handled by giving well-trained and disciplined troops sufficient time and training to transition to OOTW missions, although it is admitted that this might not solve the OOTW problem. Further, Army planners, in discussing implicit assumptions underlying Force XXI, have repeatedly pointed to aspects of OOTW actions significantly different from those called out by the concept. An explicit assumption of the concept is that OOTW will be manpower-intensive, yet no specific actions are called out to address this assumption. This points to a large area across several aspects of vulnerability where serious work is required to make the Force XXI concept viable for OOTW missions it could face in the coming 15-20 years.

Another general area of vulnerability is in the unaddressed (unconnected) assumptions. Until concept developers have identified the actions required by those assumptions, it cannot be determined how important those assumptions are to the Army, and therefore how much any vulnerabilities might affect the Force XXI concept. Nonetheless, some judgments can be made. Clearly the assumption about OOTW being manpower-intensive is an important one to address. Another unaddressed assumption states that the region that will require the most attention is Asia. This assumption was widely doubted by the Army respondents and appears as though it ought to be removed from the concept. Other unaddressed assumptions of lesser concern are identified in the "Unconnected Assumptions" section of Appendix A. TRADOC has expressed interest in these as areas for further development.

Several implicit assumptions were identified by RAND and—in discussions with the developers—acknowledged to underlie the Force XXI concept. Upon review by Army planners, many of these were rejected. That is, given that they were implicit assumptions in the minds of the

developers of Force XXI, these assumptions **were judged vulnerable and, in fact, broken** by the reviewers. These should be of particular interest to the planners in DAMO-SSP as important areas for shaping and hedging actions, or for significant replanning. They include:

- The Army can always force the enemy to accept engagement;
- Operations will have clearly defined objectives achievable by classical military means;
- The enemy will have identifiable, targetable centers of gravity; and
- Operations are continuous: they progress smoothly from peace to war.

Those who reviewed these assumptions generally accepted that they could be true in some cases, but argued against their accuracy in all cases. To address these vulnerabilities requires addressing the other possible cases. In general, the other possibilities fall into the category of operations other than war—reinforcing the notion that OOTW is underrepresented in the Force XXI concept.

Beyond the above vulnerabilities, a large number of implicit (and vulnerable) assumptions were also generated by the Army respondents. These are provocative and potentially important, but require additional review by Force XXI developers to ensure that they underlie the thinking behind the Force XXI concept. In addition, vulnerabilities were identified in the impact of the information revolution on the Army, but those vulnerabilities are generally being (or have been) tested in the Battle Labs, Louisiana Maneuvers, and Advanced Warfighting Experiments.

THE MOST IMPORTANT AND VULNERABLE ASSUMPTIONS

Assumption-Based Planning recommends that all important and vulnerable assumptions be carried through the process of identifying signposts and shaping and hedging actions. There was a wide disparity of opinions among those who took a critical look at the assumptions generated in this work as to which were important and which were vulnerable—with many receiving at least one vote as important or vulnerable. ABP also recommends that the most important and vulnerable be carried through the process first. In that regard, there was more consensus among the reviewers. Thirteen of the assumptions received significant consideration as most important and vulnerable. Though they are more properly the interest of those who would carry on the Assumption-Based Planning exercise, those thirteen are included here

for completeness and as an indication of the kinds of vulnerabilities of Force XXI that were identified. In no particular order, they are as follows:

- Armed forces will remain fully engaged throughout the world; United States interests will remain worldwide; few states will have the resources, or the need, to directly attack the U.S. However, many will challenge it for control or dominance of a particular region.
- Nation states will continue to be the world's primary political unit (though they are under attack). Nationalism will be the leading cause of interstate and intrastate conflict.
- Ability to manipulate, isolate, or negate portions of the electromagnetic spectrum will be a key element of future military operations.
- Combat involving advanced, complex, adaptive armies will transform the battlefield. Formations will be more dispersed.
- Well-trained and disciplined units, provided with sufficient time and resources to train, can transition to OOTW missions as required.
- Information technology will greatly increase the volume, accuracy, and speed of battlefield information [that could be] available to commanders. Lower-scale operations will spread widely over distances and time.
- Information will allow greater synchronization of effort, control of tempo, and control of force application. Better intelligence, shared among all elements and moved or retrieved rapidly on demand, will allow commanders to control and vary tempo based on superior knowledge of friendly situation/location, enemy situation/location, and events shaping the overall battlespace. Internetted information will greatly enhance all battle operating systems with the greatest potential payoff in intelligence, operations, and fire support functions. Information about enemy posture, position, and activity will be known earlier and in far greater detail than ever before.
- The commander brings the requisite ability, experience, and wisdom to convert information to battlespace knowledge.
- The Army will have realistic training at all levels between actual units on the ground and units simulated on the computer.
- Horizontal insertion of digital electronics (into an existing organization using current doctrine) will increase lethality, survivability, and tempo across the force.
- The Army can always force the enemy to accept engagement.

- Operations will have clearly defined objectives achievable by classical military means.
- The Army can successfully substitute capital (technology) for labor.

CONCLUSIONS

It is unfair to ask that a work in progress such as the Force XXI concept be entirely robust to future uncertainties—particularly in the increasingly uncertain post-Cold War world. What *is* fair is to suggest where its greatest vulnerabilities lie and to assess the magnitude of those vulnerabilities. As indicated above, **vulnerabilities abound in addressing the Army's role in future operations other than war.** This is a problem well known to the Army, but it emerges as the single most significant vulnerability of Force XXI.

Filling out the "holes" or unaddressed assumptions should be a priority of the concept developers because the way they are addressed could produce further vulnerabilities.

Beyond that, the concept appears fairly robust. That is, most of the remaining vulnerabilities are minor. They should be the target of shaping and hedging actions and signposts, but they appear to be more tractable in general than the OOTW and unaddressed assumptions issues.

APPENDIX A

List of Assumptions and Comments

This appendix lists the assumptions identified as underlying Force XXI. There are four kinds of assumptions listed:

- Well-connected, explicit assumptions
- Weakly-connected assumptions
- Unconnected assumptions
- Implicit assumptions
 - RAND generated from a reading of PAM 525-5
 - RAND generated from unconnected actions
 - Generated by Army planners

The first three kinds of assumptions come directly from Force XXI documentation and were collected from three documents: *TRADOC PAM 525-5*, *Army Focus 94: Force XXI*, and the LAM Force XXI document from 15 January 1995. The implicit assumptions come from the sources listed under the bullet.

The three kinds of assumptions taken from Force XXI documentation were initially extracted in an approach based on the Army tendency to present information about both the world and Army actions in sentences containing the word *will*. That is, each document talks about both what the future *will* be like and what the Army *will* be like in that world. Searching electronically on the word *will* gave us a preliminary list of assumptions (and the actions we were to use in trying to "rationalize" the Force XXI process). Remaining information about both assumptions and actions was gleaned from the few sentences that contain words such as *can*, *may*, and (for Army actions) *therefore*, *accordingly*, and *must*.¹ Judgment was used in combining similar assumptions (and actions) and paring the lists down to manageable size.

After collecting the assumptions, we attached to each one the actions found in Force XXI that we judged were most responsive. Those assumptions for which clear, responsive actions could be found form the well-connected explicit assumptions. Those for which actions could be found, but where the actions were judged to not adequately address the assumption, form the weakly-

¹In PAM 525-5, for example, the word *will* appears over 470 times, *can* and *may* occur about 45 times each, *must* appears 93 times, while *therefore* and *accordingly* appear five and two times, respectively. It is the *therefores* that this document is trying to supply.

connected assumptions. Those assumptions for which responsive actions could not be found form the unconnected assumptions. In some of the latter cases, we have added what we refer to as a "decision pending" (DP). This is an attempt to identify common-sense responses to the assumption.

After the "rationalization" process was complete, the list of explicit and implicit assumptions was sent out to 36 Army MACOM and ARSTAF planning units. They were asked to add their thoughts on these assumptions, and their comments form the bulk of this appendix. Responses were received from 30 of the 36 requests. The specific questions and instructions that were sent under the signature of LTG Paul Blackwell, DCSOPS, can be found in Appendix B.

Each of the assumptions has an identifier of the form "A##." They have been left on here because they are referred back to by some of the responses from Army planners. No other significance is attached to these identifiers.

Appendix C contains a glossary of terms used in this appendix.

WELL-CONNECTED, EXPLICIT ASSUMPTIONS

To the extent possible, like assumptions have been grouped together. Other than that, no attempt has been made to categorize the assumptions—they appear in the order they appeared in the three reference documents. Indented under each assumption (and identified as "FXXI responses") is what we found in the documents about what the Army will do explicitly about that assumption. The primary ground rule is that both the assumption and the Army's associated action are taken directly from one of the three documents. The numbers in parentheses give the pages from which the material was taken. For example, (4-5) refers to section 4, page 5 of PAM 525-5, (F-25) refers to page 25 of Focus 94, and (FX-14) refers to page 14 of the LAM Force XXI document.

All of the comments and suggestions from Army MACOM and ARSTAF planners that related to a given assumption are included in the "Army Comments" section after the FXXI responses.

A1 Change will be constant (1-1). World's geopolitical framework will continue to undergo dramatic restructuring (2-1).

FXXI responses: Doctrine will be less prescriptive (1-3). Our Army must design organizations and develop capabilities that will allow it to be rapidly tailorable, rapidly expandable, strategically deployable, and effectively employable (3-1). We will need to create an organizational and operational framework which accepts the constancy of change. How to do this is the operative question. We need to build a capability for organizational change; a command and control headquarters, say at brigade level, which is adaptable to change.

Army Comments:

Add: These organizations and capabilities span the total Army—active Army, Reserves, Army civilians—and support from contractors.

A2 Armed forces will remain fully engaged throughout the world (1-1). United States interests will remain worldwide (1-2). Few states will have the resources, or the need, to directly attack the U.S. However, many will challenge it for control or dominance of a particular region (2-3).

FXXI responses: Army will continue to be a force projection army (3-2). Army based primarily in the United States must be deployable and agile to counter regional conflicts that can erupt anywhere in the world on short notice (F-27). Need capabilities to improve and execute power projection logistics (FX-21).

Army Comments:

Need additional emphasis on warfare becoming more coalition/agency dependent. Potential exists for us to outrun our friends and “flanks” with technology that outpaces them. When that happens, does the plan lose its value/potential? For example, should we invest in the computer literacy of only our force? More emphasis on our ability to get to the fight as a force projection Army is suspect or could be if we cannot keep the “choke points” open for our surface means.

Add: Army logisticians must be fully prepared to respond to these worldwide challenges (T-2).² Extended lines of communication and potential forcible entry into logistically bare-based areas of operations require Army development of a logistics system that is versatile, deployable, and expandable (T-3). Army logisticians should consider the creation of a system in which the realities of force projection necessitate the weaving of the current strategic, operational and tactical levels of logistics into a seamless continuum (T-3).

A4 Army will be called upon, often on short notice and often in combinations of nations and armed forces not previously experienced (1-1). Many scenarios in which soldiers will be employed cover the full range of military operations, but virtually all will involve joint operations and most, particularly in OOTW, will be combined (4-3).

FXXI responses: Our Army must design organizations and develop capabilities that will allow it to be rapidly tailorable, rapidly expandable, strategically deployable, and effectively employable (3-1). There will be improved Army liaison and language capabilities; expanded training, exercise, and professional education programs; and exchanges with foreign armies (3-22). Force XXI must be resilient and versatile (F-5).

²Note: T is for PAM 525-200-6.

Army Comments:

Further, impact of frequent, unexpected deployments on morale/quality of life and retention should also be addressed. Concrete actions must be taken to deal with these challenges affecting our force and execution of national military strategy.

What is the basis for the assumption that there will be improved liaison and language capabilities? Are we assuming that the Army will develop new training programs to accomplish these goals?

We will need significant inter-agency planning and coordination. Past participation in the non-DoD planning process for "Operation Uphold Democracy" showed it to be chaotic and episodic. The Army has to initiate inter-agency training for planning and execution. Greater training is a given.

Add: During peacetime the Army must properly train, structure, and equip its units to prepare for joint logistical operations (T-2). Combined and coalition operations will require a different logistical integration process than the one used during the Cold War (T-2).

... soldiers *and civilians* will be employed . . . , . . . capabilities *involving military, civilians and contractors* that will allow . . .

A5 *Army must be prepared to face the full spectrum of operational environments (3-1). Force XXI must still be able to deal with agrarian age guerrillas and industrial age tank regiments, plus any information age adversaries that may arise (F-18).*

FXXI responses: Army must . . . be rapidly tailorable, rapidly expandible, strategically deployable, and effectively employable (3-1).

Army Comments:

Need to say more about info age technology being vulnerable to the least sophisticated "hacker." The potential threat to U.S. forces and operations from low tech hackers is as great as the potential advantage we gain from the technology.

Agree, but you cannot call a guerrilla armed with the latest anti-tank and surface-to-air missiles an "agrarian age guerrilla." This guerrilla will evolve into a very capable threat which armed force will find very difficult to counter.

Add: The impetus of Army logistics will shift from echeloned support to projecting and sustaining force capability (T-3). [The Army will develop] a seamless logistics system capable of providing world-class logistics support for America's Army in any scenario (A3-3).³ (DP) The Army's Battlespace Logistics

³Note: A3 is for ASLP.

concept, which introduces the National Provider concept, will be the Army's logistics system to support Force XXI (A3-3).

A6 *The nation will find itself leading allies in pursuit of collective interests; unique capabilities and leadership of America's armed forces will be applied in different forms (1-3). U.S. forces will lead coalition efforts [supported by our coalition partners] (3-21).*

FXXI responses: U.S. forces will likely provide certain capabilities they alone possess, such as strategic lift, battle command, strategic intelligence, and sustainment capabilities (3-2).

Army Comments:

Need additional emphasis on warfare becoming more coalition/agency dependent. Potential exists for us to outrun our friends and "flanks" with technology that outpaces them. When that happens, does the plan lose its value/potential? For example, should we invest in the computer literacy of only our force?

In leading allies, the Army will face significant logistics sustainment challenges. The National Provider concept offers an approach to ameliorating these challenges.

Add: Multinational efforts, designed to streamline the focus of combat power, are supplanting national doctrines (T-2). Combined forces and coalitions must capitalize on the unique strengths of individual members who can best provide specific support to deploying forces (T-2).

Add: Total Army (active, reserve, civilian, contractors).

A8 *Developments in information technology will revolutionize how nations, organizations, and people interact (1-5).*

FXXI responses: New leadership and command approaches will be required of many militaries (2-8). Conduct an in-depth study to determine which organizational changes in the institutional support structure can leverage information-age technology and improve the Army's ability to accomplish its Title 10 functions (FX-28).

Army Comments:

Need additional emphasis on warfare becoming more coalition/agency dependent. Potential exists for us to outrun our friends and "flanks" with technology that outpaces them. When that happens, does the plan lose its value/potential? For example, should we invest in the computer literacy of only our force? Training of leaders, soldiers, commanders, staff officers in digitized work under digitized conditions to bring them to full capability is important if

we are to maximize the decision making potential that exists in the info age technology.

Add: With digitally linked tactical and supporting organizations, the historical hierarchical echelonment of logistics elements . . . at the company, battalion, brigade, and division levels may no longer be relevant (T-5). Improved communications . . . for logistics automation will allow the processing of administrative functions at the strategic level, leaving only highly mobile tactical automation in the tactical and operational levels (T-6).

. . . required of military and civilians.

A11 Army will be called upon, often on short notice . . . (1-1). Population growth will strain resources and social structures of nation states (2-2). Cross-border pollution will cause tension (2-2). Phenomenological threats may require military response (2-3). Events in Southwest Asia, Africa, and Korea are evidence that crises may erupt at any time—and the nation may call on its Army (F-32).

FXXI responses: The requirement to be trained and ready to win the land battle remains the absolute priority (3-2). All training executed in the institution and in the unit or by the individual soldier will directly contribute to . . . unit mission readiness (4-2). Critical challenge for the Army . . . is to remain trained and ready, while growing more capable (FX-10).

Army Comments:

What is the U.S. strategic interest in Africa? Suggest include Eastern Europe and the former Soviet Union as potential crisis areas.

Emphasize more that as long as so much of the early need forces are in the RC, we have to be able to get to them quickly and get them mobilized and deployed.

Critical challenge . . . remain trained and ready. From assumption viewpoint, trained and ready for what? OOTW continues to make demands on Army resources. Will the focus on land combat continue to be the focus of the Army into the 21st century if the nation continuously employs the Army in other than combat roles?

Add: The logistics units must coordinate training and readiness cycles with key elements of other services and allied coalition forces (T-8). Modularity [modularly designed logistics units] will enhance the Army's ability to rapidly respond to a wide range of global contingencies with a force projection of required functions and capabilities (T-7).

Assumption so basic it is a fact.

Add: Similarly, all training executed in the institution or by the individual civilian will directly support mission readiness.

A12 *American technology superiority cannot be guaranteed (2-2). Military Technical Revolution will continue (2-7).*

FXXI responses: DoD will continue to focus on maintaining its technological advantage over these varying threats (4-3).

Army Comments:

May be true in the aggregate, but not in all categories (look at reactive armor). Also, we may have the edge, based on research, but may not be able to afford to field the technology, or not be able to field it in decisive quantities.

Believe that we will maintain the overall technical edge; however we may not be able to maintain a technological edge for specific areas.

The assumption that American technological superiority cannot be guaranteed contradicts the implicit assumption that we will have a technological edge over any potential adversaries. A more consistent assumption would be "Military technology will continue to grow worldwide in both quantity and quality."

Need to include Revolution in Military Affairs here, not only Military Technical Revolution. Change the term, then recognize the need for organizational and operational concepts implicit in the RMA. The implicit assumption is that we will have a technological superiority over any potential adversaries.

Add: The Army must continue to exploit technological opportunities to design, acquire and field more capable weapons systems and support systems to achieve higher productivity and a more efficient and effective force (T-9). The Army must improve its global automation and communications capabilities (T-9). Successful long-term implementation of [logistics] is contingent upon assured communications/automation (T-3).

Add: The Army needs to determine the level of technological development expertise that must be maintained in-house to avert total reliance on contractors.

A13 *Future complex threats will be smaller and increasingly high-tech (2-5). Faster, lighter, more lethal, and more survivable fighting systems will be available (3-8).*

FXXI responses: We will overmatch enemy capabilities in range, target acquisition, accuracy, and lethal punch (3-10).

Army Comments:

Need to say more about info age technology being vulnerable to the least sophisticated "hacker." The potential threat to U.S. forces and operations from low tech hackers is as great as the potential advantage we gain from the technology.

Add: Improved and assured communications will allow routine management functions to be accomplished in CONUS while critical wartime functions can be

projected forward early in an operation (T-7). Reducing ammunition, fuel, and maintenance requirements will assist in decreasing logistics support requirements for combat forces (T-9).

Not what 525-5 says: in paraphrasing the PAM, the issue (Future complex threats will be smaller and increasingly high-tech) has been misstated.

A14 *Theater ballistic missile attack will continue to be a threat (2-5).*

FXXI responses: Tactical and theater missile defense against enemy long-, medium-, and short-range rockets and ballistic missiles must be developed (3-12).

Army Comments:

It is true rockets and missiles will remain a threat causing us to continue to develop weapons to counter them. At the same time, we should include the development of defenses against cruise missiles. The technology is within reach for many countries to develop a cruise missile. This is a great danger to us since we do not have an adequate anti-cruise-missile defense capability. Even if potential enemies develop only short-range cruise missiles, we should ensure that our development of rocket and missile defenses includes the cruise missile threat.

A16 *Proliferation of weapons and technology will continue and will pose serious challenge to U.S. military superiority (2-5). Security challenge having the most serious ramifications for U.S. interests will come from the proliferation of WMD (2-7).*

FXXI responses: Three areas of technology require emphasis: weapons of mass destruction (WMD), information operations, and space control (2-6). Effective air defense against cruise missiles, UAVs, and RPVs must be pursued (3-12).

Army Comments:

Need to say more about info age technology being vulnerable to the least sophisticated "hacker." The potential threat to U.S. forces and operations from low tech hackers is as great as the potential advantage we gain from the technology.

A17 *Space-based assets will provide an ever-increasing proportion of the intelligence, communications, and navigational support to the world's militaries and economies (2-7). Future operations will rely greatly upon space-based intelligence and communications systems (4-8).*

FXXI responses: Three areas of technology require emphasis: weapons of mass destruction (WMD), information operations, and space control (2-6).

Army Comments:

Add: Improved communications (to include the use of satellites) for logistics automation will allow the processing of administrative functions at the strategic level, leaving only highly mobile tactical automation in the tactical and operational levels (T-6). [Space based] automation and communications will link vendors and transportation elements such as freight forwarders directly to the Army's logistics systems and provide better support for tactical units in the field (T-6).

Agree.

A18 *Ability to manipulate, isolate, or negate portions of the electromagnetic spectrum will be a key element of future military operations (2-7).*

FXXI responses: We must develop the protection of [information] systems (3-3). Protection of friendly information systems from myriad threats, while denying the enemy use of his systems, will be absolutely critical (3-7). Three areas of technology require emphasis: weapons of mass destruction (WMD), information operations, and space control (2-6).

Army Comments:

Force projection will involve the development of embedded technologies to protect against nonlethal attack of our C4I assets, as well as the operational employment of physical protective measures and C2W. Commanders will be cognizant of the full range of potential threats; prioritize their protect requirements in terms of key assets, critical nodes, and EEFI; and then allocate resources accordingly. C4I systems must include AI methods to detect unauthorized access or attempted access to friendly C2 information (525-xx, IO). The Army will use a proactive and aggressive strategy to deny an enemy the capability to acquire/use information critical to the command and control of his forces (525-69).

A19 *Military technology will likely advance at a slower rate than commercial (2-6).*

FXXI responses: The Army will increasingly adapt, with little or no change, the successful techniques, procedures, and materiel innovations of the commercial sector to meet its logistical support requirements (3-14). Increasingly exploit state-of-the-art commercial technology that can be rapidly adapted to military use (FX-24). Invite and encourage industry to live the development cycle with the Army in a close and more interactive way than in the past (FX-24).

Army Comments:

Assumption should be challenged and substantiated—why would this be true? Expense?

Disagree with the blanket assumption that states “military technology will advance at a slower rate than commercial.” *Some* military will advance at a slower rate than *some* commercial. Certain technology areas are rather unique to the military and do not have large commercial sectors, such as those related to chemical and biological defense.

Add: The Army needs to determine the level of technical expertise that must be maintained in-house to avert total reliance on contractors.

Agree. From all indications, civilian R&D continues to expand while military R&D continues a downward spiral. This is not necessarily bad. In actuality, dual-use technologies developed by commercial concerns have resulted in fewer service-developed initiatives. The military procurement system is outdated and hardly responsive. Furthermore, it is expensive and inflexible. Commercial off-the-shelf technologies are changing the way we do business. While there is no commercial use for Rail Guns or MIA2 Tanks, the technologies involved have commercial applications. It is probably cost-effective to let civilian concerns do the R&D for military systems as much as possible.

A20 *Integrating technological capabilities is difficult (2-7).*

FXXI responses: The Army Digitization Office helps the Army adapt to the information age by uniting doctrinal experts from the U.S. Army Training and Doctrine Command, technical experts from Army battle labs, engineers from the U.S. Army Material Command, and specialists from the Army Acquisition Corps to forge new ideas and deliver new capabilities (F-19).

Army Comments:

Recommend that planning assumptions clearly address the need for Army to develop an information or data architecture to complement and drive the technological infrastructure. In our electronic age where massive amounts of information can be passed at the push of a key, it is essential to define peacetime as well as wartime or contingency information requirements. Army must work toward standardizing key information and ensuring immediate accessibility to the right people and organizations. The exchange of information between TDA and TOE systems must also be explored, requirements identified, and technical solutions developed.

Is it difficult, or expensive?

Agree with the comment. This is true within Army systems; between services; and in the multinational and interagency arenas. There are actions that can be

taken to integrate new technologies faster and more effectively. Proponents can be given the mission and resources to aggressively pursue new technologies, model capabilities, and testbed applications, then coordinate them across the Army. Issue is prioritization of effort.

Integrating technological capabilities is difficult. This is also what makes it so vulnerable to failure. The serious integration of Information Age technologies in the Force XXI process requires commitment at the highest level. There must be a commitment to sell the process. Long-term investments in both people and material are required. The integration of technological capabilities within the next 10–15 years will fail miserably if we show a lack of confidence and commitment to the process. Force XXI cannot be allowed to falter at this critical juncture. We have come too far to turn back.

A21 *Combat involving advanced, complex, adaptive armies will transform the battlefield (2-8). Formations will be more dispersed (2-9).*

FXXI responses: Commanders will avoid linear actions, close-in combat, stable fronts, and long operational pauses (2-9). Units will rely more on electronic connectivity than geographic or physical connectivity (F-5).

Army Comments:

Bad assumption. Operations in restricted terrain such as urban areas and jungle must be addressed.

Add: Improved and assured communications will allow routine (logistics) management functions to be accomplished in CONUS while critical wartime functions can be projected forward early in an operation (T-7). Agility is key; the intelligence system must be able to “re-synch” rapidly (525-xx, IO).

Agree with comment. Overall, historical trend is geographic dispersion. Increasing trend to electronic connectivity raises risks. Dispersed units with communications disruption become vulnerable. On the other hand, commanders may not always want to avoid linear actions, close-in combat, stable fronts, etc. These will have to be deemed situational.

A22 *Real-time visual images of operations will influence national will and popular support for them (2-10).*

FXXI responses: Army must ensure quick, decisive results in war and success in OOTW—at the least cost in lives and national treasure (1-6).

Army Comments:

Agree with how assumption is written, and with the Army’s action. Interestingly, some recent studies indicate that the American people are NOT

particularly concerned with casualty figures, but want and demand decisive, competent leadership focused on making the war short and winning.

Agree with comment. Media management must become a trained skill. Suggest we establish a qualifying combat training course for media. The key is the decision to commit.

A29 *The power of shared information will challenge the authority of long-standing institutions and the meaning of terms such as sovereignty (2-2).*

FXXI responses: Military operations will involve the coexistence of both hierarchical and internetted, nonhierarchical processes (1-5). New ways of managing forces will alter, if not replace, traditional, hierarchical command structures with new, internetted designs (2-8).

Army Comments:

Recommend this assumption be deleted—the reference, PAM 525-25 (2-2), elaborates on phenomenological threats (environmental threats, famine), potential adversaries with no traditional nation-state allegiance and the characteristics of future armies. It does not address the “power of shared information challenging institutions . . . and terms such as sovereignty.” Sovereignty is not a Force XXI issue.

Intelligence operations will be conducted by a thoroughly integrated, internetted intelligence system where operational levels (national, theater, tactical, joint, Army, Reserve) will virtually lose their identity during the development of intelligence to support multi-dimensional, simultaneous and dispersed operations (525-xx, IO). This assumption compares two “worlds,” that of information technology and organizational management to that of geo-politics (“sovereignty”). The “power of shared information” is not a threat except to those individuals, institutions, organizations or countries which do not have individual freedoms or are too bureaucratic or autocratic. I see no relevance for the way this assumption is worded. The discussion does refer to Army organizations and relationships along with internetted relationships, all of which is valid. The Army must change its organizations and units, but the discussion used the wrong context. However, there is no reference to sovereignty or to any external organizations or institutions.

Agree.

A30 *Information technology will greatly increase the volume, accuracy, and speed of battlefield information [that could be] available to commanders (1-5).*

FXXI responses: Units, key nodes, and leaders will be more widely dispersed (2-8). Commanders will seek to avoid linear actions, close-in combat, stable fronts, and long operational pauses (2-9).

Army Comments:

Again, to avoid "information overload" or providing commanders the wrong information, assumption should also indicate that information requirements are or will be defined and well known. Data must be disseminated in a usable format.

Need to say more about info age technology being vulnerable to the least sophisticated "hacker." The potential threat to U.S. forces and operations from low tech hackers is as great as the potential advantage we gain from the technology. Training of leaders, soldiers, commanders, staff officers in digitized work under digitized conditions to bring them to full capability is important if we are to maximize the decision making potential that exists in the info age technology.

Need additional assumption on the Army's ability to acquire and deploy DoD or commercial communications capabilities to support the expected exponential growth in the use of information. Assured communications to support military operations is not a given, especially to support the higher standard of logistics support envisioned under Force XXI. Cannot be an information age army without assured communications between and linking the tactical, operational, and strategic CA, CS, and CSS capabilities at the combined, joint, and Army component levels.

Add: Improved communications (to include the use of satellites) for logistics automation will allow the processing of administrative functions at the strategic level, leaving only highly mobile tactical automation in the tactical and operational levels to concentrate on analytical information and decision support systems (T-6).

Information technology will increase the volume, accuracy and speed of battlefield information: valid assumption, but the Army discussion does not necessarily follow. Information technology will ALLOW battlefield operations to be more dispersed; but dispersion of forces, non-linear operations and faster OPTEMPO will be more a result of improved enemy reconnaissance and accuracy of his weapons systems than because of improved information systems and technology.

Agree. This is critical to the success of Force XXI operations. Information carousels from which commanders can pull the information needed, coupled with vertical and horizontal connectivity, characterize the Force XXI process. It is the commander's ability to process, manage and use information that will define the success of the operations that he conducts.

A31 *Information will allow greater synchronization of effort, control of tempo, and control of force application (3-3). Better intelligence, shared among all elements and moved or retrieved rapidly on demand, will allow commanders to control and vary tempo based on superior knowledge of friendly situation/location, enemy situation/location, and events shaping the overall battlespace (3-19). Internetted information will greatly*

enhance all battle operating systems with the greatest potential payoff in intelligence, operations, and fire support functions (3-6). Information about enemy posture, position, and activity will be known earlier and in far greater detail than ever before (3-6).

FXXI responses: Force XXI must use information to dominate, control, and win on tomorrow's battlefields (F-5).

Army Comments:

Need to say more about info age technology being vulnerable to the least sophisticated "hacker." The potential threat to U.S. forces and operations from low tech hackers is as great as the potential advantage we gain from the technology.

The last bullet (Information about . . .) raises the issue of enemy capability versus enemy intent. We likely will not be able to afford addressing every potential enemy capability. Should we, and if yes, how would we design and organize our intelligence architecture to determine enemy intent?

Add: Use of Force XXI systems will allow greater survivability and less redundancy of logistics assets (T-5).

Individual or small groups of LOGPACs, directed to specific points on the battlefield, will negate the need for the movement of large convoys which invite targeting and attack (T-6).

Agility is key; the intelligence system must be able to "re-synch" rapidly. Intelligence organizations must be flexible and scalable, ready to go in with the first lift, and capable of being digitally connected in real time to their support from an Intelligence Support Base (ISB). Intelligence operations will produce a precise in time presentation of the commander's battlespace which conveys an accurate understanding of the adversary, terrain, weather and operational environment (525-xx, IO). The Army will be able to locate enemy forces quickly and precisely, whether those enemies are agrarian warlords, industrial armies, or Information Age peers (525-69).

Agree. See A30.

A32 *The commander brings the requisite ability, experience, and wisdom to convert information to battlespace knowledge (3-7).*

FXXI responses: Quality officers will be imperative to the Army's future success (F-25). Quality soldiers and information will be the key to Force XXI (3-2). It is through quality soldiers that the full power of technology will be realized (FX-6). There is a clear need to invest more heavily in the computer literacy of the force (FX-17).

Army Comments:

We need to re-engineer how we will handle this info. What will the TOC look like? What are the necessary manning levels? What are the necessary skills? What about the E-5 Tank or Bradley commander? Looking at officer development is only one part of the problem, and one that is toward the end of the effort, not at the beginning.

The quality of the force is directly related to the quality of the officers and enlisted. Delete the last sentence. It is meaningless.

Saying more about training of leaders, soldiers, commanders, staff officers in digitized work under digitized conditions to bring them to full capability is important if we are to maximize the decision making potential that exists in the info age technology.

Add: Leaders should be concerned with enriching peacetime training, thereby enhancing readiness for deployment (T-8). Training Army logisticians to anticipate requirements will be key to battlefield success (T-8).

... Quality officers *and civilians* will be imperative ... Quality *personnel* and information It is through quality soldiers *and civilians* that the full power

Commanders will be cognizant of the full range of potential threats; prioritize their protect requirements in terms of key assets, critical nodes, and EEFI; and then allocate their resources accordingly. Commanders must understand their intelligence system, its capabilities and limitations, as thoroughly as their fire and maneuver systems. Intelligence leaders and operators must thoroughly understand the operational context in which they plan and execute intelligence operations (525-xx, IO). Leaders will assimilate thousands of bits of information to visualize the battlefield, assess the situation, and direct military action appropriate to the situation (525-69).

Commander brings requisite ability, experience and wisdom to convert information to battlespace knowledge: the discussion does not support the assumption. The assumption has a lot of "motherhood" about it, and does not say anything different from what is the case today or what was the case yesterday. Future commanders will be computer literate, just as every American soldier today knows how to drive a car. Computer literacy will be a "given" in the future Army. The emphasis should be on making technology/computers as "user friendly" as possible through design and engineering. The discussion does not add anything.

The commander required for Force XXI operations will definitely need to be carefully "grown." This is only going to happen when we make a serious commitment to align our officer management system with a cohesive and viable leadership assessment and development process. There are a variety of approaches that support officer training: man-information interface standards, Command Post (CP) organization and scheduling for CONOPS, AI-based expert

systems, etc. The officer training system must, of course, have a C4I training subsystem with both the BOIP and the feedback to acquire and sustain their performance.

Agree with comment. In order to harvest info dominance and quality leaders, the Army needs a vertically and horizontally integrated Battle Command and Staff Training System. This means training incoming leaders, as well as retraining existing leaders, with high levels of BCS training simulations from platoon to the Joint Chiefs.

We will need to train the Force XXI commanders in a new way so they can optimize the technology available to them.

This is a key assumption. "Wisdom" seems esoteric in this context. The commander required for Force XXI operations will definitely need to be carefully "grown." This is only going to happen when we make a serious commitment to align our officer management system with a cohesive and viable leadership assessment and development process. Tailored recruiting also means little—it is not viable. Expanded language training has potential but we probably could not afford it. Furthermore, most states use, or have a working knowledge of the world's major languages. We would not be able to train indigenous languages "just in case." In most cases liaison personnel and civilian contractors will have to fill the void.

A34 *Spatial expansion of the future joint battlespace will result in service-specific functional battlespaces intersecting and overlapping (3-8).*

FXXI responses: The Army must continue to improve its contribution to joint and interagency operations (3-2). Army battle command capabilities must facilitate use of various Army headquarters as efficient joint force command mechanisms (3-2). Seamless information connectivity with the other elements of the joint force will be essential for the success of joint operations" (FX-7).

Army Comments:

Control measures are inherent to all operations. Overlapping battlespaces must be de-conflicted. Areas of Operation are under one controlling command.

Add: Joint force logistical interoperability is crucial to the success of logistics operations (T-2). Joint force logistics must be able to use and integrate national intelligence systems linked into joint command, control, and communication systems (T-2). Logistics units must continually train to operate in coordination with elements of other services, agencies and nations (T-8).

Agree with comment. Service-specific "battlespaces" already overlap at the lower tactical levels. Seamless C4I is a critical requirement.

A35 *Failure in early entry operations will have major strategic consequences for follow-on military action or prevent action altogether (3-12).*

FXXI responses: Lethality and survivability of early entry forces will be a main focus (3-1).

Army Comments:

All military failures have strategic consequences. Poor choice of words.

Need to say something about how our ability to get to the fight as a force projection Army is suspect or could be if we cannot keep the "choke points" open for our surface means.

Agree. Early entry force projection scheme is potentially our greatest weakness. It is most vulnerable to asymmetric response. The defining step is the decision to intervene. Therefore, the total partnership training and pre-decision simulation capability will drive that decision. The decision to not commit adequate forces, for example, in one historical event (and poorly worked out multinational roles; see total partnership training) led to casualties. Strategic deployability (by strategic air, heavy tactical lift, or ACV) capabilities must be generated with sufficiency and a degree of redundancy in order to project tailored force packages. Supportability also drives mission success.

A36 *Early entry forces will often face an enemy that attempts to deny the buildup of overwhelming combat power (3-13).*

FXXI responses: Early entry force must therefore be prepared to fight its way in or, soon after arrival, expand its battlespace (3-13).

Army Comments:

Delete entire assumption. This is an overstatement of the obvious.

Need to say something about how our ability to get to the fight as a force projection Army is suspect or could be if we can not keep the "choke points" open for our surface means.

CSS and CS units are major theater land force operators in war and OOTW. Question: Does this assumption lead to another; that as CSS plays a greater role in OOTW operations with the mission often being primarily logistics with CA in a supporting (i.e., security) role, that CSS/CS officers will be in command of such operations rather than combat arms officers? That assumption would be a cultural change in the Army.

Agree.

A38 *Strategic logistics will, more than ever, represent a subset of national power because it includes the nation's industrial base and its link to military forces. The strategic level*

will remain the purview of DoD, the individual services, and non-DoD governmental agencies, with unprecedented support from the private sector (3-14).

FXXI responses: Reduced resources for DoD logistics and applications of electronic management and information systems will necessitate the formation of strategic alliances between Army logistics mechanisms and civilian industry (3-14). Must experiment more heavily in the modular design and split-based operations of our logistics units (FX-17).

Army Comments:

Add (DP): Do not replace CSS military force structure with civilians or contractor support until the operational effect and financial cost of doing so is determined. While this decision is being discussed in numerous forums, it appears this assumption considers the decision already made. This decision is not true at this point. At the heart of this issue is, How far below the strategic level do you civilianize and use contractor support for required CSS capabilities?

Electronic management of logistics and logistics split-based operations requires assured communication. See A30/31 above.

Add: Posts, camps, and stations must become launch platforms for force projection (T-3). Installations with deployable units must treat deployment as their primary mission, and the installations themselves must be equally as capable of short-notice response as the force they support (T-3).

The future strategic environment will be highly complex due to the effects of the technological revolution and reduced size of military forces. The civilian sector will be integrated—indeed, fused—into the strategic environment as an integral component of national defense (525-xx, IO).

Agree. Stockpiling per se is a self-limiting option. We must examine alternative acquisition methods to support surges. Industry-government partnerships might preposition tooling or underwrite excess plant capacity to support preplanned ramp-up to stability and support operations, etc. Look at Desert Storm logistics lessons learned.

A39 *For a variety of reasons, the number of installations on which traditional institutional training takes place will decrease, as will the number of installations on which major (battalion level and above) field exercises will occur (4-3).*

FXXI responses: Training installations will be internettted and interconnected to facilitate both individual and collective training at all levels (4-3).

Army Comments:

Agree. Installation structure must come down as fixed BASOPS costs climb to over 50+% of the budget. Land use, environmental, and suburban growth will limit available land use. Although TADSS-based training is the solution, it is a larger concept than that. TADSS will be primarily used as an integration tool, a combat rehearsal tool, a operational planning and debugging tool, and a combat sustainment tool. TADSS, ranges, targets, etc. must therefore evolve to be a TOE asset that can deploy with units. A balanced mix of live, virtual, and constructive training is the answer to proper training.

As indicated in other assumptions, the standard doctrinal solution may not always apply, and more and more missions will be OOTW in nature and require a more tailored METT-T unit deployment and logistics support concept.

A44 Future Army will be smaller, yet have new, expanded, and diverse missions in an unpredictable, rapidly changing world environment (4-5).

FXXI responses: Be able to rapidly tailor organizations for operations; must organize around information processing and dissemination; leader-to-led ratio must change and be flexible; must organize around the division as the major tactical formation; combat support and combat service support must be modular (4-5).

Army Comments:

Add: Modularity [modularly designed logistics units] will enhance the Army's ability to rapidly respond to a wide range of global contingencies with a force projection of required functions and capabilities (T-7).

Force development will be influenced by reduced defense spending; significant growth in information technologies and digitization; reduced forward presence; stability and support missions; and proliferation of weapons and technology which may make potential adversaries more lethal and dangerous than before (525-xx, IO).

Agree. Higher leader-to-led ratios will require units with smaller span of control (3s not 4s) with more leaders in direct support (critical to sustain CONOPS/SUSOPS). High-volume information processing is fragile and vulnerable to fatigue. A new Battle Command and Staff Training System must support high levels of training to standard.

A45 Experimentation in organizational design, along with technological advances, materiel, and supporting operational concepts, will be essential to evaluate and refine future concepts (4-5).

FXXI responses: Louisiana Maneuvers process and the Army's battle labs will synchronize these axes (F-6).

Army Comments:

Louisiana Maneuvers process is history.

Agree. Concepts offer the fastest and most cost-effective way to reengineer battle processes.

This is a tool for finding out what we don't know about the Force XXI process. Experimentation is the basic foundation upon which we organize, equip, and train a credible force. The integration into the force of technological innovations and emerging operational concepts mandates a technology for experimentation. What we must continue to do is ensure that as we proceed with the advanced warfighting experimentation (AWEs), we remain flexible. The process must be impartial, quantifiable, and credible.

A50 *The Army will have realistic training at all levels between actual units on the ground and units simulated on the computer (FX-16).*

FXXI responses: Prior to deployment, the commander will train through interactive simulation and live modes (3-13). En route simulations capabilities will enable the force to continue training and conduct rehearsals (3-13).

Army Comments:

A huge assumption of technological advancement, as there is nothing beyond *individual* integration into simulations, whether at the command, technical/maintenance, or pawn level.

Add: Logistics units must continually train to operate in coordination with elements of other services, agencies and nations (T-8). Common training in many logistics skills . . . must be a routine part of the logistics force training (T-8). The use of simulations, accomplished on the same automation and communication systems already used by logisticians, should be maximized, along with the application of models, and other training exercises (T-8).

Realistic simulations of combat with a sharp focus on the operational context of Force XXI and the technologies that will support it are required to insure a trained and ready force. Training at every stage must impart higher levels of operational understanding as well as computer literacy. The three pillars of the Army training system—institutional, unit, and self-development—must change, adapt, and keep pace with technological advancements as they are incorporated into the Army (525-xx, IO).

Agree. Concept needs to be strengthened and expanded. Commanders will plan, debug, and rehearse operations through DIS, TES, and live modes during pre-deployment. Ongoing total partnership training via TADSS will enhance mission effectiveness. Units will deploy with TADSS to conduct real-time analytic and planning, teamwork builders, combat rehearsals, new skill training,

and sustainment training. Training will be in effect a weapon that acts as a combat multiplier to enable rapid, decisive, and devastating action.

A51 *Horizontal insertion of digital electronics (into an existing organization using current doctrine) will increase lethality, survivability, and tempo across the force (FX-20).*

FXXI responses: Doctrine, leaders, soldiers, technology, and information will give Force XXI the means to achieve a qualitative edge in operations (3-3).

Army Comments:

Need to say more about info age technology being vulnerable to the least sophisticated "hacker." The potential threat to U.S. forces and operations from low tech hackers is as great as the potential advantage we gain from the technology. Training of leaders, soldiers, commanders, staff officers in digitized work under digitized conditions to bring them to full capability is important if we are to maximize the decision making potential that exists in the info age technology.

Doctrine, leaders, *support personnel*, technology . . .

Agree. AWE process has started to validate this hypothesis. Critical element will be information-soldier interface. Information processing is fragile and vulnerable if not effectively human engineered.

WEAKLY-CONNECTED ASSUMPTIONS

Those assumptions for which there are responses can be questioned as to *how* responsive they are. For example, responses that are very general are not as responsive as those that describe specific changes the Army will make or that give detailed plans for handling an assumption. This section contains what we consider weakly-connected assumptions, with those responsive actions that could be found.

A7 *Strategic interests have increased the number and expanded the range of OOTW that the armed forces will be required to perform (1-4).*

FXXI responses: Leaders must demonstrate the ability to successfully command in a variety of missions, operational circumstances, and geographic environments (3-4).

Army Comments:

Should read "Strategic interests *and television* have increased . . ."

Add: The Army must train leaders at all levels to adapt to the changing global situation (T-8). The Reserve Component (RC) will be relied upon by the Active Component to provide a number of logistical functions in support of combat operations and OOTW . . . reliance on RC logistical capabilities may increase in the future (T-2).

Military leaders must . . . Add: Civilian leaders must demonstrate the ability to successfully lead in a variety of missions, operational circumstances, and geographic environments.

A9 *Army will not be able to meet the requirements of the NMS without the reserve components (1-6).*

FXXI responses: RC must be integrated fully into all facets of Army efforts (1-6).

Army Comments:

An implied assumption under A9 is that more work will be done to determine ways to better leverage the unique strengths and capabilities of the USAR. This might also include some “out of the box” thinking such as combined AC-USAR units comprised of both AC and USAR soldiers. This also links to ACT32, where TRADOC PAM 525-5 states that early entry forces will “likely have a sizable reserve component . . . contingent.”

Optimal roles and missions of active component, ARNG, and USAR in meeting the NMS need to be decided.

Assumption should be changed to “reserve components will form an essential, integral element of the Total Army’s efforts to meet the requirements of the NMS through implementation of Force XXI.” Further DPs from such a revised assumption would be: (1) Reserve components must participate in all facets of Force XXI efforts; (2) Reserve components must receive the necessary technology and training to enable them to effectively participate in Force XXI, on a first-to-fight, first-to-be-resourced basis; (3) Army must recognize RC’s unique capabilities and needs in determining direction and content of Force XXI; this includes organization and manning of TDA HQ elements.

Emphasize more that as long as so much of the early need forces are in the RC, we have to be able to get to them quickly and get them mobilized and deployed.

Use of RC shown as a weak assumption. From CSS capability standpoint, we cannot meet the requirements of the NMS without the RC. The RC has approximately 70 percent of the Army’s CSS. Consequently, from a CSS perspective this is a strong, not weak, assumption unless the Army is seriously reconsidering the AC/RC CSS mix.

Add: The Reserve Component (RC) will be relied upon by the Active Component to provide a number of logistical functions in support of combat

operations and OOTW . . . reliance on RC logistical capabilities may increase in the future. The RC will continue to maintain a significant portion of the Army's logistics force structure (T-2).

Assumption so basic it is a fact.

Need to add similar statement about fully utilizing skills of civilian component.

A23 *Most of the conflicts involving the Army will be OOTW or low-intensity conflicts (2-10).*

FXXI responses: Army will study the development and employment of nonlethal, noncrippling, temporarily disabling weapons and high-technology, crowd-dispersal systems for operating in OOTW environments and urban or village environments (3-23).

Army Comments:

Delete the term "low intensity conflicts." Change to OOTW or MOOTW.

Recommend assumption be changed, as it leads to a potential misstep in our focus. The Army must be prepared to defend the nation. While OOTW and LIC contingencies may occur more frequently, our focus must remain on combat readiness to defeat an enemy which is a major threat to our national security and interests, such as a MRC. The assumption should read: "A trained and ready Army capable of defending the nation will naturally have as a byproduct the capability of dealing with frequent OOTW and LIC contingencies."

If A23 is true, then is A11 still a strong assumption? Need to find balance between the capability to fight and win nation's wars and nation's requirements to continue supporting OOTW-type operations.

Add: (Logistics) modularity will enhance the Army's ability to rapidly respond to a wide range of global contingencies (T-7). In order to conduct logistics operations during OOTW, logistics capabilities may be deployed by any mode of transportation (T-7).

Most conflicts OOTW or LIC: Need stronger rationale in Army documents; and need to explicitly state the political, ethnic, cultural, and economic conditions/competition that are rapidly evolving. Likewise, the Army responses must be stated in broader, more encompassing terms than just relating which nonlethal weapons and other materiel are under development. Army actions and responses to MOOTW and LIC must be stated in terms of new doctrine, leader development, soldier training (e.g., improved tactics, techniques, and procedures; cultural training; more and better trained linguists).

Agree with comment. Seems to be the near-term trend. Stability and support operations interventions need more attention and separate modeling. First, the strategies and tactics of controlling populations need to be worked. Second, the political, government, nongovernment, and other nations' militaries need

training mechanisms to be able to work effectively together. Most decision makers do not have a military background and have little grasp of operational realities. Creating training courses where AID, FEMA, UN, NATO, etc. personnel can train together in OOTW can facilitate mission accomplishment. Developing multinational doctrine and training predeployment capabilities will avoid C2 failures. This might mean tailorable TES to support training. Suggest "tagging agents" be part of future R&D. "Tagging" rebels, gunmen, rioters, etc. seems like an important part of nonlethal interventions. Nation-building skills may also shift training requirements. If the MPs, for example, must not only supply security but also train residents on how to establish a police force, then new training is needed. Perhaps the units of the future SASO/OOTW forces will look more like an expanded SF A-Team.

A25 Army will be dependent on other services for strategic lift (3-2). Army will depend on a combination of airlift and sealift (FX-31).

FXXI responses: The introduction of the C-17 and the new family of large, medium-speed, roll-on/roll-off ships will dramatically improve Army capabilities to meet future strategic mobility requirements (3-13). Force XXI relies on strategic sea and airlift to move rapidly with overwhelming force to any place on the globe (F-29).

Army Comments:

Include prepositioning of equipment in this assumption.

Need additional emphasis on warfare becoming more coalition/agency dependent. Potential exists for us to outrun our friends and "flanks" with technology that outpaces them. When that happens, does the plan lose its value/potential? For example, should we invest in the computer literacy of only our force?

Agree with this assumption, and it should include the notion that Logistics Over the Shore (LOTS) is a necessary capability for deployment to many theaters.

Assumption so basic it is a fact.

This is a strong but accurate statement, followed with good examples in the Army texts. Could also add as an example "prepositioned ships."

Agree with comment. Past studies of heavy lift Air Cushion Vehicle show dramatic improvements in strategic impact. Whereas coastal geography drove the attack to heavily defended ports and accessible beaches, heavy lift ACV open 80% of coasts up to rapid crossings and deep insertions. Same is true of river-based operations. Some areas in N. Africa like major depressions and salt marshes, for example, are impassable except by ACV. Suggest strategic capability (whether Army or Navy) include this as a consideration.

A26 *Most operations, both in war and OOTW, will be multinational and multiagency and involve nongovernmental organizations (NGOs) and private voluntary organizations (PVOs) (3-2).*

FXXI responses: The Army must continue to improve its contribution to joint and interagency operations (3-2).

Army Comments:

Change all references of OOTW to MOOTW.

Need additional emphasis on warfare becoming more coalition/agency dependent. Potential exists for us to outrun our friends and "flanks" with technology that outpaces them. When that happens, does the plan lose its value/potential? For example, should we invest in the computer literacy of only our force?

Add DP: about development of doctrine and procedures to deal with and integrate the efforts of PVOs and NGOs and to identify the types of support those organizations usually expect from enemy forces.

Add: Combined forces and coalitions must capitalize on the unique strengths of individual members who can best provide specific support to deploying forces (T-2). Interagency operations may require support from the Army's logistics system (T-2). Nonuniformed and/or nontraditional personnel, from DoD organizations, non-DoD governmental agencies, and the civilian sector, will deploy in support of future operations. This has major command, control, and logistical support implications (T-4).

Add: Army must develop doctrine to use civilians, reserves and individuals outside Army in nontraditional roles to meet Army's mission.

Future operations focus on regional conflicts; crisis response; power projection; joint, coalition, and interagency operations; and a wide variety of ambiguous threats (525-xx, IO). War and OOTW will be multinational, multiagency, NGOs, PVOs; agree with the multinational assumption; but the evidence for multiagency and especially for NGOs and PVOs is less compelling. Also, the larger (and more violent) the conflict, i.e., "war," the less will be seen of the nonmilitary forces and agencies. Also, the Army response is indeed weak. Why must the Army "continue to improve its contribution to . . . interagency operations"? The "joint" aspect is understood; but the interagency aspect is not an integral part of Army Title 10 responsibilities, Army doctrine, or Army tactics.

Agree with comment. See A23. Believe this translates into total partnership strategic training requirement. Army force structure in terms of organization, capabilities, and technological innovations will define these relationships. Training offers a way to build teamwork, build strategic relationships, and debug procedures and operations.

A27 Well-trained and disciplined units, provided with sufficient time and resources to train, can transition to OOTW missions as required (3-2).

FXXI responses: Envision achieving OOTW through training (4-7).

Army Comments:

Emphasize more that as long as so much of the early need forces are in the RC, we have to be able to get to them quickly and get them mobilized and deployed.

If OOTW OPTEMPO continues, might assumption instead evolve into "With sufficient time and resources to train, units can transition to wartime missions as required." This is an obvious paradigm shift and cultural change. Question goes to impact of continuous OOTW support and its impact on combat readiness over time.

Add: Logistics units must continually train to operate in coordination with elements of other services, agencies, and nations (T-8). Nonuniformed and/or nontraditional personnel, from DoD organizations, non-DoD governmental agencies, and the civilian sector, will deploy in support of future operations. This has major command, control, and logistical support implications (T-4).

Overall a correct assumption, but it may not take into consideration the civilian slice of our forward deployed force. The increasing need to utilize civilian and contractual personnel for the logistical support base is a factor that impacts readiness. Legal issues for civilian deployment, meeting international country clearance requirements for civilian and contractor personnel and POM actions need to be considered. Transition plans should take into consideration the preparation of civilian and contractor personnel for deployment to support OOTW.

Transition Army units to OOTW: Not necessarily true for all Army units. While light infantry and military policy might make the OOTW transition, it would be nearly impossible for armored or attack aviation units to transition to OOTW operations. In other words, the Army might be able to achieve some capability to conduct OOTW through improved training, but this is true for only some combat units, and then at the expense of valid mission training "... to close with and defeat the enemy." The Army Force XXI documents should downplay OOTW.

Agree with comment. Establishing tailored organizations to meet new missions creates a need for a mandatory predeployment training phase for new tasks and new teamwork relationships. Based on lessons learned, may suggest relook of CS/CSS roles, responsibilities, and training.

A41 Future operations will frequently be interagency or with nongovernment organizations (4-7).

FXXI responses: A structure should exist at the appropriate level to properly coordinate staff actions among agencies, services, and coalitions (4-7).

Army Comments:

Need additional emphasis on warfare becoming more coalition/agency dependent. Potential exists for us to outrun our friends and "flanks" with technology that outpaces them. When that happens, does the plan lose its value/potential? For example, should we invest in the computer literacy of only our force?

Add: Nonuniformed and/or nontraditional personnel, from DoD organizations, non-DoD governmental agencies, and the civilian sector, will deploy in support of future operations (T-4). DoD civilian personnel, personnel from non-DoD organizations, civilian contractors, and elements of civilian host nation support organizations will provide an ever-increasing number of capabilities in support of military operations (T-2).

Agree. See total partnership training.

UNCONNECTED ASSUMPTIONS

For several assumptions we have no explicit reference to Army actions in response to them. They are interesting if they are not mere oversights on our part or extraneous assumptions because they represent assumptions about the world that the Army has not planned for. There are two types of such assumptions: ones with unstated actions and ones in which actions still require that decisions be made.

In addition to reading the three documents, we have talked with several of the people responsible for the concept of Force XXI, including the office at TRADOC currently responsible for it and its original primary author. Where they mentioned specific actions in response to a given assumption we added that response and marked it as "unstated" or "UNS." These represent assumptions for which the Force XXI concept does have a specific response, but one that couldn't be found explicitly in the documentation.

The second category of unconnected assumptions is more interesting to us. These are "decisions pending" on the part of Army planners, and are labeled as "DP." In all cases, we were careful to have at least one Army expert agree that these were decisions pending.

A3 *Types of crises and conflicts we have experienced since the end of the Cold War will continue (1-1). Battle between mechanized forces will be similar to armored operations of the past three decades (2-8).*

Must retain ability to conduct sustained land operations, deep-attack capabilities (UNS).

Army Comments:

Supporting statements make assumption that we will fight those crises as we have in the past. Don't believe we have committed to that decision. Additionally, assumption fails to note that new types of crisis and conflicts will arise, and that old paradigms may not be appropriate. Basic decision (already made I believe) is that we must find new ways of doing business.

Need to say something about our ability to get to the fight as a force projection Army is suspect or could be if we cannot keep the "choke points" open for our surface means.

Battle between mechanized forces will remain the same as in the past three decades—is likely to be challenged. Breakthroughs analogous to the longbow and the armored knight at Crecy and Agincourt come to mind. There were signs that the longbow could penetrate armor, but the entire feudal organization of France depended upon knights! We should anticipate important breakthroughs in anti-tank technologies.

Add: Must . . . establish procedures that will facilitate task organization and the tailoring of logistics forces across the operational continuum (T-8).

A10 Nation states will continue to be the world's primary political unit (though they are under attack). Nationalism will be the leading cause of interstate and intrastate conflict (2-1).

Must still be prepared to fight armies from other nation states (UNS).

Army Comments:

Flawed assumption. First sentence is irrelevant. We are concerned with who we may come in conflict with, and there is no guarantee that that will be with nation states. Second sentence is wrong. Nationalism is rarely a cause of conflict. It is more often economics (resources) or failure of a state (Somalia). No decision necessary, just an appreciation that we must be able to engage in operations across the range of conflict.

Economics has always been the leading cause of conflict, closely followed by religious strife and nationalism. Economic friction between the "haves" and the "have nots" will continue to be the center of future conflicts.

Add: The Army logistics system must be as capable as the joint and combined forces . . . it supports (T-3).

A15 Preindustrial and nonnation threats are likely to engage in protracted guerrilla or terrorist-like operations (2-5).

(DP) Expanded and enhanced SOF and intelligence could help deal with this.

Army Comments:

The TAP devotes considerable discussion to the subject of "hiders vs. finders." It suggests that initially, the hiders will have the advantage. The Army response is the development of inexpensive, commercially available sensors which would deny "hiders" such as guerrilla and terrorists the advantage of being prohibitively costly to find.

Presumably we are asking whether or not to increase our investment in SOF force structure. Intelligence structure should be supportive, regardless of type of conflict (see Joint Pub 2-0). The question is, how do we want to deal with insurgencies and counterterrorism? The tactics we want to adopt should drive the force structure question. If we are going to rely on nation building, and training support to foreign militaries/police forces (as in El Salvador), the answer is different than if we intend to conduct a Vietnam-style counterinsurgency.

Bad assumption. Cannot envision the U.S. getting involved in a protracted guerrilla war in the future.

The DP has not been correctly identified. Protracted guerrilla operations have proved immune to SOF actions more often than not and, under the current political realities, it is doubtful that they could even be deployed for Direct Action.

Assumption so basic it seems like a fact. It would only make sense that preindustrial nations would be more likely to engage in guerrilla operations than conventional operations. The DP should question whether conventional forces or SOF is better suited to counter these operations. It is also obvious that more intelligence would help.

These unsophisticated threats will not have the modern military structure and equipment that causes them to be information based. It is quite possible that if military leadership skills, tactics, and strategies were designed only to fight an information-based enemy, the Army would fail when tested against an adversary that eschewed information-age-based weapons systems, communications systems, and tactics.

A24 *The region that will require most attention is Asia (2-10).*

(DP) Although traditionally a naval concern, prepositioning, strategic mobility, and infantry-heavy forces would be possible responses.

Army Comments:

Reject this assumption unless there is overwhelming rationale to validate it. I would submit that this assumption is likely to fail. Force XXI concept should be global in its perspective, recognizing force projection in a capabilities-based force.

A response that is adequate for the Philippines and Japan may be inappropriate for Korea or Iraq. What is the question you are asking for a decision on?

Size of the Asian armies precludes any realistic use of "infantry-heavy forces . . . as possible responses." Whether as DPs or assumptions, it needs to be stated that land combat in Asia requires either large coalition forces of the Desert Storm type or the use of weapons of mass destruction. Also, Asia is too general a term—it must be broken down into SW Asia, Central, Indian subcontinent, etc.

Agree with the notion Asia is important, but not sure it will require most of our attention. Is this assumption based on the emerging democracies and markets in the Pacific basin, China, Japan, or because since 1945 we have had to field a 7 to 8 active Army division force, or Division Force Equivalent (DFE), in Asia three times . . . Korea, 1951; Vietnam, 1968; and SWA in 1990? With continued turmoil in southern Europe and the FSU, those areas will likely continue to demand attention. Africa and Latin America are similarly potential "demands" on our attention.

Add: Prepositioned Army reserve stock and floating sustainment capability, configured to support selected force deployments and positioned in selected overseas regions for initial support, kept afloat for rapid response, and stored in CONUS for reinforcement, will help strategic warfighting sustainability (T-7). The Army envisions a prepo fleet capable of delivering a heavy brigade, port opening capability, and initial supporting theater stocks to a regional contingency by C+15 (T-7).

Assumption should be challenged and substantiated—why would this be true? DP makes sense but will be an affordability issue.

More attention to Asia: Need stronger rationale in Army documents, stated in terms of worldwide political, ethnic, cultural and economic conditions. Also need to explain in the Army response(s) to these conditions why Asia would be more important to U.S. national interests than, say, Latin America or Africa. Will this "attention" necessarily involve the Army?

[On the DP] Probably an inappropriate constraint to assume that Asia will require most attention in the future. Europe, the Middle East and Africa could also compete for attention. There is no way to ascertain that we will be preoccupied with a single region of instability during a given time frame. The strategist should hypothesize an array of capabilities across the DTLOMS to deal with manpower-intensive Security and Stability Operations (SASO/OOTW) in Asia and other regions. If the next-level required capabilities are the time-to-commit, the short-term force resupply, and long-term force logistical

sustainability, then they should be quantified by probable scenarios. Heavy Lift Air Cushion Vehicles (ACV), for example, change the strategic access to over 80% of potential coastlines. An ACV-equipped force can commit faster, deeper, and with less risk than by traditional deep-water port access against heavy point defenses. Part of the solution might be both POMCUS-like stocks and area-based supply contracts (as in RVN, etc.)

Disagree. Political fragmentation is occurring all over the world. Suggest CAA modeling to determine best location for worldwide action.

A28 *Liaison requirements will logically increase in quantity and complexity (3-2).*

(DP) More combined operations with less traditional partners suggests expanded language training and tailored recruiting, cultural training, perhaps special companies.

Army Comments:

Decision Pending which is offered here appears to place the burden on our own forces; it must also consider the possibility of shared (or increased) responsibility of our partners in meeting liaison requirements. There are also technological responses, such as universal translator devices and communications equipment.

Will also need to examine greater reliance on interagency staffing, and effects of above on career management/paths.

The entire assumption is flawed. Combined operations do not in themselves dictate a requirement for language training, tailored recruiting or special companies.

DP obviously envisages the reactivation of the Foreign Area Officer program, currently moribund. If there is to be any hope of either retaining or recruiting FAOs, the decision must be taken soon, publicly stated, and the careers of such personnel more positively managed than in the past.

Special companies is definitely not the answer.

[On the DP] Many capabilities (across DTLOMS) will be needed to fix the proliferation of languages which deploy with the force. See comments on stability and support operations, and total partnership training. Recommend LTC Wayne Gosnell's work on intercultural communications as an approach to standardizing cultural issues.

Agree with comment. Other possibilities are auto-translators and/or hiring in-country experts. May be impossible to prestock every language, etc. Certainly, cultural predeployment training is a must. LTC Wayne Gosnell's work in standardizing cultural differences would be helpful in this area.

Increased liaison requirements: valid assumption for OOTW, but discussion is weak. Response might be better solved through contract hire of respective

"ethnic" civilians, many of whom could be U.S. citizens or resident aliens. For two examples, this approach worked in Desert Shield/Storm and Somalia. More language training, except for intelligence soldiers, tailored recruiting, and "special companies" would all detract from *military* training and operations.

A33 OOTW will be manpower-intensive (3-8).

(DP) Allies could provide much of the manpower; multicomponent force also a possibility.

Army Comments:

Expanded use of sensors on the battlefield would appear to also be a viable response.

This decision is above the level of the Army. Situation in Bosnia is clear case in point, allies won't commit manpower without U.S. leadership, U.S. leadership is defined as men on the ground. We need to look at how to implement multi-component forces in MOOTW (joint doctrine already exists), and its implications for how we train and man the force.

Not true. MOOTW may be resource intensive; however, in a majority of the operations small detachments may be involved.

DP is incorrectly stated as the decision will be made elsewhere, e.g., by the allies who, if current U.S. foreign policy trends continue, will be hardly likely to provide troops. Even a decision to employ significant numbers of U.S. troops is not one that the DoD can take. The term "multicomponent force" is misleading. Does it mean a U.S. joint task force or an international coalition? In reality, this assumption does not lend itself to a DP.

Emphasize more that as long as so much of the early need forces are in the RC, we have to be able to get to them quickly and get them mobilized and deployed.

Add: Nonuniformed and/or nontraditional personnel, from DoD organizations, non-DoD governmental agencies, and the civilian sector, will deploy in support of future operations (T-4). DoD civilian personnel, personnel from non-DoD organizations, civilian contractors, and elements of civilian host nation support organizations will provide an ever-increasing number of capabilities in support of military operations (T-2).

OOTW is METT-T dependent. Can be manpower-intensive in duration and a rotation plan, as well as in the size of the operation.

DP is not within the power of the U.S. to decide. It is true the allies could provide much of the manpower, but that is a decision for the allies themselves to make. The U.S. may prefer the allies to provide much of the manpower, but we have no decisionmaking power to effect that end. Recommend this PD be deleted or the wording changed.

Assumption needs to consider the civilian and contractor support personnel required for operations. As the force downsizes and certain military skills are being revised, the Army is relying upon civilian and contractor personnel to fill those requirements. This is especially true in the logistical support base. Examples are (a) the Army's MOS (77LV6) for military personnel who can certify tests for certain rotary-wing aircraft has been deleted. The inventory of remaining military certifiers is down to about 4 personnel to support worldwide operations. Therefore, the Army must rely on civilians or contractors to adequately support future deployed operations with mobile labs. Allies may not be able to support this requirement. (b) Also, downsizing of the Army's TMDE positions now requires significant civilian/contractor support. If we had to support two MRCs and be ready to support ongoing OOTW, then this is a factor of readiness. Possibly our allies could assist with systems that are interchangeable, but this is an issue to consider.

Army must develop doctrine to use civilians, reserves, and individuals outside Army in nontraditional roles to meet Army's mission.

The underlying premise for this [DP] should be whether or not IGOs/NGOs and alliances like the UN and NATO will continue to function as the umbrella organizations for these type operations. Most countries will only contribute manpower to an operation if there is something in it for them (U.S.\$).

[On the DP] If the required capability is to provide manpower sources for manpower-intensive stability and support operations (OOTW), then there is a wide variety of options that could be studied across DTLOMS. The analysis should identify total government and nongovernment roles, responsibilities, and assets to define unique military requirements. If AID, for example, has the mission and/or capability to conduct certain stability and support operations missions, then that needs identification. Given pure military required capabilities, further analysis would be needed to identify where manpower is needed. If the issue is logistics manpower, then a CAA-type analysis would be critical to identifying DTLOMS-based operations. Military assistance, exchanges, and training programs for allied forces and potential coalition partners must be cultivated to facilitate cooperation and active participation in undertakings like these in future operations.

Agree with comment. The biggest manpower cost is in CS/CSS functions. In-depth studies (e.g., the British ammo resupply study) should drive technological advances to cut manpower requirements.

A37 *Army CSS and CS units are usually the major theater land force operators in war and OOTW (3-13).*

(DP) Force structure issue; usually one-of-a-kind units. Reserve components may be important.

Army Comments:

A37 is stated incorrectly. The majority of the Army's CS and CSS units, especially at echelons above division, are in the Reserve Components, with most of the CSS in the USAR. Therefore, the Reserve Component is, not may be, important. The force structure issues are being worked. However, the AC must continue to work with the RC to determine the most effective ways of leveraging the unique strengths and capabilities of the reserves.

Consider also potential for split-based operations, expanded use of host nation and contracted capabilities, and greater self-sustainment capability in Force XXI organizational designs. Recommend stronger wording for role of Reserve Components: "Reserve Components will be essential."

Again, what is the decision here? This is a statement of how we are currently organized. Use of term "major theater land force operators" in A37 begs question of most numerous? Most important? Largest? The question is, do we have the right AC/RC mix of CS/CSS units, and do we resource the RC CSS sufficiently? These are the areas where decisions must be made.

This DP is correct, although the writers downplay (or are unaware of) the role of the RC in such units.

Add: The most effective mix of Active and Reserve Components, DoD civilian, and private-sector contractor personnel must be assembled and deployed to sustain the force (T-6). The Reserve Component (RC) will be relied upon by the Active Component to provide a number of logistical functions in support of combat operations and OOTW . . . reliance on RC logistical capabilities may increase in the future (T-2). The RC will continue to maintain a significant portion of the Army's logistics force structure (T-2).

Assumption is difficult to understand. Is the issue there are more CS and CSS forces than combat forces? Is it addressing EAD forces? What is the issue?

Add "Civilians will play an increasingly larger role."

Intelligence forces will access, leverage, and integrate the complementary and unique specialized capabilities of the total intelligence system to include: national agencies, service agencies, strategic, operational and tactical units, active and reserve components, tactical organizations, and joint/multinational forces. The Deployable Intelligence Support Element (DISE) will often include nonorganic, specialized augmentation teams as well as organic resources (525-xx, IO).

Army CS and CSS units are usually the major land force operators: the assumption is valid, but needs much more discussion. The Army will need to redesign its EAC/theater headquarters/command and control units and its CS/CSS units to support major land force operations. Modularity of key support teams will be more important than the CS/CSS unit headquarters themselves. As long as the Army places its major CS/CSS support capabilities in the RC, the

Army will need to rapidly activate these modular RC support teams. The RC will need to be fully integrated, trained to support the AC, and able to be rapidly mobilized. Just as AF National Guard and Reserve air crews can immediately fill in and operate AF airlift assets, so too do the Army RC "crews." See Army Actions "ACT 4."

[On the DP] CS and CSS manpower and skill requirements are based on supporting units in primitive environments. The key problems are the lead time for CS/CSS skill training and the expensive maintenance/sustainment of a CS/CSS infrastructure to support potential combat operations (vice lower peacetime requirements). This is an ideal area for re-engineering. Force structure is only one option.

Agree. CS/CSS folks supporting the units and the populace need technology levers to reduce manpower requirements. CS/CSS units will need upgraded skills and training to meet nonlinear battlefield requirements.

A40 *Downward trend in the size of the force will stabilize toward the end of the century (4-3).*

(DP) Don't reorganize until force is stabilized.

Army Comments:

As downsizing continues, it is imperative that the Army continue to examine its core missions, functions, competencies, etc. and identify improvement opportunities. Once these missions, functions, and competencies are known and processes established, appropriate organizational structures can be developed to support and facilitate execution. Reengineered processes should drive reorganizations.

Reorganization must be a continual consideration as OOTW may not wait until the end of the century. The overall Army structure needs to know its eventual end-strength, but the need to consider the role of civilian and contractor logistical support base personnel is an ongoing issue.

Question the validity of this assumption, given constants of "change" and declining resources.

I think the answer is we can't afford to do that. Reorganizing is destabilizing. Waiting just expands the time frame of destabilization.

DP should be: Don't reorganize until the missions are clarified.

Do not entirely agree with DP; should be how best to reorganize the force to accommodate continuing, rapid change. The Army, as a whole or in part, may have to transition through interim designs prior to achieving its end state. It is very difficult if not impossible to change large, complex organizations like the U.S. Army all at once instead of in phases or stages.

Disagree with decision pending "Don't reorganize until force stabilized." The Army cannot wait until the end of the century, when the force is stabilized, to reorganize. The force will continue to be reorganized through the end of the century because of downsizing decisions and re-engineering enhancements approved for execution. In fact, the force has been continually reorganizing over the last 25 years and will continue to change.

Agree.

Force may never be "stable." Need to reorganize "on the fly" in a logical and systematic manner in response to the NMS and fiscal realities.

This assumption is not valid. The "end of the century" is nearly here, and the downward pressure to reduce forces is continuing. The discussion should focus on a more fundamental question: What happens if the resulting force structure is not adequate to meet the U.S. government's national objectives? Will the military still be able to conduct two MRCs?

Disagree with DP. Pace of change does not allow us the luxury or time to wait until (or if) the force is stabilized. Force projections give us one driving reason to reorganize. Is the issue the required force structure options and logistical capacity to meet the range of trends and scenarios with the projected 2010 force? The Army cannot wait until the end of the century to adapt and adjust. Change is constant.

A42 Use of deep-precision strike weapons, sensors, brilliant munitions, and smart weapons will allow combat forces to apply overwhelming firepower within their battlespace (4-7).

Force XXI multidimensional strike concept—requires information, flexible leaders and battle staffs (UNS).

Army Comments:

Change "within" to "throughout" (we already can do it "within"). Associated decisions deal with force structure and troop sequencing, based on changes to deep strike capabilities. Costs of capabilities (including necessary C4I architecture) may preclude full modernization in other areas (Tanks and IFVs, for example). Resource decisions must be explicit, not made by default.

Brilliant munitions, systems and weapons must be developed with artificial intelligence capabilities that prevent fratricide and ensure target destruction.

Intelligence operations will produce a precise in-time presentation of the commander's battlespace which conveys an accurate understanding of the adversary, terrain, weather, and operational environment. Intelligence operations must precisely locate and track critical targets (525-xx, IO).

This is more than a "multidimensional strike concept." This assumption represents the heart of Force XXI/Intel XXI operations and needs to be supported

by more in-depth discussion. Implied is a vastly increased requirement for total shared situational development, almost automatic synchronization of forces across a widely dispersed battlefield, clear mission-type orders, greater initiative by junior commanders. Also needed are well-thought-out plans, integrated logistics support, highly trained commanders and staffs, and reliance on sophisticated simulations to support the planning and training processes.

Agree. Smart and brilliant munitions dramatically reduce the tonnage needed to support military operations. Cost-effective, too. Each unit must have the organic firepower with the targeting and the range and volume of fires to destroy massed forces within its battlespace. Coordinating and integrating real-time concurrent multinational fires will require very high levels of battle command and staff training. Interconnectivity is ever important.

A43 *Technology trend is toward brilliant systems, not brilliant munitions (4-9).*

(DP) Pay more attention to systems than to munitions; as effectiveness increases, focus less on support and protection. Allows downsizing (although benefits attributable to mass remain).

Army Comments:

The DP states that "as effectiveness increases, focus less on support and protection." With regard to critical information systems, arguably the preeminent enabling capability behind brilliant systems, C2 Protect, Communications Security, and Information Security, are indispensable and must have greater and not less focus as the Army transitions to information/knowledge-based operations.

The statement "focus less on support and protection" is unclear. Agree that systems need emphasis; however, brilliant munitions are an essential part of systems and require integration.

Again, a true decision. Need to ensure we look at costs of new systems vs. cost of new munitions for old systems (BAT, for example). Not sure I follow logic that support and protection require less focus. Less support required (because fewer systems in field) but survivability of systems becomes more critical (each loss represents higher percentage of combat capability).

Assumption should be challenged and substantiated—can we afford new systems or just technology insertions? It is an affordability issue.

Not sure what is being said here, but should not imply that we will focus less on troop protection and welfare.

Agree that systems engineering is the most powerful approach. Fielding brilliant munitions that require man-years of packing/repacking, loading/unloading, etc., across the battlefield appears to be counterproductive. The British macro-

analysis of their ammunition supply system from factory to gun is the kind of work that should be done to support effective "rightsizing" and force structure.

Agree. Analysis and design must look at the total system, not just eaches.

A46 Advanced technology will yield new combat capability options which promise to revolutionize future battlefields in five key areas: lethality and dispersion; volume and precision of fire; integrative technology; mass and effects; and invisibility and detectability (F-11).

Must have information dominance of battlespace, fewer people (UNS).

Army Comments:

Information dominance is key; however, this is an incomplete set of responses. Organizational, Training, and Leadership responses are also implicit (see ACT 2). Solutions must permit soldiers and leaders to manage information without human "overload" and safeguard against disastrous command errors.

Relevant decisions are resource decisions. Absent a change in the fiscal environment, we cannot afford to resource the force in all areas. Decisions need to be made on which areas will receive priorities, based on additional capabilities that they offer, and the ability of the unresourced areas to maintain some level of adequacy.

Assumption leaves out one other important area that must become part of the Revolution in Military Affairs: Logistics. Advanced technology will yield new logistics capabilities that are more effective and efficient. Technology is key to the achievement of world-class logistics and will provide the means from which the logistics "footprint" will be reduced.

The Army will gain an unprecedented advantage on the battlefield and in MOOTW by using and protecting the use of information infrastructures (525-69). "Advanced technology will yield new combat capability options . . . ": Need more discussion; information dominance is but one aspect of assumption. Discussion should expand thoughts on each of "five key areas."

A47 Maneuver will be more effective on future battlefields (F-13).

(DP) Economic investment in and doctrine for firepower vs. maneuver. We have yet to understand fully the impact of digital technologies on the proper mix between fire support and maneuver elements (FX-18).

Army Comments:

Question the validity of this assumption. As invisibility and detectability become more important, maneuver may be less effective. Laws of physics still apply—movement may be more significant as a "signature" than the actual

combat system. Unclear on how this assumption should influence the implied decision on investment priorities (maneuver vs. firepower).

We need to invest in both and have doctrine for both. Reliance on firepower or maneuver alone is impossible.

Maneuver will be more effective because of digital technology.

Add: The impact of Force XXI Battle Command on logistics doctrine, organizations, and materiel is not yet fully known (T-5).

Agree.

Assumption is problematic, and discussion does not support it. Need to give examples and provide expected results if assumption is indeed valid.

[On the DP] History is replete with examples of maneuver providing the decisive differential in the ability of one force to generate overwhelming combat power vis-à-vis an opponent that relied exclusively on firepower. The defeat of France by Germany is a classic example of firepower rendered subservient to maneuver. For the purpose at hand, agree that we must determine a proper economic investment mix between the two elements of combat power. If the expected advantages of digital technologies envisioned for Force XXI operations are realized, then the basic assumption (A47) may be correct. The ability to conduct decisive maneuver at all levels through superior situational awareness could dominate future battlefields. "What cannot be seen cannot be hit," and conversely. A force conducting "dominating maneuver" will need/have a qualitative advantage in firepower in most potential scenarios.

Insupportable with the facts at hand. Maneuver and firepower are inseparable. However, Force XXI concept is premised on distributed, nonlinear, noncontiguous, full-dimensional operations. This would lead one to conclude that the ability to maneuver is critical to successful operations.

A48 Three general levels of military threat to the United States and its interests: nuclear, biological and chemical weapons; standing armies of foreign powers; and irregular forces ranging from ethnic militias to terrorists and the gunmen of criminal cartels (F-14).

(DP) Force structure issue: Are all equally important?

Army Comments:

All three general levels of threat in A48 are equally important. The United States could face a mixture of all three levels depending on the type of conflict.

Wrong question. All three have different levels of probability and different levels of risk. Question is, what level of investment are we willing to make in force structure, given the probability and risk associated with each threat? And, does each threat require a different force structure? What are the differences?

Change to read “military threat to the U.S. strategic interests” there is no standing army that is a threat to the U.S.

Not just a force structure issue, but also a combat development and training issue. How do we defend ourselves against these types of weapons?

Force development will be influenced by reduced defense spending; significant growth in information technologies and digitization; reduced forward presence; stability and support missions; and proliferation of weapons and technology which may make potential adversaries more lethal and dangerous than before (525-xx, IO). “Three general levels of military threat . . .”: DoD/Army must be able to respond to each type of threat; but this does not mean that resource cost/force structure to meet each threat has to be equal. The U.S. must always be able to defeat the first two threats.

These three levels of threat are not all equal—we are going to have to accept risk somewhere. We must be optimized to fight the standing armies of foreign nations. It is these armies who are going to possess any substantial NBC capability. If states resort to the use of NBC weapons, it could be indicative of desperation in the face of battlefield defeat. We must assume that despite actions to the contrary, all states are rational actors in the international system. Most will commit their standing armies to an operation before they even think about the employment of NBC weapons. Our Army must continue to focus on warfighting. Force structure must be in full support.

[On the DP] The threats (ranging from small terrorist groups through irregulars or guerrilla forces to standing armies; all capable of NBC attack) are all important because they may all require military action. Determining the probability and a force structure flexible enough to meet those probabilities is the difficult part. Niche forces with access to weapons of mass destruction pose the most immediate threat to the United States and its interests. However, the military and economic actions of peer competitors pose the most dangerous long-term threat.

Agree. The range of threats (from high-technology niche elements, to stability and support operations, to conflict involving peer competitors or combinations thereof) has always been there. Shifting probabilities and capabilities will cause shifts in force structure.

A49 Fiscal realities dictate that future systems will be produced at low rate and in small quantities (F-45).

Systems must be made more effective, and thus will not be needed in large quantities (UNS).

Army Comments:

The future systems produced in A49 still must be in sufficient quantities to ensure Reserve Component fielding. The critical nature of the USAR's CS/CSS

units and the AC's heavy reliance on them for battlefield success make any such system's fielding vital.

Decisions on acquisition strategies are critical. Ability to discriminate between required capabilities and desired capabilities is important. Decisions about the need for all force packages to have same capability level or whether to have tiered levels of capability are important. Decisions on whether to maintain general purpose forces or to specialize some forces (MOOTW specific vs. general purpose vs. war) must be made.

C41 systems must include AI methods to detect unauthorized access or attempted access to friendly C2 information. Force development will be influenced by reduced defense spending; significant growth in information technologies and digitization; reduced forward presence; stability and support missions; and proliferation of weapons and technology which may make potential adversaries more lethal and dangerous than before. Future intelligence systems will incorporate advanced technologies into an open systems architecture to provide full-spectrum collection, automated processing and analysis, dynamic management, and multimedia presentation and distribution which support pre-mission planning and rehearsal exercises in addition to military operations. Future intelligence operations will be conducted against advanced technology now considered nonmilitary. Successful intelligence operations will be determined by the availability of global and tactical broadcasts, supported by bandwidth on demand and multipurpose, nonlethal C2 Attack systems capable of accessing enemy automation at depths of 300 km (525-xx, IO).

Assumption is not backed by good discussion, and is probably valid only for the most expensive of weapon systems, e.g., ships and aircraft. The function of a system would dictate the quantity needed, and does not depend on how effective the system is. For example, combat radios will still be needed down to every squad and crew, no matter how good the system is. Bombers and aircraft carriers will be produced in small quantities because of their cost.

Agree. Small-scale high-technology production in automated factories is feasible. Shifting the acquisition and distribution concepts can make special-purpose advance technology units supportable. Terms "low rate" and "small quantity" should be defined. Configuration management, reparability, training, logistics, etc. problems increase geometrically with this approach.

RAND-GENERATED IMPLICIT ASSUMPTIONS FROM GENERAL READING OF PAM 525-5

There are two kinds of implicit assumptions that we think underlie Force XXI. One comes from the unstated assumption that surely underlies an Army action that seems to have no assumption associated with it in the Force XXI documentation. Those are detailed in the next section.

The other kind is more difficult to identify. These come from a general sense while reading the Force XXI documents. They tend to be more general implicit assumptions. We both tried to identify such assumptions and asked the experts we interviewed if there were any that came to their minds. This section contains those that we identified. Each was "validated" in the sense that one or more of the "experts" involved with the writing or maintaining of the Force XXI concept acknowledged that the assumption was implicit in their thinking.

A52 *The Army can always force the enemy to accept engagement.*

Army Comments:

Do not agree that the Army will always be able to "force the 'enemy' to accept engagement" in the strategic long term. This will chiefly be due to increasing global media coverage of military operations/OOTW, leading to far greater scrutiny and potential manipulation by propagandists and "misinformationists" in the era of information warfare.

Only true in war, not always true in MOOTW. Also, engaging enemy does not always mean being able to attack enemy's center of gravity. The Army may not always be able to effectively engage the enemy, because his forces may not represent his center of gravity.

Assumption is simply not true. Change to sometimes or usually and/or in a conventional situation.

Not true. We did not and could not force the enemy to accept engagement in Vietnam. The political, diplomatic, and economic elements of national power will continue to influence the application of military power.

Assumption is true only if we are not already at war or "overengaged." Restate, "In general war the Army can always force the enemy to accept engagement, it will not necessarily be able to in OOTW or if we are currently engaged elsewhere."

Not correct. Must define engagement.

What if they just surrender? This is a nonsense assumption.

Delete—this should not always be an assumption, implicit or explicit. Reason: if the enemy does not choose to accept engagement on our terms, do we create "Gulf of Tonkin"-style engagements? It is dangerous to think that we can always influence the course of human events. There could be situations in which we do not desire to have the enemy accept engagement!

Assumption is not valid, especially when discussing OOTW/LIC.

Disagree. The hallmark of guerrilla operations, for example, is that the enemy can decide to not engage. On the other hand, an enemy consistently choosing not to accept engagement probably lacks will and courage, and most likely has lost the initiative. Defeat through capitulation is highly probable.

A53 *Operations will have clearly defined objectives achievable by classical military means.*

Army Comments:

Restate as "Army operations will have clearly defined objectives achievable by classical and evolving military means."

Not true. First, do you mean military objectives or political ones? Military objectives that do not support political objectives are not of much use. Getting clear and achievable political objectives will not always be possible. Second, achieving military objectives by classical military means may be possible, in some cases, but not desirable.

This is an assumption that requires considerably tighter definition. What are "classical military means"? Operations will have political objectives loosely (if at all) defined, and combat forces may have no role beyond security. In an OOTW context, this assumption is fatuous. Perhaps the assumption should be that the NCA will assign militarily feasible objectives to the military, rather than political, economic, or social objectives that the military realistically cannot accomplish.

Somalia did not, Bosnia does not. OOTW never lends itself to a clearly defined objective achievable by classical military means. Restate: "Operations in general war will have clearly defined objectives achievable by classical military means."

Must define endstate before entering any operation. If this is done there should be defined objectives. Do not understand what "classical" means.

Please see Bosnia.

We do know that increasingly, operations do not have clearly defined objectives in the classical definition of the term. But this does not mean that we should not conduct them. Objectives and their definitions are level dependent. At the tactical level of war we need a stricter construction of the concept. At other levels the objective can be, and has been, more intangible—given the complexity of "globalism"—in our national security/military strategy.

Disagree. The future Army must be capable of thinking beyond maneuver and firepower. Admittedly a difficult area to define, but look at the ARPA studies on the Fulda Gap. Army may be forced to accept situations without clearly defined objectives and must be open to concepts and solutions that achieve the mission without "classical military means." SASO (OOTW) is a perfect example.

Assumption is desirable, but may not be achievable. Much depends on political leadership and the nature of the "enemy" force.

A54 *The Army can successfully substitute capital (technology) for labor.*

Army Comments:

True, within bounds. At some point the law of diminishing returns will apply. The substitution of capital for labor also has a profound impact on the type of labor (skill and education level) required. The Army may find it has substituted itself away from its potential labor base.

As written, this is incorrect, as the law of diminishing returns will apply if the Army's strength is reduced below that necessary to accomplish the missions assigned. Technological advancement is a force multiplier but has its limits.

This assumption is not valid because it is at odds with A23 (OOTW will be most frequently encountered) and A33 (OOTW will be labor intensive).

Do not understand the point here. If it is that we can reduce force structure by increasing technology, I am not sure that is sound or affordable.

What does this mean? For example, can technology replace an infantry man? We need to qualify this statement by skill level.

Agree. Capital can substitute for labor to a degree depending on the context. Digitization/automation of functions, for example, battle command and precision munitions will result in the supplanting of labor.

This concept surely has its limits, land dominance requires physical presence on terrain.

This may fail to come about for two reasons. First, we may reach the point in the near future that the intersection of the substitution of technology for labor is cost prohibitive. Secondly, there may be a point at which technology fails to adequately perform to human standards.

Taken to its extreme, of course, if this assumption were true, there should be some time in the future that only machines will fight wars. Humans will "fight" from some protected area in the rear. If this assumption does not prove to be true, then people, not machines, will remain the most valuable asset in an Army. This limitation in technology substitution of humans would increase the worth of the human actor in the wars of the future. The limitations of the information age would not allow us to dominate, control, and win on tomorrow's battlefield. Neither will the battlefield be as advanced as hoped for. The fighting of the battle will be more traditional and not be transformed as expressed in A21.

A55 The enemy will have identifiable, targetable centers of gravity.

Army Comments:

Both are questionable. What is the center of gravity for the DPRK? Their leadership? Their potential nuclear weapons? Their army? What about the Bosnian Serbs? The Serbian Serbs? How targetable are their centers of gravity? What about terrorists and narcotraffickers?

This is false if taken across the entire spectrum of war/conflict as aptly demonstrated in Lebanon, Somalia and Bosnia. Although it is often (but not always) possible to identify centers of gravity, it is frequently impossible to target or strike them. The assumption will be valid if prefaced by "In a conventional war"

In OOTW there may not even be an "enemy" to target. This leads to a vague mission statement and ineffective operations. Restate: "In general war the enemy will have identifiable, targetable centers of gravity. In OOTW they may not."

Agree. All military operations entail certain characteristics. The concept of a center of gravity is fundamental to operations involving opposing forces or groups. The problem is, a center of gravity is not often easily identifiable, hence not easily targetable. If identified and defeated, a center of gravity provides the attacker a marked advantage towards mission accomplishment. Bottom line is, there is always a center of gravity across the range of operations.

Centers of gravity should be identifiable, but may not be targetable.

Please see Viet Nam, Somalia, Bosnia, Chechnya, drug cartels, etc., etc.

Assumption is not valid, e.g., Somalia. See comments for A52.

A56 *Operations are continuous; they progress smoothly from peace to war.*

Army Comments:

Rewrite as "Operations are continuous; they transition smoothly from peace to conflict to redeployment."

Not according to history. Pearl Harbor, the Gulf War. Conflict is continuous. It rarely moves directly from peace to war, but war is not the same thing as conflict (hence MOOTW).

Misleading. Operations may not progress smoothly from peace to war. In many cases, the transition will be uncertain and disjointed. Changing political, diplomatic and military conditions may cause mission creep and an unclear threshold between peace and war. There is a need for continued reassessment to develop the restated mission statement.

This is almost never true. There are many examples of a "straw breaking the camel's back" in recent history. Desert Shield was no continuous progress, it just appeared out of nowhere. Restate: "Operations are very rarely continuous; they progress by a slow building of tension followed by a seemingly insignificant event that 'breaks the camel's back' and commences general war."

Please see Pearl Harbor, the blitzkrieg, start of Korean War, start of Desert Shield/Storm, etc.

Bad assumption.

Delete: probably not valid by any stretch of the imagination. Add: Operations are continuous, both in time of war and peace. Reason: nothing is perpetually smooth, especially when we talk about human activity.

Disagree. Current systems are discontinuous (see Desert Storm Lessons Learned). Future systems should facilitate a continuous ramp from peace to increasing levels of war. But the situation may be "discontinuous" despite our efforts. ACT 63 contradicts?

Assumption is not valid. OOTW/LIC engagements/stages will be hard to define and sometimes even to determine what stage a force is in. Operations would lurch from one phase to another, and back again.

A57 *Changes in conduct of warfare won't invalidate the precepts of war.*

Army Comments:

This is true of war but is unlikely to be true in OOTW. ROE is an excellent example; i.e., U.S. forces will not fire on hostiles for any reason except self-protection. Restate: "The precepts of war are valid in general war and may be valid in OOTW."

Agree. Fundamental precepts will remain, but some may have to be modified in recognition of evolutions/revolutions in warfare areas.

A58 *First battle paradigm is still valid.*

Army Comments:

Not necessarily true in MOOTW.

Yes in general war but only maybe in OOTW. Restate: "In general, the first battle paradigm is still valid. It may not be in OOTW."

What is the "first battle paradigm"? Explain. If it is meant that the "first battle" will be the "last battle of the last war," it is not a valid assumption. Modern forces CAN learn to conduct new operations in accordance with new doctrine and weapons technology, especially through the use of simulations and battle labs. As an example, the 1939 Wehrmacht blitzkrieg of western Europe was certainly a new approach to war.

Agree.

RAND-GENERATED IMPLICIT ASSUMPTIONS FROM UNCONNECTED ACTIONS

In "rationalizing" the Force XXI documents, we connected assumptions about the world with Army actions. Assumptions for which no connections could be found were listed above as unconnected assumptions. Army actions for which

no associated assumption could be found are also interesting because they represent potential implicit assumptions about the future. That is, there are undoubtedly good reasons for the Army to plan to take a given action. It is desirable to try to state the reasons explicitly so they can be examined. Some of these implicit assumptions can become vulnerable in the future. This section lists Army actions for which no assumption could be found, our attempt to supply the assumption that was implicitly being made, and the comments on those assumptions from Army planners. All Army actions in this section have an identifier of the form "ACT##". This came from the list of Army actions that were identified during this work and has no other significance.

ACT2 Army will be structured to keep pace with the evolutions of its strategies and doctrine (1-4).

Either the structure won't have to change much, or the Army will recognize when change is necessary and be able to make the necessary changes.

Army Comments:

This should link to A46, with reference to Revolution in Military Affairs resulting from technological advances.

Very optimistic. We are a conservative organization, and rarely make major structural changes unless forced to. Also, we tend to evolve strategies and doctrine that are supported by our structure, not the other way around.

This could require paradigm shifts and cultural changes. The Army will change, but the question is whether the change is proactive or reactive. In addition, change, even if desired, will probably be constrained by fiscal limitations. Add to last sentence of (I) " . . . be able to make the necessary changes IN TIME to keep pace with the evolutions in strategies, doctrine, and missions."

Add: A second implied assumption. "Leveraging information age technologies mandates force structure changes." Significant manpower reductions will also do the same. Reason: Not business as usual. Ushers in a different epoch in the history of warfare.

Agree with implicit assumption. The Army has a relatively flexible force structure that should be tailorable to most scenarios. A second implied assumption: "Leveraging information age technologies mandate force structure changes." Significant manpower reductions will also do the same.

ACT14 Organizations will become flatter and less rigidly hierarchical (3-2). ABCS will include both hierarchical and internetted processes (3-5).

Information age will change optimal organization and combination of hierarchical and internetted is best.

Army Comments:

As to the assessment of the "optimal organization," this could be debatable. Action could also link to A46.

Agree with implicit assumption.

ACT22 Commanders accessing intelligence databases will have greater access to, and place greater reliance on, the counsel of civil affairs, PSYOP, and other SOF assets (3-6).

More often than not, combat and OOTW will co-exist. Civil affairs, SOF, and PSYOP will accordingly be of increasing importance.

Army Comments:

This links to A26 and A27. Unclear on meaning of "coexisting" war and OOTW; suggest use of a better word.

This is either an oxymoron or a crashing statement of the obvious: war and other-than-war operations co-existing. The implicit assumption needs to include something about the same theater of operations or sequentially during successive phases. If CA, PSYOP, and SOF will be of increasing importance, then the assumption must include an increase in such personnel assets.

Agree with implicit assumption.

Disagree with this assumption. Being able to access intelligence data bases does not necessarily equate to relying more on SOF assets. These are two separate functions and capabilities. The SOF assets listed are valuable for OOTW, but would not be as much use in a general war.

Agree with implicit assumption. This also suggests that interventions may be non-"classical" and that objectives and desired end states may not be clearly defined in given situations. The integration of civil affairs, PSYOPS, etc. to support both combat and stability and support operations is important. May need to go farther (?) Wars are fought for a variety of reasons. If an army is being inserted into a place like Bosnia, or Ireland, or RVN, then are the "classical" tools and solutions the only ones? True, such solutions may be outside our lane, but what is Gen. Marshall remembered for? His firepower and maneuver . . . or other skills and solutions? What should Army role be in the future, and what additional skills might be needed? Might part of the "Army" look like CARE or the Peace Corps . . . or somehow support such nation building?

ACT24 Overmatches in the elements of combat power—maneuver, firepower, protection, leadership, and, ultimately, information—will prove essential to maintaining the edge against potential adversaries (3-9).

Adversaries will be technologically sophisticated, although not to the same degree as the U.S., and thus vulnerable to the tactics and strategies of knowledge-based operations.

Army Comments:

The implication that all adversaries will be "technologically sophisticated" is a risky assumption.

In war or near war. Not necessarily true in MOOTW.

Need to emphasize more that info age technology is vulnerable to the least sophisticated "hacker," the potential threat to U.S. forces and operations from low-tech hackers is as great as the potential advantage we gain from the technology.

Implicit assumption is wrong. Adversaries will not necessarily be technologically sophisticated and thus not be vulnerable to the tactics and strategies of knowledge-based operations.

Implicit assumption conflicts with A15. Implicit assumption is that our potential enemies will be technologically sophisticated. A15's assumption is preindustrial nations will engage the U.S. in guerrilla warfare, the least technologically sophisticated type of warfare. The implicit assumption is true for our potential adversaries who have a modern military structure and are equipped with relatively modern weapons systems. But the implicit assumption suggests all future U.S. enemies can be defeated using the training, equipment and technical skills based on fighting a sophisticated information-based enemy.

Recommend that wording of implicit assumption be changed to read "*Some* adversaries"

Disagree with implicit assumption. Adversaries may be anywhere on the technology spectrum from stone-age to more technologically advanced than us in a given area. Due to the "snowplow" and scale effects, wealthy nations can field the fruits of our R&D faster than we can. While adversaries will generally be vulnerable to our conduct of knowledge-based operations, many will be able to exploit windows of vulnerability. Niche capabilities will be able to dominate given periods and situations. All adversaries may not be technologically sophisticated. The Japanese learned that lesson in the SE Asian mountains.

ACT26 UAVs will be employed at the lowest tactical levels (3-11).

UAVs and UGVs will be effective surveillance and reconnaissance platforms and will be plentiful (i.e., inexpensive).

Army Comments:

Under implied assumption, delete "and will be plentiful (i.e., inexpensive)."

Rationale: UAVs will be force multipliers and enhance situational awareness

across the battlespace. Do not agree that it follows that there will be the requirement for a multiplicity of UAVs or that they will be inexpensive.

Affordability will always be an issue, how much is plentiful? Given budget constraints, this is a decision, not an assumption.

Implicit assumption is wrong. UAVs and UGVs are not now effective surveillance and recon platforms (OPTIC COBRA) and the technology to make them effective is not on the horizon. They would need better sensors and artificial intelligence to conduct their mission more effectively. This is most likely going to be expensive.

Implicit assumption is questionable. Not sure UAVs and UGVs will be plentiful even if they are inexpensive.

This is not a critical assumption. Not sure we need UAVs at company or battalion level. The important thing is to get timely, accurate information to the user. Who employs the UAVs at a given level is probably not that critical. We may not even want to employ these assets at the lowest tactical level for a host of reasons, including: logistic, interconnectivity, detectability, and the potential for the opponent to deduce friendly information from their employment. Additionally, the tactical employment of UAVs does not necessarily lead to a shorter sense-to-shoot time.

Agree with implicit assumption. UAVs are already inexpensive and effective. The Colby UAV, for example, being used in Bosnia is less than \$25K and links to the upcoming micro-GPS system. Organization and integration of UAVs into the force structure will be a key issue. The Army will need to possess organic UAV capability.

Define "lowest tactical levels," which could be considered as the company or battalion level. UAVs would not normally be placed below brigade level, especially because of the UAV support and communications requirements.

ACT27 All acquisition systems, including maneuver and command platforms, will have sensor-to-shooter fusion links to direct, indirect, and joint attack assets (3-11).

The shorter the sense-to-shoot time, the better.

Army Comments:

Assumption is most definitely correct.

Disagree with implicit assumption. This is a dangerous assumption. Conceptually this is generally desired, however there must be a decision mechanism in the loop. Shorter does not necessarily mean better!

ACT28 Depth and simultaneous attack will be a key characteristic of future American military operations (3-11). Depth and simultaneous attack in concept also applies to military OOTW (3-12).

Depth and simultaneous attack will prevail in future military operations.

Army Comments:

Extend applicability of depth and simultaneous attack to "information strike" operations.

Sounds like an Air Force ad. Depth and simultaneous attack are necessary but not sufficient components of decisive military results.

Only if it is a conventional operation involving combat. This ignores OOTW.

Yes but this supposes general war and does not address OOTW.

Disagree with implicit assumption. This is only one of several key operational characteristics of future military operations.

ACT31 Improved measures to prevent fratricide must be developed (3-12).

IFF will increasingly be a problem on the "empty" battlefield with widely dispersed troops.

Army Comments:

Link fratricide prevention to A31 (knowledge of friendly situation, control of force application) and A22 (national will dictates minimizing loss of life).

Under implied assumption "IFF will . . ." change to read "IFFN" for Identification Friend, Foe or Neutral. Rationale: The future battlespace will become more ambiguous and this contingency will be required.

The whole "situational awareness" objective is to eliminate this problem. Do we want to implicitly assume failure in this area?

Change: Implicit assumption that IFF will increasingly be a problem on the "empty battlefield" with widely dispersed troops should be the other way around. Reason: the ability to sense through improved situational awareness enables two significant phenomena to occur: friendly forces are more dispersed in lesser densities and know their relative positions vis-à-vis friendly forces and the opponent. Knowing where he is, and where you are not, in my mind spells a decrease in the incidence of fratricide. This does not imply that we must not do everything that we possibly can to minimize the incidence of fratricide. Especially when we consider the increasing lethality of weapons systems and munitions.

Disagree with implicit assumption. The ability to sense through improved situational awareness enables two significant phenomena to occur: first, friendly

forces are more dispersed in lesser densities and know their relative positions vis-à-vis friendly forces and the opponent. Second, Information Age systems allow increased detectability of an opponent. Knowing where he is, and where you are not, in my mind spells a decrease in the incidence of fratricide. This does not imply that we must not do everything that we possibly can to minimize the incidence of fratricide. Especially when we consider the increasing lethality of weapons systems and munitions. Agree with action: Joint and multinational operations might pose the highest risk for fratricide. Positive control mechanisms exist, but have never been fielded. Counter fratricide equipment procedures must be standardized and/or made available.

ACT38 Prenegotiated host nation support agreements will be imperative (3-15).

Host nation support will be forthcoming.

Army Comments:

Link host nation support to A33 and A37.

Only in prenegotiated situations will this be close to certain.

Not only may the assumption be incorrect, as host nation (HN) support may not always be forthcoming, but, even if the HN is willing to support, it simply may not have the assets. After all, in most cases, the crisis that has brought the U.S. troops is probably resource-driven in some fashion or the country may be under/lesser-developed with a limited or nonexistent support infrastructure. The HN won't always be Saudi Arabia, South Korea, or West Germany.

Many nations refuse to sign host nation agreements, e.g., countries in SWA.

Disagree with implicit assumption. Host nations must always be assumed to be uncertain.

ACT42 Army will continue to be a doctrinally-based institution (4-1).

*This is the best means for preparing a large armed force in a democratic society.
If there is a shared vision of how to fight, the Army can expand rapidly.*

Army Comments:

Don't agree at all with first sentence, and don't understand what it has to do with having a doctrinally based army. Second sentence presupposes that the training base and leader base are sufficient for expansion. Even so, "rapid" is a relative term. If we rely on new recruits/units vice recalled reservists, we are talking six months to create soldiers, and a year to 18 months to create battalions/brigades/divisions. (Look at historical data from WWII.)

Having a doctrinally based army as the best means for preparing a large armed force does not apply only to a democratic society. The advantages are clear in

any society, democratic or otherwise, in using doctrine to prepare a large armed force. A shared vision of how to fight in a doctrine-based army of a fascist country would allow that army to expand rapidly also. Whether a country is a democracy or not is beside the point. Recommend changing the wording in implicit assumption to delete "in a democratic society" or add "in the United States."

Add: Doctrine will cover the Total Army.

The discussion does not support the assumption. The fact of a doctrinally based Army has little to do with preparing a large armed force in a democratic society. Will the civilian populace "train" on Army doctrine because the U.S. is a democracy? Don't think so.

Agree that the Army must be doctrinally based if doctrine is empirically validated. Doctrine should be treated as seriously as materiel and be subject to the same kind of validation.

ACT45 It is essential that new soldiers at all levels be instilled with the warrior ethos (4-3).

Warfighting must remain the primary focus of the Army. Too much concentration on non-warfighting activities will "soften" the Army dangerously.

Army Comments:

The truth is that non-warfighting requirements have allowed us to achieve significant improvements in our deployment planning and TTP. All activities have training value, if the leaders will take the opportunity to develop it. Agree that warfighting should be focus, but reality is that the majority of our employment will be in operations short of war. The challenge is to find ways to use those operations to prepare us for warfighting, while still meeting the objectives of the operation itself.

This does not track with all the emphasis on OOTW and associated training. The assumption must strike some kind of balance, preparing units and personnel for both war and OOTW, without damaging the ability to perform either mission. Perhaps designate some units as primarily warfighter and others primarily OOTW.

Interesting implicit assumption that "non-warfighting activities "soften" the Army dangerously." The current OPTEMPO trend seems to be tilted toward a continued Army involvement in non-warfighting activities. Agree with the main assumption of ACT45, as that is the common identity of the Army that sets us apart from other institutions. Implied assumption is of limited value unless the term "too much" can be quantified, and may be gauged differently across the various Army branches.

Add: Other than soldiers will man OOTW operations where feasible and practical.

Agree with implicit assumption. Add: Another implied assumption is that the Army personnel management system is aligned with its leadership assessment and development policies. Reason: Without this metamorphosis, future leaders will not be able to effectively leverage technology, employ dynamic operational concepts, and successfully conduct complex military operations at minimal costs.

ACT47 Army's future leaders will be fundamentally competent and have the necessary intuitive sense of operational units and soldiers (4-4).

The Army will continue to attract, develop, and retain fundamentally competent people for its officer ranks.

Army Comments:

Link to A32.

It is dangerous to assume this. If we are wrong the results could be disastrous. We must work to make sure that this happens.

Force reductions and never-ending downsizing may impact on this assumption.

Yes if by fundamentally competent you mean the BE in Be-Know-Do.

Army's future leaders will be *superbly* competent and have the necessary intuitive sense of operational units, soldiers, *and civilians*. (I) . . . fundamentally competent people for its *leaders*.

Add: Another implied assumption is that the Army personnel management system is aligned with its leadership assessment and development policies. Reason: Without this metamorphosis, future leaders will not be able to effectively leverage technology, employ dynamic operational concepts and successfully conduct co . . . [cut off].

ACT54 We will maintain an edge in microelectronics, robotics, advanced propulsion, molecular engineering (4-8).

These are the most important technologies from a technology breakthrough standpoint.

No. History tells us that the most important technologies are always the ones that are just developing or are not developed yet.

Agree with implicit assumption.

ACT60 Army of the 21st century must maintain unit cohesion in the face of ever-increasing battlefield lethality (F-12).

Unit cohesion has been an important element of battlefield success in the past. It will be more so in the future because of the problem of isolation on the "empty" battlefield.

Army Comments:

Unit concept must expand to incorporate civilians or nonmilitary personnel.

Agree with implicit assumption. As much as 70% of unit performance is teamwork (see WWII studies on casualty rate vs. combat effectiveness). Our personnel management system under the Leader XXI Campaign Plan must be cohesive and credible enough to stabilize units by curtailing turbulence. This is part of the formula for building high-performing units.

ACT64 Five modernization objectives: rapidly project and sustain forces, protect committed forces, win the information war, conduct precision strikes, and dominate the maneuver battle (F-27).

Maneuver will still be important on the "empty" battlefield.

Army Comments:

Maneuver is only one element; need to develop other linkages—e.g., "rapidly project forces" links to A2, A4, A11, A35, and A36.

Not an action.

Agree with implicit assumption.

ACT77 Force XXI brigades will be optimized for warfighting (FX-25).

Warfighting is the most important task the Army will have in the future.

Army Comments:

Assumption is correct, but not most frequently executed one.

As with ACT 45, this is true, but . . . it is not the most likely nor the most prevalent task we will be called upon to do.

May be semantics, but assumption requires clarification. As alluded to elsewhere, Army has been given warfighting tasks only three times in the last 50 years. Consequently, it should be that warfighting is the most critical task that the Army can be assigned in the future, because of the consequences of failure. The most important tasks assigned by the NCA/JCS may not involve warfighting. Action is critical to success of Force XXI concept.

Re: vulnerability, if the Army prepares principally for warfighting and there is no war . . . ! In the half-century since the end of WWII, the Army has been involved in three incidents that could properly be called war—the Korean

"police action," the Vietnam conflict, and the "100 hours" in the desert. Yet the Army has been deployed in the cause of U.S. interests in any number of instances all over the world. The thinkers must get away from the concept that war is the only reason for the military—the *prevention* of war is equally, if not as, important.

Agree with implicit assumption. "Warfighting" is the most important, stability and support operations is most prevalent and can be equally important. Agree with action.

ARMY-IDENTIFIED IMPLICIT ASSUMPTIONS

Finally, we asked Army planners if they could identify any further implicit assumptions in their reading and understanding of the Force XXI concept. Listed here are the implicit assumptions they identified.

Combat power model is applicable across range of Army operations.

A fundamental principle of future CS (intelligence) operations is the ability to conduct responsive, effective support to the commander through split-basing of intelligence assets (525-xx, IO).

Deployed intelligence assets will be digitally connected in real time to their source(s) of support in the Intelligence Support Base (ISB) (525-xx, IO).

Intelligence organizations and agencies operating in sanctuary will provide focused intelligence support to the deploying force by accessing and leveraging all available resources at all echelons (525-xx, IO).

Nondeployed and rear intelligence activities will support combat operations using broadcast, smart "push," and smart "pull" distribution technologies (525-xx, IO).

Treaties and agreement will reduce but not eliminate the proliferation and potential use of weapons of mass destruction.

Action: Therefore, Army must continue to train and equip its forces to survive and operate in NBC environments.

Rationale: A host of strategic treaties and agreements on banning chemical weapons are being worked. They impact planning assumptions and required Army actions.

Unit and soldier effectiveness will be degraded during operations in special environments.

Action: Therefore, Army must develop better equipment that protects our soldiers with minimum degradation to their effectiveness.

Rationale: Protective clothing and equipment needed to operate in NBC and other special environments degrade individual, leader, and unit

performance by 30–70%. Technological advances in WMD and delivery systems will further stress this weakness.

Dust, smoke, and other obscurants will degrade the effectiveness of technological advances in equipment that uses the electromagnetic spectrum.

Action: Therefore, Army must develop effective countermeasures and better equipment and procedures for employing our smoke and obscurants.

Rationale: High-technology, high-cost items can be offset by relatively low-cost, low-technology smoke and novel obscurants. He who can best operate on an obscured battlefield has a decisive advantage.

Implicit assumption that the Army will be able to afford Force XXI. This is critical because if it is not valid then it will affect the validity of some of the other assumptions, such as A2, A40, A46, and A54.

Implicit assumption appears to be that having more information is more important than having firepower, mobility, protection, etc.

Implicit assumption that the role and mission of the Army will remain the same vis-à-vis those of other services.

One "implicit" assumption is missing from the analysis: Technological superiority will allow us to achieve battlefield dominance across the gamut of potential threats (e.g., agrarian, industrial-age and information-age adversaries) that we will face in the 21st century. (I) We are not sacrificing force structure for gadgets (we still need people to take and hold terrain).

Additional implied assumption that the structure of the sustaining base (institutionalized Army) will have to change to reflect new and emerging support and training requirements.

We assume that the diversity of the population base will increase. As immigration trends and American demographics change, our new soldiers each year will demonstrate greater heterogeneity.

The U.S. will be successful in limiting the proliferation of weapons of mass destruction (WMD) and the means of delivering them against the U.S. and its allies.

Rationale: Our political and military strategic calculus is predicated on this assumption.

The U.S. cannot bear the burden of world leadership alone. American diplomacy, backed by its military might, will maintain dependable alliances with those who share our values. In concert with those alliances, it will work to favorably influence the outcome of the dynamic political, ethnic, social, economic, and religious forces that will shape the world of the 21st century. Above all, it will prevent the emergence of a countervailing power or group of powers that could threaten our vital national interests or those of our allies.

Rationale: The U.S. has but 6.2 percent of the world's land mass, and 4.7 percent of its population. The U.S. population is expected to continue its drop from 6.0 percent in 1950 to a projected 3.6 percent by 2025. More important, however, is the rapid modernization of former Third World countries to the point that they have not inconsiderable economic and military capabilities. For example, Iraq had more mechanized forces in 1991 than Germany and France combined in 1940. The U.S. felt compelled to operate within an alliance against Iraq. It achieved its objectives rather impressively, but at a cost exceeding \$100 billion—to defeat a single nation of 14 million people.

The U.S. will accept the political constraints imposed by operating within alliances to achieve international legitimacy for actions taken to achieve its political objectives.

The U.S. will engage only those adversaries against which it can project its military capabilities with reasonable assurance of quick and decisive victory.

The U.S. will be capable of, and not restricted from, identifying and adapting foreign technologies to domestic military use.

Rationale: An increasing proportion of technological innovations will be developed outside of the U.S. To presume that the U.S. will maintain an indefinite monopoly on human talent and ingenuity may not be realistic.

The Army will have real-time visibility of prioritized functional (e.g., logistics) requirements, down to the unit level, in terms of operational measures and standards of performance (MSOPs). It will have the capability to satisfy those requirements to the specified standards in consonance with dynamic changes in command priorities.

Rationale: To exploit information-age technology, and support the more robust capabilities of Force XXI, requires the ability to identify and respond to prioritized operational requirements, at each level of command, in real time.

The focus will shift from global to highly diverse, regional conflicts—for peacekeeping, humanitarian, or combat missions—which demands agile logistics support. Agility requires greater mobility, complete asset visibility, rapid response to requirements, and improved management information to assert necessary control over employment of logistics resources. The process that begins with the identification of a requirement or need, and ends when the customer accepts delivery, must be streamlined.

Ships and aircraft (both military and commercial) available to the DoD that are able to carry military equipment to both improved and unimproved locations will continue to be a constraint to deploying forces. Expanded intermodal transportation, including containerization, will somewhat compensate for this constraint. For airlift, there will be an increased reliance on commercial assets to augment military strategic airlift capability in the future. As transportation, rather than storage, becomes the prime contributor to

the DoD's ability to deliver material on time, the importance of managing information about in-transit assets and the status of movements becomes paramount.

Logistics information will become a principal commodity of the logistics system. As resources decline, the demand for assured communications will increase. At the same time, both information and supporting facilities will become a more lucrative target as the information explosion accelerates, systems become increasingly integrated, and processes become more automated.

Industrial base implications of the future logistics environment.

- A. There will continue to be an overall reduction in defense logistics-related work, diminishing sources of manufacture, potential loss of domestic sources of supply or transfer to offshore sources, and a decrease in the capability to surge. The economic and political ingredients of defense will need to be increasingly integrated with logistics planning.*
- B. Many of the weapon systems in the DoD inventory today will remain in use well into the next century. Modernization of older systems will require the DoD to support a broader range of old and new technologies.*
- C. Weapon system complexity will increase to meet military threats. Continued improvements in reliability and maintainability will provide opportunities and challenges to change traditional logistics support concepts.*
- D. Just as defense planning in the post-Cold War era has become more coalition-oriented, the United States will need to continue to support its systems in foreign inventories. At the same time, economic interdependencies will insert more technologies developed outside the United States, and DoD will rely more on offshore sources for equipment, supplies, and support. Host nation support agreements, joint ventures, and co-production will increase.*
- E. Although petroleum is projected to remain the major source of mobility energy, economic and environmental considerations will require increasing commitments to alternative, clean fuels. At the same time, new air/spacecraft designs are likely to require more exotic energy sources that have no present industrial resource base.*
- F. The decrease in force structure, coupled with the trend toward smart munitions, will decrease the demand for some sources of conventional ammunition. The infusion of new technologies which do not consume munitions during employment (such as directed energy weapons) will add to this impact.*

APPENDIX B

Instructions to Army Respondents

To solicit the responses of the Army planning community, the assumptions were sent out under the signature of LTG Paul Blackwell, DCSOPS. The exact instructions and information are reproduced in this appendix. The list of assumptions that was sent out was marked as described in the information section.

FORCE XXI ASSUMPTIONS BASED PLANNING ANALYSIS

Information and Instructions

INSTRUCTIONS:

This document should be staffed to your long-range and strategic planners, and those involved with Force XXI planning and development. All involved in Force XXI should have the opportunity to provide input for your response.

The purpose of the action is to provide answers to the following questions:

1. Have the "decisions pending," (DP), been correctly identified? If not, what is a better way of stating the decisions yet to be made?
2. Are the implicit assumptions, (I), at the end of the assumptions section correct? If not, how would you state them?
3. Are the implicit assumptions that are attached to Army actions correct? If not, what improvements would you suggest?
4. Can you identify explicit or implicit assumptions to attach to the dozen or so Army actions that are still unlinked? Unlinked actions have no * in front of the action number, they are: ACT 32, 40, 43, etc.
5. Can you identify further decisions pending for those assumptions for which only skeletal responses have been identified?
6. Which of these assumptions is most critical to the success of the Force XXI concept? That is, which assumptions, if they failed, would require significant changes in the Force XXI concept? Why?
7. Which of these assumptions is most vulnerable to failure in the next 10-15 years? Why?

There is no format to your answers. Respond to the questions using your assessment of the future security environment and Force XXI. There are no limits on your response other than that they should be the result of your analysis of each question and the relevant assumptions. You may call RAND and Dr. Jim Dewar at (310) 393-0411, ext. 7554 for any clarification.

INFORMATION:

This document contains RAND's work to date on the assumptions that underlie Force XXI. It is intended to be a "strawman" starting point for discussions both about Force XXI and about the future. At this point it contains more than the assumptions because of the manner in which they were collected from three documents: *TRADOC PAM 525-5*, *Army Focus 94: Force XXI*, and the *LAM Force XXI* document from 15 January 1995. As with typical strategic plans, each document contains both information (assumptions) about what the world (i.e., the part that the Army doesn't control) will be like and information about what the Army will be like.¹

A good, well-rationalized plan of this type will have several attributes:

- **Responsiveness and traceability:** for every assumption worth mentioning about the world, there should be a responsive (Army) action; and every (Army) action mentioned should be traceable to an assumption about the world. This is the "rationalized" part of the plan in that the Army's actions are in response to assumed characteristics of the future world.
- **Parsimony:** there shouldn't be any "leftovers" or extraneous assumptions or (Army) actions. That is, information about the state of the world which does not imply any response on the part of the Army is extraneous, as are actions that are not traceable to any assumptions about the world.
- **Logical consistency:** the assumptions about the world and the projected (Army) actions shouldn't contain any logical inconsistencies.
- **Completeness:** the assumptions should contain everything about the world that is important to the organization and its projected actions should be similarly complete.

Every plan also has a structure. The typical military structure (including that of 525-5) lumps all (or most) of the assumptions about the world into one or two sections and all of the Army actions into a separate section (or sections). This structure is well-suited to checking the logical consistency and completeness of the plan, but ill-suited to checking the responsiveness/traceability and parsimony. The latter is of particular interest to us for two reasons: 1) Assumptions for which the Army doesn't have an explicit response are indicative of "decisions pending" or actions that haven't been spelled out yet, and 2) Army actions unrelated to an explicit assumption about the world are indicative of implicit or unstated assumptions.

¹More exactly, there is a continuum of what an organization can control—from "not at all" to "completely." What I am suggesting here is to break that continuum at some point and arbitrarily talk about the "outside," uncontrollable world and the controllable world of the organization.

Putting the document into a form that makes it easier to check responsiveness/traceability requires "disassembling" the current document into assumptions and responses and then making the connections between the two. This document is the result of that disassembling and reassembling process.

The specific approach we used stemmed from the Army tendency to present information about both the world and Army actions in sentences containing the word **will**. That is, each document talks both about what the future **will** be like and what the Army **will** be like in that world. Remaining information about both can be picked up in the few sentences that contain words such as **can**, **may**, and (for Army actions) **therefore**, **accordingly**, and **must**.²

So this document contains not only the assumptions underlying Force XXI, but also what the Army will do about those assumptions. It is divided into two parts: the first concentrates on the assumptions, or "what the world will be like." To the extent possible, like assumptions have been grouped together. Other than that, no attempt has been made to categorize the assumptions—they appear in the order they appeared in the three documents. Indented under each assumption is what we can find in the documents about what the Army will do explicitly about that assumption. The primary ground rule here is that both the assumption and the Army's associated action are taken directly from one of the three documents. The numbers in parentheses give the pages from which the material was taken. For example, (4-5) refers to section 4, page 5 of PAM 525-5, (F-25) refers to page 25 of Focus 94, and (FX-14) refers to page 14 of the LAM Force XXI document.

In the first section, then, those assumptions marked with a "+" are backed up by one or more explicit references in one of the three documents to what the Army will do about that assumption (as documented by the references that follow it). The collection of assumptions marked with a "+" form an explicit, rationalized plan of the form "the world **will** be like this, therefore the Army **will** do this."

Several assumptions are not marked with a "+" because we have no explicit reference to Army actions in response to them. They are interesting if they are not mere oversights on our part or extraneous assumptions because they represent assumptions about the world that the Army has not planned for. There are two types of such assumptions. In addition to reading the three documents, we have talked with several of the people responsible for the concept of Force XXI including the office at TRADOC currently responsible for it and its original primary author. Where they mentioned specific actions in response to a given assumption we added that response and marked it as "**unstated**" or "**UNS**." These represent assumptions for which the Force XXI concept does have a specific response, but one that couldn't be found explicitly in the documentation.

²In PAM 525-5, for example, the word **will** appears over 470 times, **can** and **may** occur about 45 times each, **must** appears 93 times, while **therefore** and **accordingly** appear five and two times, respectively. It is the **therefores** that this document is trying to supply.

The second category of assumptions not marked with a "+" are more interesting to us. These are "**decisions pending**" on the part of Army planners, and are labeled as "**DP**." In all cases, we were careful to have at least one Army expert agree that these were decisions pending. (Note: empty parentheses are used as internal indicators of source for these not-for-attribution comments.)

Even those assumptions for which there are responses can be questioned as to *how* responsive they are. For example, responses that are very general are not as responsive as those that describe specific changes the Army will make or that give detailed plans for handling an assumption. Weak responses may also reveal decisions pending, and are designated with a "w" after the "+."

Finally, it is possible while reading these Force XXI documents to discern some more general, implicit assumptions. We both tried to identify such assumptions and asked the experts we interviewed if there were any that came to their minds. There are seven such implicit assumptions at the end of the assumptions section in reverse video (white on black background).

The second part of this document concentrates on Army actions—those actions the Army will take as part of Force XXI. Those actions marked with a "*" can be (and have been) related to one or more specific assumptions in the first part. That is, they represent actions the Army will take in response to some explicitly stated aspect of the future. As above, those that are unmarked, (again if not oversights or extraneous) are interesting because they represent potential implicit assumptions about the future. That is, there are undoubtedly good reasons for the Army to plan to take a given action. It is desirable to try to state the reasons explicitly so they can be examined. Some of these implicit assumptions can become vulnerable in the future. Our attempts at explicitly stating implicit assumptions are shown preceded by "(I)."

APPENDIX C

Glossary of Terms

ABCS	Army Battle Command System
AI	Artificial Intelligence
AID	Agency for International Development
ARNG	Army National Guard
ARPA	Advanced Research Projects Agency
ARSTAF	Army Staff
ASLP	Army Strategic Logistics Plan
AWE	Advanced Warfighting Experiment
BOIP	Basis of Issue Plan
BCS	Battle Command System
BASOPS	Base Operations
CA	Combat Arms
CAA	Concepts Analysis Agency
CONOPS	Contingency Operations
CONUS	Continental United States
CP	Command Post
CS	Combat Support
CSS	Combat Service Support
C2	Command and Control
C2W	Command and Control Warfare
C4I	Command, Control, Communications, Computers and Intelligence
DFE	Division Force Equivalent
DIS	Distributed Interactive Simulation
DISE	Deployable Intelligence Support Element
DoD	Department of Defense
DP	Decision Pending
DPRK	Democratic People's Republic of Korea
DTLOMS	Doctrine, Training, Leadership, Organization, Materiel, and Soldiers
EAC	Echelons Above Corps
EAD	Echelons Above Division
EEFI	Essential Elements of Friendly Information

FAO	Foreign Area Officer
FEMA	Federal Emergency Management Agency
FSU	Former Soviet Union
GPS	Global Positioning System
HN	Host Nation
HNS	Host Nation Support
HQ	Headquarters
IFF	Identification Friend or Foe
IFFN	Identification Friend, Foe or Neutral
IFV	Infantry Fighting Vehicle
IGO	International Governmental Organization
ISB	Intelligence Support Base
JCS	Joint Chiefs of Staff
LAM	Louisiana Maneuvers
LIC	Low Intensity Conflict
LOGPAC	Logistics Civil Augmentation Program
MACOM	Major Command
METT-T	Mission, Enemy, Troops, Terrain and Time Available
MOOTW	Military Operations Other Than War
MOS	Military Occupational Specialty
MP	Military Police
MRC	Major Regional Contingency
MSOP	Measures and Standards of Performance
M1A2	Heavy Armor Variant of Abrams tank
NATO	North Atlantic Treaty Organization
NCA	National Command Authority
NGO	Non-Government Organization
NMS	National Military Strategy
OOTW	Operations Other Than War
OPTEMPO	Operational Tempo
PAM	Pamphlet
POMCUS	Prepositioned Overseas Materiel Configured in Unit Sets
PSYOP	Psychological Operations
PVO	Private Voluntary Organization
RC	Reserve Component
RMA	Revolution in Military Affairs

RPV	Remotely Piloted Vehicle
RVN	Republic of Viet Nam
R&D	Research and Development
SASO	Security and Stability Operations
SF	Special Forces
SOF	Special Operations Forces
SUSOPS	Sustainment Operations
SWA	Southwest Asia
TADSS	Training Aids, Devices, Simulators and Simulations
TDA	Table of Distribution and Allowances (the non-tactical Army)
TES	Tactical Engagement Simulation
TMDE	Test, Measurement, and Diagnostic Equipment
TOC	Tactical Operations Center
TOE	Table of Organization and Equipment (tactical units)
TRADOC	Training and Doctrine Command
TTP	Tactics, Techniques and Procedures
UAV	Unmanned Aerial Vehicles
UGV	Unmanned Ground Vehicles
UN	United Nations
UNS	Unstated
USAR	U.S. Army Reserve
WMD	Weapons of Mass Destruction