Chapter One

INTRODUCTION

BACKGROUND

The U.S. Army has begun transforming itself to meet the needs of the new millennium. This transformation vision, as defined by both the Chief of Staff and Secretary of the Army, will ultimately lead to a more responsive Army capable of full-spectrum operations. As a starting point for realizing this vision, the Army is configuring a new kind of mechanized force, one that is highly mobile and capable of being air-deployed around the globe in a matter of days.¹ This new type of force—a “medium” or “medium weight” force—will incorporate attributes from both light and heavy forces, bridging the gap between current capabilities and those needed for tomorrow’s battles by incorporating some of the strategic responsiveness of light forces while providing some of the protection and tactical mobility associated with heavy forces.²

As the Army begins its transformation into medium-weight forces, it will do so in two integrated steps. The first step involves crafting a medium-weight force from technology that is currently available, resulting in an Interim Force, with the first unit equipped (FUE) as early as fiscal year 2003; the second step will involve creating a new

¹The goal is 96 hours for the first brigade to deploy and 120 hours for the first division to deploy.

²The more formal reference to such medium-weight forces is, for the near term, the Interim Force and, for the longer term, the Objective Force. These forces are envisioned to be structured into brigade-sized units called interim brigade combat teams (IBCT) and brigade combat teams (BCT), respectively.
medium-weight force from advanced technologies and a yet-to-be-determined chassis, resulting in the Objective Force with an FUE as early as fiscal year 2012.

The cornerstone for the Objective Force is the Future Combat Systems (FCS). The FCS is envisioned to be a network-centric force that will integrate a range of technologies likely to be centered around a family of vehicles. The major difference between the FCS family of vehicles and the current inventory of heavy combat vehicles will be in how they fight. Physically, these vehicles will weigh less than 20 tons—a considerable weight reduction compared to the M1 Abrams tank, which weighs 70 tons, the M2A3 version of the Bradley Fighting Vehicle, which weighs 33 tons, and the planned self-propelled howitzer, the Crusader, which may weigh somewhere around 40 tons. As a result of this dramatic reduction in weight, the force may have to rely more on surprise, dispersion, and standoff with massed effects to achieve its goals.

Understanding the capabilities and challenges of the FCS concept is critical for the Army. To help achieve this understanding, the 2000 Army Science Board (ASB) was tasked to examine “Technical and Tactical Opportunities for Revolutionary Advances in Rapidly Deployable Joint Ground Forces in the 2015–2020 Era.”

OBJECTIVE

This report summarizes the findings from a quick-response analytic support effort performed at RAND in coordination with the ASB effort. The principal objective of the research was to help the ASB assess the many technologies, tactics, and operational concepts being considered for the transformation. More specifically, by interacting

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3The Light Armored Vehicle (LAV) III produced by GM Canada has been selected as the chassis for the Interim Force.
4Using a common chassis across the variety of vehicles will provide economy of scale effects in research, development, and acquisition; peacetime operations and maintenance; and battlefield logistics.
5The self-propelled howitzer and the resupply vehicle of Crusader were each intended to weigh 55 tons, but this has since been reduced to 40–45 tons. See J. Matsumura, R. Steeb, and J. Gordon, Assessment of Crusader, Santa Monica, CA: RAND, MR-930-A, 1998, for more information on the issue of weight.
with members of the ASB Operations panel, four key research questions were identified:

1. How much remote “situational understanding” is achievable in the 2015–2020 time frame?
2. What can be accomplished using a full range of joint assets without close combat (manned)?
3. Does adding ground maneuver, possibly close combat, with the brigade combat team (BCT) offer advantages?
4. What are the implications of enhanced air insertion of the BCT, such as by vertical envelopment?

The first question examined the level of intelligence or “situational understanding” available without using ground organic assets. In effect, it examined whether the commander would be able to deduce enough information about enemy force composition, location, tactics, and intent through the use of overhead assets, such as satellites and manned and unmanned aircraft.

The second question looked at the option of standoff fires, without commitment of ground forces. Among the systems available in this time frame are air, ground, and naval precision weapons. Unmanned ground sensors, advanced fire support systems, and other robotic elements were also considered for this option.

The third question considered the synergistic use of maneuvering ground forces and standoff fires. The ground force is assumed to be organized in the combined arms form of a BCT (associated with the Objective Force rather than the Interim Force), with tactics, techniques, and procedures (TTPs) of non-line-of-sight (NLOS) engagement and close combat.

The fourth question explored one of the more aggressive uses for the BCT—deep air insertion and maneuver against the enemy’s flanks and rear areas. This examines issues of survivability of the airlifters, advantages in time and position afforded by rapid maneuver, and special synergies between air and ground elements in the operation.

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6 The original terms of reference for the ASB effort divided the work into four panels: Operations, Intelligence, Sustainment, and Training.
This work is preliminary, but it was envisioned from the outset to provide quantitative insights on the potential benefits and risks of the various options being considered for future rapid-reaction forces.

**APPROACH**

In answering the four research questions, we followed a multistep process, described below.

**Select Concepts and Technologies to Be Assessed**

We started by coordinating with the ASB on selecting concepts and technologies to be assessed. There are many concepts and technologies the ASB is considering for future U.S. rapid-reaction forces, ranging from advanced sensors to new command and control (C2) systems to manned and robotic weapons platforms. Many of these are also being considered for the FCS program.

**Modify an Existing Scenario**

We then modified an existing scenario for a small-scale contingency (SSC) in close, foliated terrain, to reflect 2015–2020 threat capabilities. The emphasis on an SSC was intended to complement the TRADOC Analysis Center (TRAC) analysis of a Southwest Asia major theater war (MTW) in open terrain.

In this case, we revisited a Kosovo scenario based on the 1999 Kosovo conflict, which was used in research conducted for the Center for Land Warfare and the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)). These projects examined near-term (IBCT) and far-term (FCS) options for rapid-reaction forces, and the scenario—now modified—provided a suitable framework for examining the issues facing the ASB. The modified SSC scenario used Kosovo terrain and a modified Serbian order of battle (systems upgraded to reflect the 2015–2020 time frame).7

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7 While the terrain, road network, towns, and degree of foliation are specific to Kosovo, the scenario is also intended to be representative of SSCs that might occur in many different parts of the world.
The mission of the rapid-reaction force is to neutralize four in-place enemy battle groups (BGs) in a 40×40-kilometer region and block any follow-on forces from joining up with them. The situation is much more stressful than clean engagements in open terrain. The Serb BGs are in place and dispersed throughout the region, they use foliage and cover to maximum advantage, and they are able to hide among noncombatants. The Blue force cannot simply ignore or bypass the enemy positions, but must quickly stabilize the situation to halt ethnic cleansing, control key areas, and set the conditions for a follow-on attack (if needed).

Figure 1.1 shows a JANUS screen simulation of Serb strength early in the conflict.\(^8\) (In this case, we are showing a notional situation 6–8 days after the initiation of hostilities in Kosovo.\(^9\))

We assumed the four BGs were dug in with defensive positions (shown by red circles in the left screen image). Seven more supporting battle groups would attempt to join them (shown as red arrows moving along multiple avenues of approach), once they became aware that the mountain passes were being secured by Blue forces. Many of the dug-in systems are located in the tree lines and are stationary, with minimal signature. The other seven BGs in the north are moving but are often under cover.

The Serb force is assumed to be an improved version from what they actually had in 1999, as reflected in the Table of Organization and Equipment (TOE) shown in Figure 1.2.

Each BG is a combined arms unit on the order of a reinforced company. There are roughly eight tanks and twelve armored personnel carriers (APCs) per battle group. The tanks, a mix of T-72s and T-80s,

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8JANUS is a high-resolution force-on-force ground combat simulation developed by the U.S. Army and modified at RAND for analysis.

9The representation of this 2020 Serb force differs somewhat from the situation in 1999. In 1999, for example, Serb regular and paramilitary forces were rather evenly distributed throughout the province to fight the KLA and conduct ethnic cleansing. Small groups of enemy (platoons and companies) were operating in all areas of Kosovo. The enemy array used for this scenario assumes that to the rear of the four forward battle groups defending the passes, there are few enemy forces. The reinforcing battle groups shown as arrows are held off the map until U.S. forces start to arrive in our simulation.
are equipped with forward-looking infrared (FLIRs) and AT-8 missiles with a 5-kilometer range. BTR-60 APCs have FLIRs and AT-6 missiles.

**Determine How to Integrate Future Concepts and Technologies into Simulation and Run the Simulation**

Figure 1.3 shows the constituent models of the simulation environment. The models are linked together using the Seamless Model Interface (SEMINT), a form of locally distributed network. The individual models center on the force-on-force JANUS wargaming simulation and comprise a wide range of capabilities. JANUS itself has been modified for analysis from its original form, by increasing the
Each platoon has:
- Four trucks or APCs
- One ATGM
- Three squads (each with one MG and one RPG)

- 4 x T-80 or T-72+
- Some Battle Groups have two tank platoons
- 3 x D-30 122mm howitzers and 10 trucks
- One truck or APC with Engr Squad (mines, flame throwers)
- 2 x 23 or 37mm towed AA guns
- 2 x SA-14
- 3 x 82 or 120mm mortars, six trucks

Plus: 10–15 trucks for C2 and supply

Figure 1.2—TOE for Serbian BG

size and scope of engagements, adding automated operations, and allowing special digital terrain representations.

The other models surrounding JANUS are primarily for modeling advanced systems. RAND Jamming and Radar Model (RJARS) dynamically simulates infrared (IR) and radio frequency (RF) air defense engagements against helicopters, unmanned aerial vehicle (UAVs), and fixed-wing aircraft. Model to Assess Damage to Armor with Muniitions (MADAM) models the flyout, encounter, detection, and endgame with smart and brilliant munitions. The combination of the RAND Target Acquisition Model (RTAM) and the Cartographic Analysis and Geographic Information System (CAGIS) enables us to represent detailed target detection/acquisition phenomenology as needed, including low-observable vehicles. The Acoustic Sensor Program (ASP) models acoustic sensor phenomenology. And the Active Protection System (APS) simulates the effectiveness of vehicle protection systems against a variety of incoming weapons. Preliminary communications and C2 models represent the connectivity and
in some cases the delays in decisionmaking involved in the sensor-to-shooter links.

The terrain in the western portion of Kosovo was input to our simulation in a series of steps. The 80×80-kilometer region encompassing the pass and the enemy-occupied region (itself about 40×40 kilometers) were the focus of the work. Overlays in the model include Digital Terrain Elevation Data (DTED) Level II (30-meter spacing) terrain elevation data, foliage data, and feature data such as roads, bridges, and towns.

Some of the concepts and technologies were modeled explicitly, and some had to be represented by parametric effects modeling. Sets of excursions, refined over the course of several iterations, were used to examine each of several sets of options. The results are then used to provide insights on the four research questions postulated earlier.
The system is normally first used interactively by Red and Blue gamers, setting up movements, fire missions, coordination lines, etc. Once the dynamics are set, the model is run autonomously for many iterations to arrive at a statistically converging ensemble of runs for each excursion.

ORGANIZATION OF THIS DOCUMENT

The report is organized into five chapters, the next four of which correspond to the four research questions. The final chapter summarizes the research and highlights the key insights that came out of the work.