



## Rapid Equipping and the U.S. Army's Quick-Reaction Capability

*The [Rapid Equipping Force] has provided unprecedented capability to our Soldiers and Army units, a capability that has provided overmatch over our adversaries and saved Soldiers' lives.*

Brigadier General Brian P. Cummings,  
Commander, Program Executive Office (PEO) Soldier,  
at the REF Patch Ceremony, 31 January 2015<sup>1</sup>

### Introduction

Despite views to the contrary, U.S. combatant commanders and U.S. allies continue to request land forces to mitigate risk in their respective theaters. The joint and combined force currently faces an increasingly complex, ambiguous and rapidly changing operating environment. Threats are developing from diverse sources, such as nation-states, rogue states and non-state actors. These enemies—including transnational terrorist, insurgent and criminal organizations—use asymmetric tactics, enabled by increasingly accessible and affordable technologies, to present an unpredictable and sophisticated threat to U.S. vital interests.

The U.S. Army, as the backbone of the joint force, protects the U.S. homeland and is prepared to deter and defeat enemies around the world who challenge the United States and its allies. Army forces train to seize, retain and exploit the initiative on the battlefield—to present multiple dilemmas to the enemy and decisively defeat him on land.

The Army is working to develop agile, adaptive and innovative leaders and institutions to respond to the current threat environment. Acquiring the most advanced technology remains a critical component of maintaining overmatch against potential and actual enemies. The traditional Department of Defense (DoD) acquisition process strives to develop future capabilities by establishing programs of record (PORs) to meet these threats through requirement analysis, technology development and testing. The process procures, fields and integrates new technologies across the doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) prism and ensures the U.S. military remains the most technologically advanced force in the long term.



The nature of warfare, however, is unpredictable. Enemies change tactics and unexpected environmental challenges often arise. As the Army faced these challenges very early in its experiences in Afghanistan and Iraq, it became clear that quick-reaction capabilities were needed to complement the standard procurement system with faster and less expensive materiel solutions. As a result, the Rapid Equipping Force (REF) was established to quickly procure and deliver nonstandard, situation-specific solutions that mitigate urgent capability shortfalls. These solutions, often derived from commercial-off-the-shelf (COTS) and government-off-the-shelf (GOTS) technologies, are typically delivered in less than 180 days. In addition, the REF maintains a critical communications loop with the requirements, product producer and end-user communities that helps develop the next iteration of off-the-shelf technologies. Through quick-reaction capabilities, delivered by initiatives such as the REF, the Army is adhering to the fundamental tenets of adaptability, innovation and institutional agility contained in its Operating Concept.<sup>2</sup>

<sup>1</sup> <http://www.army.mil/article/142225>.

<sup>2</sup> Department of the Army (DA), *The U.S. Army Operating Concept: Win in a Complex World*, TRADOC Pamphlet 525-3-1, 31 October 2014, pp. 21, 43, <http://www.tradoc.army.mil/tpubs/pams/tp525-3-1.pdf>.

## Background

In 2002, early in the conflict in Afghanistan, Soldiers who were clearing caves with rudimentary technologies encountered booby traps and grenades. The Vice Chief of Staff of the Army (VCSA) chartered a team of Army leaders to work with the Defense Advanced Research Projects Agency (DARPA) and industry partners to find commercial-off-the-shelf, remotely-operated technology that could help reduce casualties by clearing caves and other enclosed spaces. In less than 30 days, the team—which became known as the Rapid Integration of Robot Systems (RIRS)—procured and subsequently deployed the PackBot, the MARCbot and the M7 Operator Control Unit to Afghanistan. The team and the product’s success made apparent the viability of quick-reaction capabilities for the war effort. The VCSA’s chartered team formed the basis of what eventually became the REF, which was officially founded under Headquarters, Department of the Army (HQDA) Operations and Plans (G-3/5/7) in late 2002.

The REF demonstrated the potential for quick-reaction capabilities to provide short-term answers while long-term solutions remained in development. For example, in 2003, the REF equipped units in Iraq with Armor Protection for Tactical Vehicles kits—without full DOTMLPF documentation<sup>3</sup>—to enhance protection for the soft-sided vehicles used in the early days of Operation Iraqi Freedom. The REF initially equipped 33 systems with the new kits and, after receiving end-user feedback, provided the kits to the broader Army. The kits served as an interim solution to improve security for units conducting mounted operations; broader development and fielding under the tradition acquisition system resulted in the Mine-Resistant Ambush Protected (MRAP) vehicle. While the kits were not a perfect solution, they allowed the Army to temporarily mitigate a critical capability gap and greatly enhance protection for its Soldiers. Projects such as this demonstrate the vital role of quick-reaction capabilities in the short term.

The REF has used innovative methods to further enhance the Army’s quick-reaction capabilities. In 2004, the REF stood up fixed laboratory workshops on large forward operating bases to enhance its capacity for rapidly fielding engineering solutions. In 2012, these workshops were containerized for increased mobility and became known as Expeditionary Labs (Ex Labs). Ex Labs are engineering and manufacturing hubs designed to be deployed and transported around theaters. Through versatile, state-of-the-art equipment such as 3-D printers, fabrication tools and Computer Numerical Control Machines, the Ex Labs have provided custom engineering for hundreds of projects that have directly aided Soldiers in the field. The REF currently owns three Ex Labs: one that was recently returned from Kandahar Airfield and is currently being refurbished; one at Bagram Airfield; and one

currently in Kuwait. On average, the Ex Lab in Afghanistan works on 10 to 12 projects per week while the Ex Lab in Kuwait works on five to eight per week.

The Ex Lab staffs, which include a small team of engineers from the U.S. Army Research, Development and Engineering Command’s (RDECOM’s) Edgewood Chemical and Biological Center, allow the REF to access reachback support from the Army’s development community. The REF is currently working to take advantage of common Army material-handling equipment (MHE) and rotary-wing aircraft to increase the mobility of the next generation of Ex Labs. Through Ex Labs, the REF uses innovative methods to streamline its solution identification and equipping process, enhancing the Army’s quick-reaction capabilities.

As the U.S. military has reengaged in Afghanistan and Iraq, the number of requirements sent from U.S. Army Central’s (ARCENT’s) area of responsibility (AOR) to the REF has increased from 186 in Fiscal Year (FY) 2013 to 487 in FY 2014. As of 18 August 2015, U.S. Central Command (CENTCOM) has sent 455 requirements to the REF and is on track to meet or exceed last year’s total. Since CENTCOM usually accounts for about 88 percent of total requirements sent to the REF, the past two years have seen a significant expansion in the REF’s overall activity. The majority of these requirements, which focus on the movement and maneuver and force protection warfighting functions, range from small kit items for Soldiers to complex surveillance systems. Many of the requirements represent capability shortfall trends that the REF has been addressing for years, but new challenges constantly emerge.

The REF, designated as an enduring Army capability in January 2014, will be realigned under U.S. Army Training and Doctrine Command (TRADOC) in October 2015. This transition will enable the REF to align trends in requirements and technology with TRADOC’s goal to build and integrate formations, capabilities and materiel across the Army. This alignment will help to further institutionalize the Army’s quick-reaction capabilities.

## The REF and Traditional Acquisitions

**Acquisition Authority.** In the traditional Army-wide acquisition process, a “wall” was erected between the Army’s “Big Three” acquisition functions—requirements development, acquisition and contracting—by the 1986 Goldwater-Nichols Act and the 1987 National Defense Authorization Act, often resulting in delays in procuring equipment. To ensure quick-reaction capabilities receive a top priority, the Army G-3/5/7 provided the REF with the authority to validate requirements while the Assistant Secretary of the Army for Acquisition, Logistics and Technology provided flexible acquisition authority that integrates these core functions under one entity. The Army afforded the REF these authorities

<sup>3</sup> This solution, however, was tested by the Army Test and Evaluation Command.

because it is focused on situation-specific challenges that do not necessarily effect change across the whole Army. This authority increases the institutional agility and collaboration with the end-user and the solution-provider communities, both of which are required for quick-reaction capabilities.

**Funding.** The REF obtains the resources to equip units globally with nonstandard technology solutions because it has secured funding from both the DoD base budget and Overseas Contingency Operations (OCO). This combination of funding sources allows the REF some of the flexibility necessary for predicting the equipment challenges Army forces will face in regions such as Africa, the Pacific and Europe. Without adequate DoD base funding, the REF cannot provide solutions outside of specific regions.

**Risk Acceptance.** The REF has the flexibility to absorb a level of risk greater than the traditional acquisition system can accept. PORs procured under the traditional system have comparatively higher costs, longer life spans and greater implications across the Army's DOTMLPF prism, which limits the opportunity to invest in untested technologies and make adjustments. On the other hand, the REF produces materiel solutions that are generally lower in cost and for limited use, allowing the flexibility to test technologies, incorporate stakeholder feedback and make adjustments more easily. By providing the freedom to incur a higher level of risk, the Army is ensuring the REF can undertake the investments and make the adjustments needed for quick-reaction capabilities.

**Partnerships.** Quick-reaction capabilities are a complementary component of the broader acquisition system. Initiatives such as the REF neither compete with nor usurp the role of the traditional acquisitions process. However, aspects of quick-reaction capability can have potential areas of applicability for Army-wide procurement. The REF's feedback loop—encompassing the end-user, DoD, product producer and academic communities—has helped to identify challenges in technological systems prior to manufacturing, resulting in the increased usability of the end product and cost avoidance. For example, the REF partnered with the Project Manager Soldier Sensors and Lasers (PM SSL) to identify and test an off-the-shelf interim solution for the Joint Effects Targeting System (JETS). During testing, the REF discovered significant performance issues in the JETS' celestial navigation system. The REF and the PM SSL conveyed these concerns to the celestial navigation system's original equipment manufacturer. Once these issues were addressed, the REF incorporated the improved systems into its off-the-shelf solution, which was then added to 34 systems.

In addition, the REF has provided interim solutions for a limited number of units that have been transitioned into permanent acquisition programs for the broader Army. For example, the REF provided individual Rapid Aerostat Initial Deployment (RAID) Towers with hybrid generators to



reduce fuel consumption and, therefore, the towers' sustainment burden. Due to the interim solution's success, the REF is working closely with PM Electro-Optical/Infrared (PM EO/IR) to modernize RAID Towers with hybrid power systems. Through partnerships and solutions such as the RAID Towers, quick-reaction capabilities are contributing significantly to broader Army modernization.

### Initiatives

**Tactical Aerostat.** The REF's tactical aerostat initiative began in 2011 as requirements for tactical intelligence, surveillance and reconnaissance (ISR) assets increased in Afghanistan. The REF canvassed industry to find a man-portable aerostat system that could be deployed quickly and identified a specific system that met the majority of requesting units' needs. As a result, the REF equipped Army units with four different tactical aerostat models.

As the Army reengaged in Afghanistan and Iraq, the REF continued to equip units on the ground with the aerostat system as a proven, off-the-shelf solution. Currently, there are eight tactical aerostat systems in Afghanistan and three in Iraq. In 2014, the aerostats were used to support security protocols during the Afghan elections and during base closures and transfers. In Iraq, however, the environment presented new challenges that made the system less effective than those operating in Afghanistan, especially during the summer months. The REF is currently researching methods to reequip the units in Iraq with hardened aerostat systems to ensure that they meet the environmental challenges in that theater.

**Subterranean Operations.** Despite the Army's many years of experience in Iraq, the environmental impact on the aerostats was an unexpected challenge. To mitigate such challenges, the REF is directing resources to address the general problem of predicting environmental challenges on equipment before full-scale operations commence. Specifically, the REF partnered with several Army organizations—among them the Asymmetric Warfare Group (AWG), the Maneuver Center of Excellence, the Army Test and Evaluation Command and the 2d Infantry Division in



South Korea—to focus on the environmental impact of subterranean operations and explored technologies that improved non-line-of-sight communications, reconnaissance, visibility, protection, life support, situational awareness, mobility and personnel tracking. These technologies have the potential to mitigate this capability gap for deployed and forward-stationed Army units in other locations around the world.

After incorporating feedback from Soldiers in the 2d Infantry Division in Korea, the REF has drawn up plans to equip the unit with company-sized solution sets for use in training. These solution sets will include 50 mobile ad hoc networking radios to be delivered in November 2015; four robotic systems with chemical and biological detection capabilities, also to be delivered in November 2015; and an Armament Research, Development and Engineering Center (ARDEC) system for real-time mapping and blue-force tracking in a Global Positioning System (GPS)-denied environment to be delivered in January 2016. Through subterranean solutions, the Army demonstrated the proactive and predictive potential of its rapid equipping capabilities.

**Regionally Aligned Force (RAF) Equipping.** In areas around the world where Army forces have a minimal or temporary presence, the REF is working with deployed units that conduct bilateral or multinational training events with the forces of U.S. allies. The REF recently worked with a RAF unit prior to its training deployment to the Horn of Africa (HOA) to assess its capabilities and identify challenges it may face in the field. When the RAF unit faced a potential power shortfall, the REF provided two kilowatt generators and training for their use within two weeks. The unit was also equipped with commercial water-purification tools and small force protection systems. Upon the RAF unit's return in the fall of 2015, the REF will meet with the unit to analyze how the solutions operated in the deployed environment and what unexpected materiel challenges arose. This will increase the REF's capacity to equip future units deploying to HOA or similar environments. By providing solutions for RAF units, the Army is demonstrating its capacity to provide quick-reaction capabilities to forces anywhere in the world.

**Patriot Radar Cooling System.** In July 2014, the REF responded to a request by Army leadership to determine what technologies could mitigate the effects of harsh desert conditions on the Patriot Radar system. These conditions included temperatures of up to 130° Fahrenheit and the pervasiveness of sand. After conducting an assessment of the viability of an initial solution, the REF began working directly with industry to integrate off-the-shelf solutions for the Patriot Radar system. As a result, three proof-of-concept

Patriot Cooling Systems and diagnostic systems to measure their effects will be installed during the fall of 2015. This solution could result in lower maintenance costs and increased operational readiness. The REF will continue to work with the units on the ground to gather operational feedback and determine a way forward for the project.

## The Way Ahead

The Army will continue to face an increasingly diverse and unpredictable set of threats—such as nation-state and non-state actors—across the global operating environment. As a result, the REF will likely receive increasing requirements from areas outside ARCENT's AOR, such as Eastern Europe, the Pacific and Africa. The REF is proactively working to anticipate these requirements to reduce its reaction time for these theaters.

In addition, the REF is connecting with the Army service component commands, Army divisions focused on the RAF assignment areas, RDECOM and TRADOC elements located around the world to understand which emerging technologies can address capability gaps and mitigate the effects of new operating environments. Once solutions are developed, the REF plans to equip units with kits for training prior to deployment—similar to the effort to mitigate the effects of the subterranean environment.

As Army units deploy to new areas around the world, the REF anticipates an increase in requests for technologies that help units understand their surroundings and operating environment. This will likely result in an increase in requirements for electronic warfare technologies, signals intelligence systems and social media analysis tools.

The REF is also exploring technologies with multiple federal agencies inside and outside DoD to counter unmanned aerial systems (UAS) and promote tethered, squad-level intelligence, surveillance and reconnaissance capabilities. In the fall of 2015, the REF is conducting demonstrations of current off-the-shelf technologies to counter UAS.

The current fiscal environment, however, threatens to deprive the Army of the resources it needs to provide its Soldiers with technological solutions. Years of continuing resolutions have hampered long-term fiscal planning and the law of sequestration forces DoD to make unrealistic tradeoffs between end-strength, readiness and modernization. Throughout the past 14 years of war, the REF has proven itself equal to the task of equipping U.S. Soldiers wherever it has been called upon. With timely and predictable funding in the base budget, the REF will continue to provide the quick-reaction capabilities the Army needs to win in a complex world.