The Future Engineer Force

Projecting the Capabilities of the Regiment

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Our Army is at war. Since Operation Enduring Freedom and Operation Iraqi Freedom began, more than 444 soldiers have been killed in action and more than 2,252 severely wounded. The largest rotation of Army forces in history is taking place, and nine of its ten active divisions—all but the 2d Infantry Division, which is already committed to Korea—will have seen action in Afghanistan or Iraq. We have activated the largest number of U.S. Army Reserve (USAR) and Army National Guard (ARNG) soldiers since the Korean War.

Some may say this operational state, that of war, is the exception rather than the norm. As stated by some of our nation's most experienced leaders, peace will be the exception in the future. Americans face a "new reality"—one that is significantly different from that of the Cold War. A conflict of irreconcilable ideas exists. Adaptive adversaries seek our demise by any means. Our own forces can't focus solely on future overseas contingencies but also must defend bases and facilities at home and abroad. Above all, because at least some current adversaries consider "peaceful coexistence" with the United States unacceptable, we have a foreseeable future of extensive conflict in which real peace will be the anomaly.

Today's Army is not designed for such a strategy; consequently, swift change is essential to survival in our new reality. As the Chief of Staff of the Army, General Peter J. Schoomaker, pointedly states, "We're going to have to [change] some of the things that made us the best Army in the world. Our values are sacrosanct. But everything else is on the table."[1]

Accordingly, the Engineer Regiment must change—NOW. The fact that we provide a unique set of core competencies that critically enable the combatant commander and the joint team with the mobility they need to provide a position of advantage at the tactical through strategic levels will not change. However, we must reexamine and challenge our most fundamental institutional assumptions, paradigms, and procedures to better serve our nation. We must be a campaign-quality, modular force with a joint and expeditionary mindset in order to adapt to unforeseen circumstances that will occur in the future. We'll retain the best of our current capabilities and attributes and develop others that will increase relevance and readiness to respond in the current and projected new reality.

Joint and Expeditionary Transformation Framework

One of the most essential pieces of transformation is "viewing all change processes through the lens of a joint and expeditionary mindset."[2] The Army's transformation efforts irrefutably must support operations in a joint environment, with an underlying interdependence among all services down to the tactical level to maximize complementary effects. Additionally, the uncertainty as to where we deploy, the probability of a very austere operational environment, and the requirement to fight on arrival throughout the battlespace pose an entirely different requirement—the fundamental distinction of expeditionary operations. The Army's new framework of how we organize *echelons of command*, *maneuver units of action* (UAs) and *support units of action* (SUAs) clearly support such operations and provide the joint force commander the right capabilities at the right place and the right time.

The nature of modern operations requires that our echelons of command become more flexible than our current divisions and corps. Hence, the Army is changing its command structure from three echelons of command (divisions, corps, and armies) to two—*units of employment-tactical* (UEx) and *units of employment-operational* (UEy). Both echelons will be modular entities designed to employ a tailored mix of forces. The particular organization of Army forces will be based on the requirements of the joint force commander and the conditions in the theater. These commands will orchestrate tactical engagements into battles, major land operations, and even campaigns when designated as a joint task force.

Maneuver UAs made up of battalion-sized and company-sized subunits will be the principal means of conducting tactical engagements. The principal tactical unit of the modular Army—the combined arms maneuver brigade—will consist of three standard types. The first two types will replace task-organized formations inside today's divisions.

- Heavy (armored) UA
- Light (infantry) UA
- Medium Stryker brigade

These maneuver UAs will be approximately the size of today's task-organized brigades and will include battalion-sized combined arms maneuver, fires, intelligence and reconnaissance, and logistics subunits. In contrast to current divisional brigades, the modular force maneuver UAs will be fixed-base (table of organization and equipment [TOE]) units.

Along with the maneuver UAs that will operate under the command and control (C2) of a UEx will be five brigade-sized SUAs that will provide modular, scalable, and tailorable effects to the maneuver UAs or operate independently given missions from the UEx:

- Fires
- Reconnaissance, surveillance, and target acquisition (RSTA)
- Aviation
- Sustainment
- Maneuver enhancement (ME)

The ME brigade deserves critical attention because it is the conduit for engineer effects that support the UEx above those embedded in the maneuver brigades. The ME brigade is designed as a shell headquarters to organize and control forces within the area of operations assigned to the UEx but outside of the areas assigned to the maneuver UAs. This SUA has the secondary mission of controlling combat and combat support assets not committed to the fires, RSTA, aviation, and sustainment SUAs. Typically, the ME brigade will include a mix of engineer, chemical, civil affairs, and military police personnel. It also may control air and missile defense units when assigned to the UEx. Depending on the scope of the operation, more than one ME brigade may be assigned to the UEx. Figure 1 shows the Army's expeditionary modular force model.

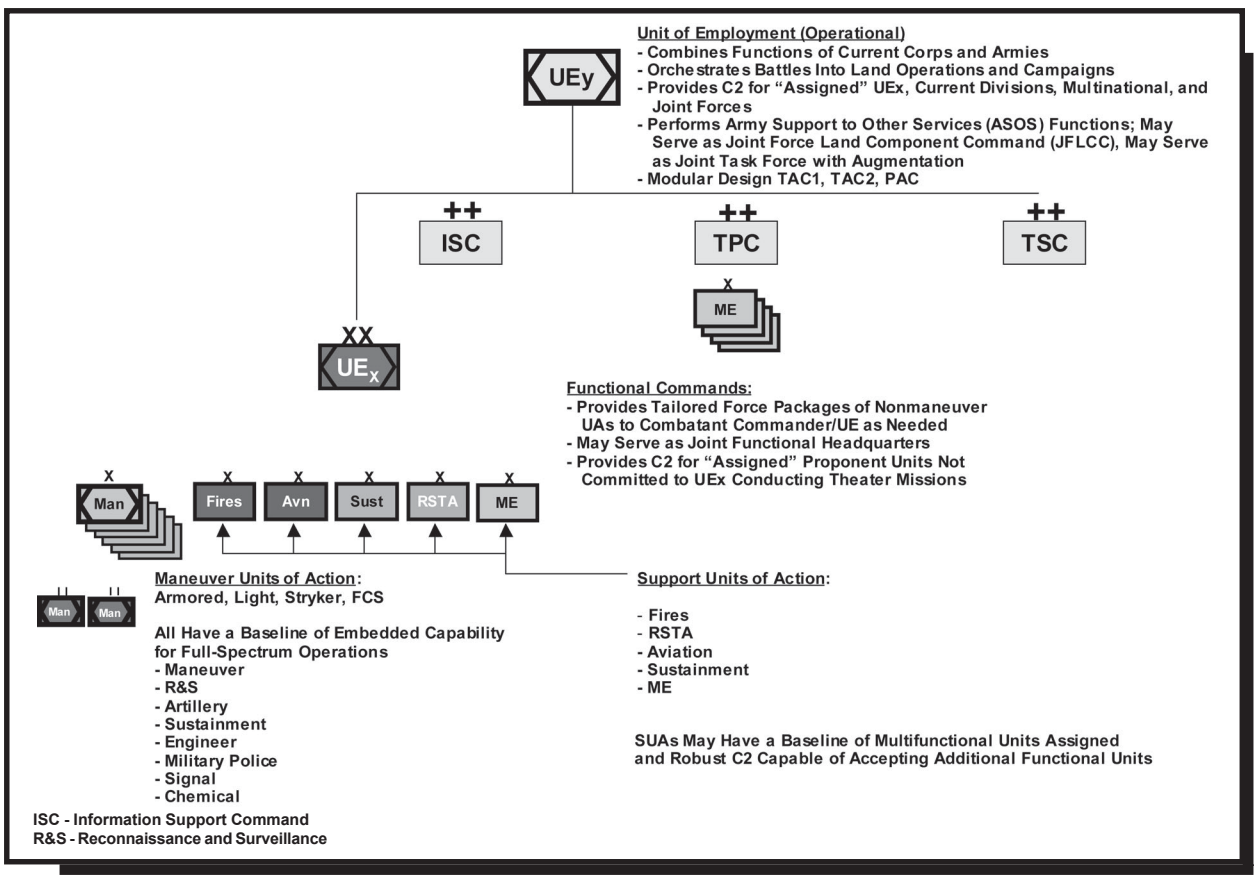

Figure 1. The Army's Expeditionary Modular Force Model

Transforming the Engineer Regiment

The framework of the future Army is the model for the Engineer Regiment's transformation efforts. The first installment of the Engineer Model clearly depicts a joint and expeditionary flavor and defines what engineers must bring to the fight and how. It is the starting point for partnering on organizational solutions, equipment, doctrine, standards, and training strategies. It also becomes the reference point for the discussion we must have on joint interdependencies—a practice we must embrace if we are to optimize our support to the joint force commander. This means taking a hard look at divesting ourselves of certain "traditional" Army engineer capabilities.

The Future Engineer Force facilitates the joint fight by supporting the five *joint functional concepts*:

- Battlespace awareness.
- Force application.
- Protection.
- Focused logistics.
- C2.

These concepts provide an overarching description of how the future joint force will operate across the *full spectrum of operations* (support, stability, defense, and offense). To enable the joint functional concepts, the joint engineer force must provide unique engineer capabilities to the joint force commander. These are referred to as *joint engineer capability elements*. Figure 2 shows the relationship of the joint engineer capability elements to the joint functional concepts via the universal joint task list (UJTL) tactical and operational tasks, depicting how engineers have adopted the joint concept.

Equipment and organizations must be common for all engineer forces as much as possible. This allows interoperability and cooperative engineer engagements. It also enables efficient equipment acquisition and fielding and a significant reduction in logistics footprints for the entire joint engineer force. Common equipment is more sustainable, easier to manage from a joint force perspective, and easier to train for the entire joint engineer force. For example, if a bridge unit in the Marine Corps has the same modular design as that in the Army, and undergoes the same training as its brethren in the National Guard, the joint force commander has increased flexibility tenfold.

To ensure a complementary and interoperable mix across all components and services, we must engage the Joint Capabilities Integration and Development System process through the Joint Operational Engineer Board. This will ensure that we utilize a top-down approach, achieving interoperability while influencing the overall organization of joint engineer forces.

A critical characteristic of future operations—one that came early in our recent operations—is the requirement for the force to be able to execute across the full spectrum of operations simultaneously. In the past, our force design and time-phased force and deployment data (TPFDD) was based on a linear

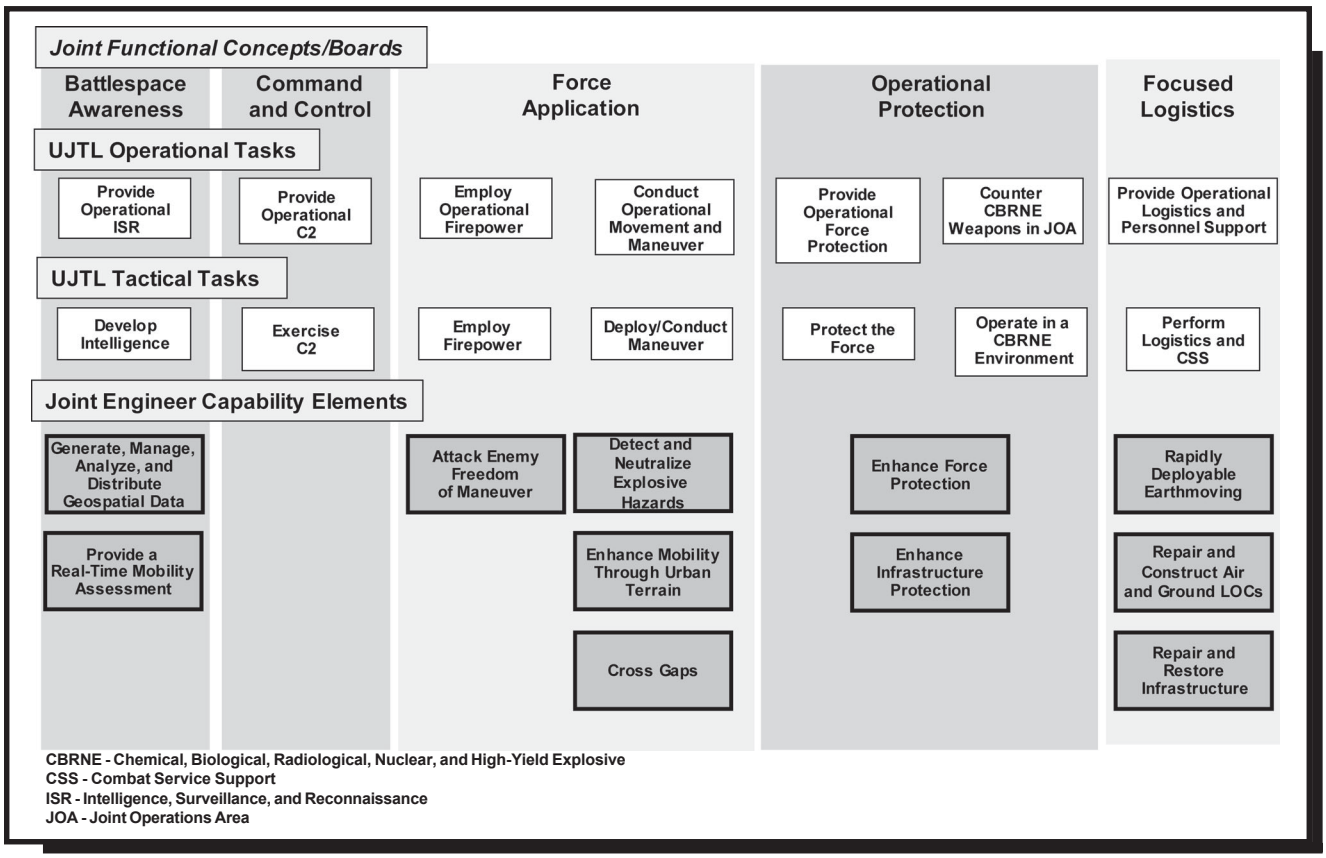

Figure 2. Joint Engineer Capability Elements

progression from defense, to offense, to stability—and rarely embraced support operations. Today, the model no longer fits.

Our formations must be capable of conducting rapid, decisive operations in part of the battlespace while executing defensive and stability operations in other areas. This "new" nature of operations is one of the primary drivers of a joint and expeditionary mindset. It demands a tailorable, scalable force and brings the joint commander a suite of capabilities that can be right-sized, mixed, and projected to meet the full range of operations.

Figure 3 depicts the range of capabilities that an expeditionary engineer force must be capable of bringing to the fight and how the premier capabilities change as the nature of the operations changes. Add the dimension of simultaneity—executing both offensive and stability operations in separate, noncontiguous areas—and one fully understands the challenge set, as well as some of the fundamental requirements from modularity that must be inherent in the Future Engineer Force design.

Engineer Organizational Concept

The Army's framework of maneuver UAs, SUAs, and functional commands organized under two echelons of command—UEx and UEy—drives the Future Engineer Force framework. We must layer engineer capabilities in the same manner.

- The first layer is an *embedded engineer capability* in the maneuver UAs, which is fixed. The embedded capability is either engineer forces or technology that is organic. The focus of these forces is the mobility of small-unit tactical formations. It is crucial that engineer C2 is an integral part of these elements.
- The second layer consists of an *engineer force pool* of baseline forces (building blocks), mission module forces (specialized blocks), and an expeditionary engineer brigade C2 headquarters designed to support all echelons. It is the expeditionary force pool that gives the joint force commander the ability to tailor the force and react. This gives the force a full-spectrum capability and campaign qualities.

Baseline and Mission Module Forces provide the modular effects building blocks. Baseline forces provide two early-entry basic engineer capabilities—combat and construction. These elements can augment the embedded capability of the maneuver battalions or brigades. They are capable of receiving modules from the mission module forces for specific short-duration missions. Mission module forces provide engineer effects modules required by baseline forces to respond to specific changing missions. They consist of fixed organizations with discrete sets of capabilities.

Expeditionary Engineer Brigade C2 Headquarters will manage the training, certification, employment, deployment,

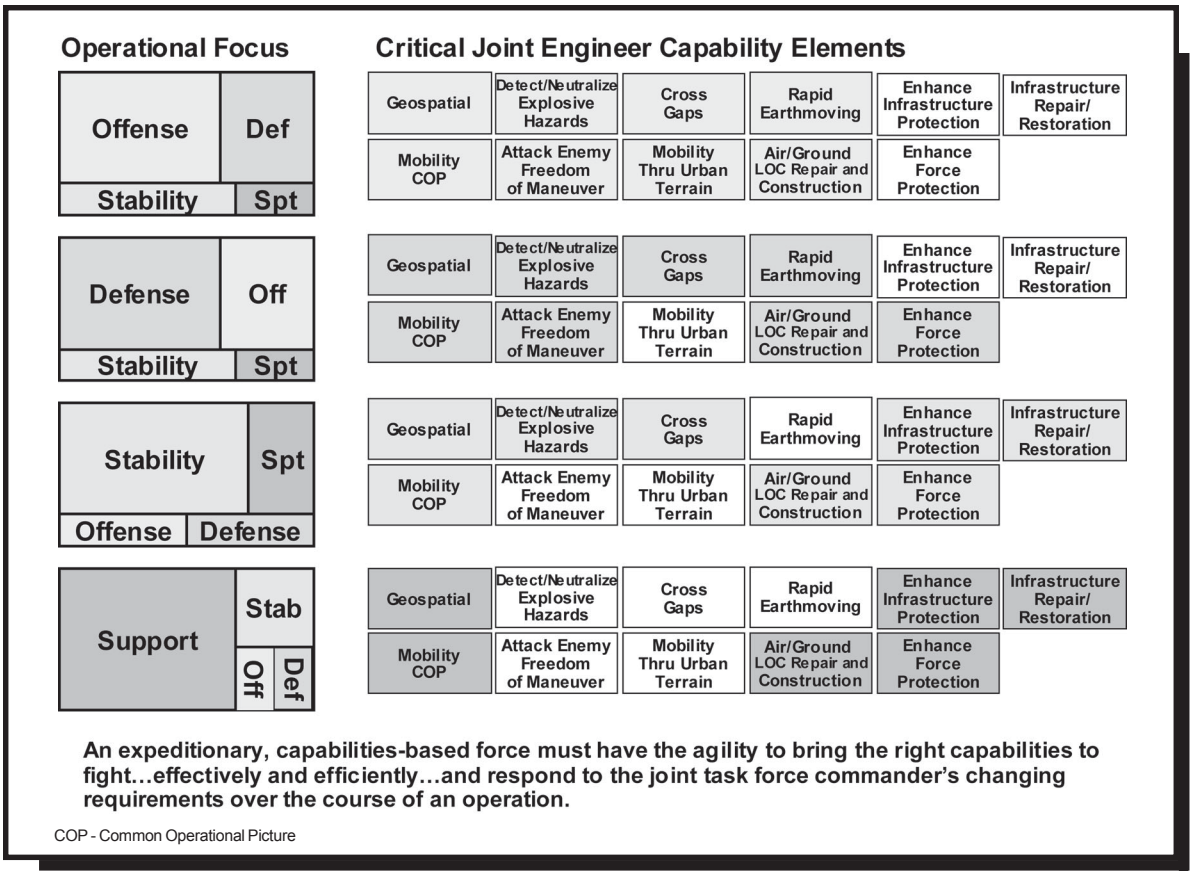

Figure 3. Critical Expeditionary Engineer Force Capabilities

and sustainment of engineer forces, both in garrison and operationally. It will provide operationally scalable C2 for the baseline and mission module forces. Engineer brigades become streamlined modular organizations able to command and control any combination of capabilities—Army, joint, or multinational. They will consist of network-enabled organizations that have separable, deployable command posts that are linked to home station operations centers (HSOCs) to minimize forward footprints that provide the rapid, early-entry, and sustainable C2 of engineer forces.

Engineer Employment Concept

An expeditionary mindset requires that we think of force employment differently than force structure. Although we will continue to have squads, platoons, companies, battalions, and brigades as a garrison structure that oversees training readiness, we won't employ wholesale garrison units—we will mission-tailor. The following paragraphs describe a framework of how we will employ forces (depending on the frequency required, integration required with other forces, where they will be positioned on the battlefield and when, and theater-specific conditions):

Engineer Effects Modules (EEMs) are the basic building blocks of engineer baseline forces and mission module forces. EEMs are narrowly focused, fixed organizations that train as a team to deliver discrete engineer effects. They do not have a C2 element. They are composed from engineer units, equipment contracts, and even full contracts. The commander will own the contract and execute it when required.

Engineer Mission Teams (EMTs) combine engineer effects to accomplish specific missions and fight engineer engagements. The C2 element is fixed and only capable of C2 for EEMs. EMTs are not designed to plan future operations. For example, there is a mission to clear and repair a route from Main Supply Route (MSR) A to MSR B to facilitate logistics. EEMs will consist of route clearance, rapid earthmoving, resurfacing, security, and initial line-of-communication (LOC) bridging elements. When combined, an EMT is formed.

Engineer Mission Forces (EMFs) are tailorable forces that orchestrate engineer missions, support maneuver operations, anticipate engineer requirements, synchronize engineer effects, and command and control engineer units at the tactical or operational level where necessary. They have the capability to integrate into Army or joint headquarters, and unlike EMTs, they are capable of simultaneous C2 and planning future operations. In the previous example, an EMF may be used to sustain the route clearance mission for an extended period of time, constituting a number of EMTs capable of planning future missions.

One of the fundamental shifts that an expeditionary mindset demands from leaders is the ability to separate garrison organization (optimized for training readiness) from employment organization. We do this today in the maneuver force. Garrison companies become companies and teams, and garrison battalions become task forces. We must have the same mindset in the Future Engineer Force using EEMs, EMTs, and EMFs. These organizations do not have a set size; their use is tied to the scope and duration of their mission and the command/support relationship they have with the supported force. More importantly, it breaks the mindset of sending an entire company or battalion if there is a requirement. We must be more precise than that. We must send only what is needed, when it is needed, for as long it is needed—and nothing more.

Early Deployment Detachments (EDDs) are perhaps the most important feature of the Future Engineer Force framework. This element serves as an engineer assessment team that advises the commander on what engineer assets are needed and where, when, and how (EEM/EMT/EMF) to optimize them to best support the fight. Unlike our non-TOE tactical reconnaissance capabilities in the past, this element focuses on a technical reconnaissance TOE capability within our formations. It provides the force commander with engineer eyes forward, as it did in the past, but helps the commander develop engineer solutions before commitment using a reachback capability. It also enables the commander with a forward contracting capability to reduce the amount of assets that must be moved to the fight.

Given an operational scenario, an EDD is deployed into a theatre of operations. It determines the mix of forces required to support the operation. Based on the technical reconnaissance and assessments, it determines that one brigade-sized EMF is required. That EMF consists of three EMTs with a mix of twelve EEMs and two full equipment contracts. As the operation progresses, additional technical reconnaissance and assessments are conducted and the composition/number of EMFs, EMTs, and EEMs is adjusted to meet the changing requirements.

Complementary and Expeditionary Employment Concept

An expeditionary force design framework demands a complementary expeditionary employment concept. This also must fit within the Army framework of how forces will be employed. It presumes that UE headquarters are standalone and do not require plugs from engineer subordinates. It also presumes that engineer forces will use the combination of theater protection commands (TPCs); and ME brigades as the primary conduit for projecting forces into theater and to the UEx. In some instances, missions may be so engineer-specific that the multifunctional capability of the ME brigade headquarters is not an optimal match. As a result, an engineer brigade may be assigned directly to a UEx.

The Future Engineer Force will be dynamically employed, enabled by its agile and modular design to meet the needs of the warfighter and the combatant commander. Combinations of expeditionary engineer C2, baseline forces, and mission modules will form EMTs and EMFs to support the two echelons of command—UEy and UEx (see Figure 4, page 12).

As depicted in Figure 5, page 12, engineers in the UEy will be allocated to the TPC based on mission requirements. EMTs

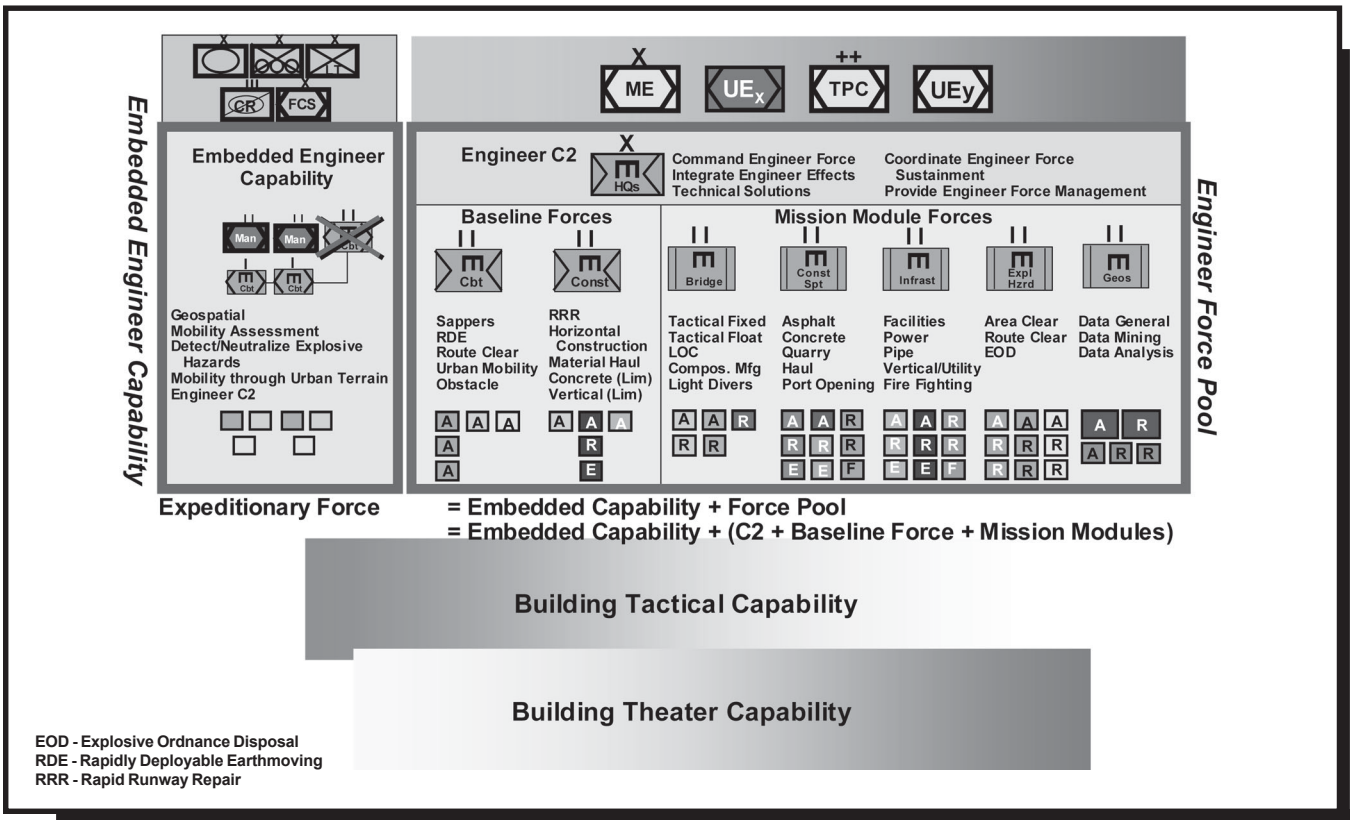

Figure 4. Future Engineer Force Framework

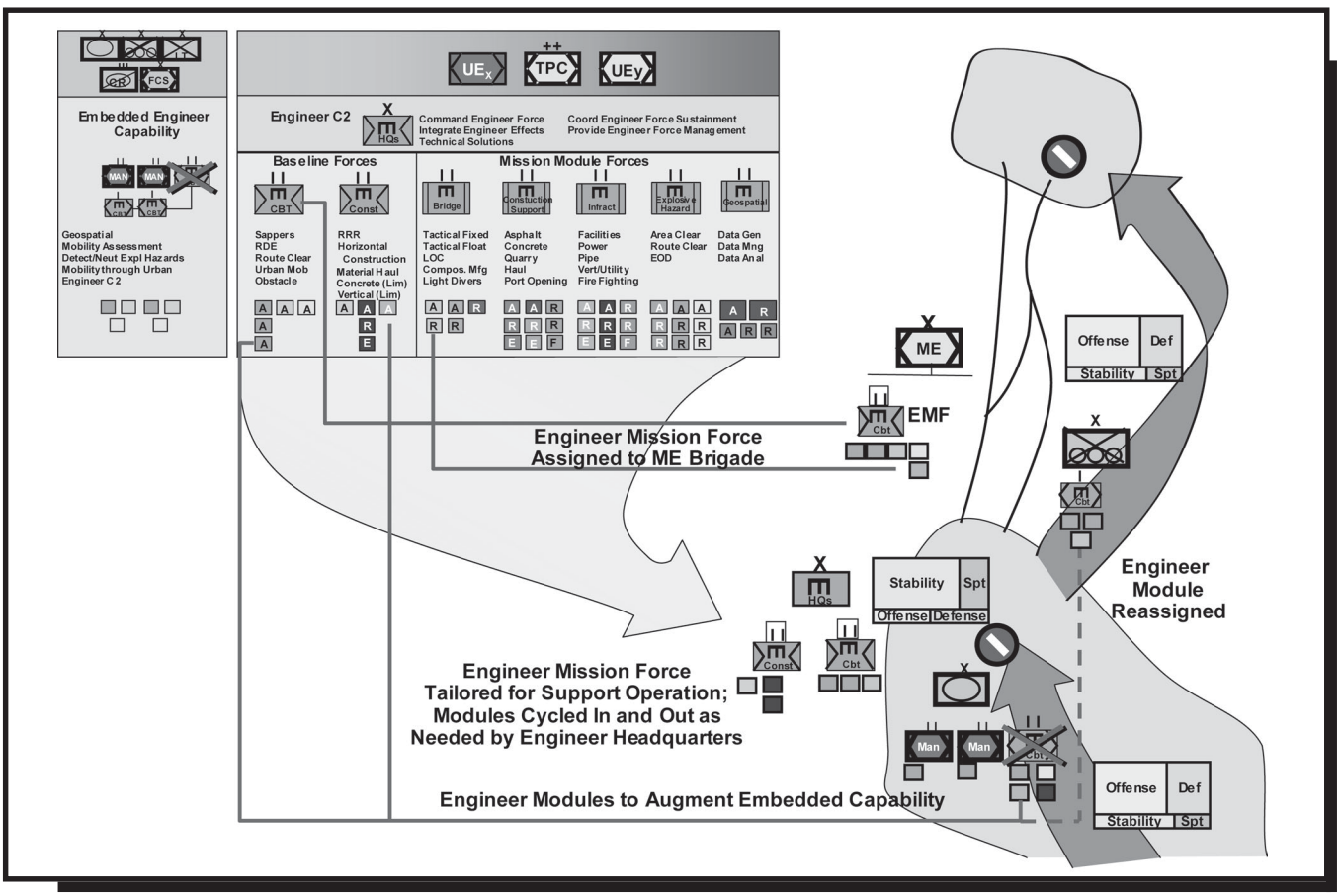

Figure 5. Force Design Theory Applied

and EMFs will be organized under the C2 of expeditionary engineer brigades that will serve as the force employment managers within theater. The number of engineer brigades and subordinate EMTs and EMFs will be tailored to the specific missions assigned by the UEy. EEMs, EMTs, and EMFs will be rapidly cycled in and out to meet the demands of full-spectrum operations. As required, the TPC may allocate an EMF to the theater support command (TSC) in a support role. This retains the ability to rapidly reallocate forces to meet the demands of the rapidly changing nature of full-spectrum operations.

To meet the needs of the UEx and its subordinate UAs, the TPC will form a tailored ME brigade. The expeditionary engineer brigades from the TPC will create EMFs, tailored to the specific needs of the UEx, and allocate them to the ME brigade. As required, EMTs or individual EEMs will be pushed from the ME brigade to other SUAs in the UEx or to augment the embedded forces in the maneuver UAs to conduct short-duration missions. As with the engineers assigned to the TPC, EEMs and EMTs will rotate in and out of the ME brigade based on changing mission requirements (see Figure 6).

Structuring the Total Force for the Expeditionary Model

The plan to convert the current structure to joint expeditionary units that are more deployable, employable, modular, and sustainable demands a comprehensive relook of the roles and structure of the Active Component and Reserve Component. As stated by General Schoomaker, "We need to examine what we have in there and what we need."[3] The Army is thus reviewing 100,000 positions to redress the balance—especially for the early days of a conflict.

> *"We are riddled with industrial-age policies that make no sense in a time of constant mobilizations…we want to have more modularized units…we intend to lower the force structure dramatically."*
>
> *Lieutenant General James R. Helmly*
> *Chief of the Army Reserves*
> *Reserve Officers Association meeting, 23 January 2004*

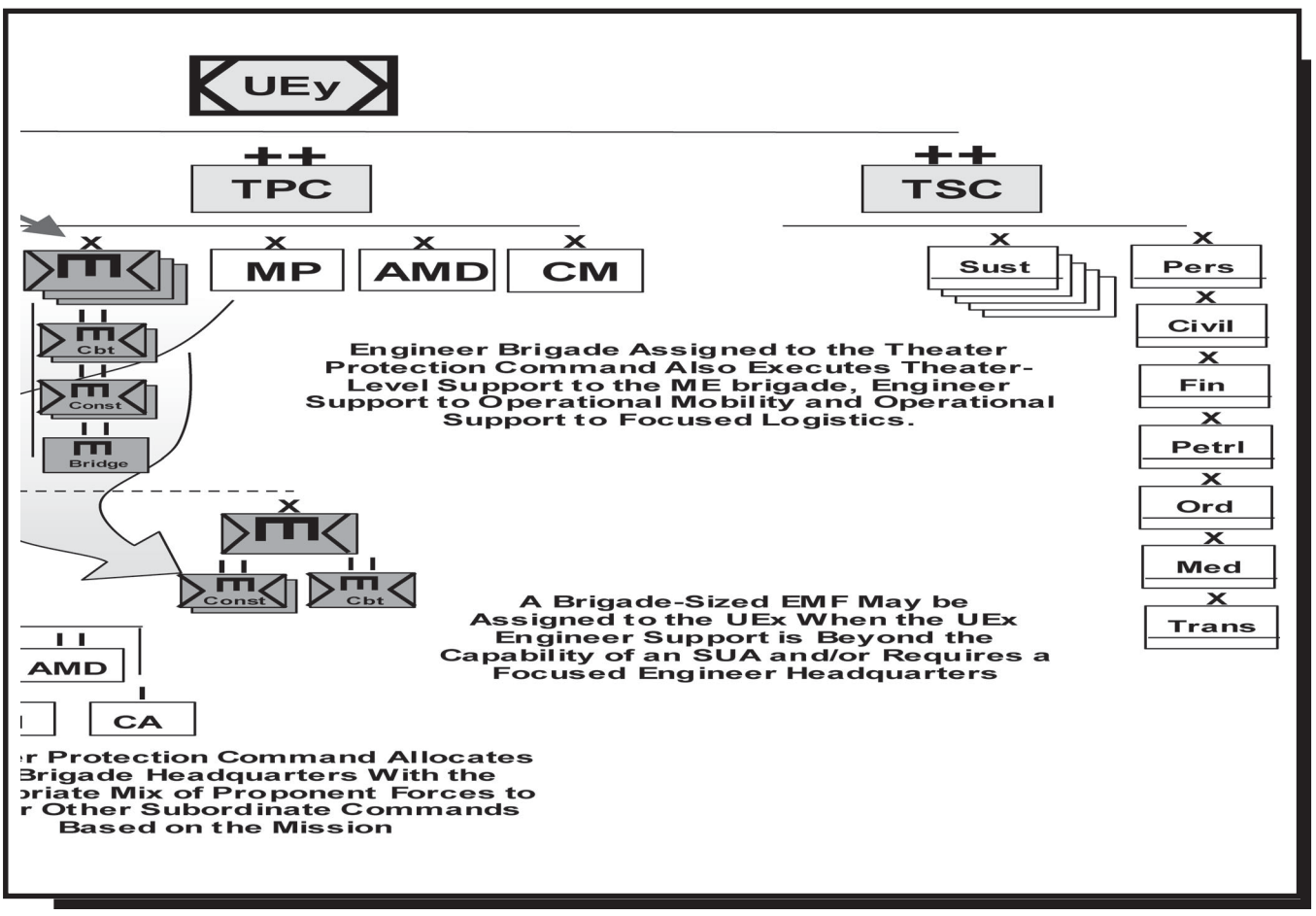

Figure 6. Projecting Engineer Capability to the Force

It is likely that changes required in our Reserve Component organizations will match or exceed those in the Active Component. Some of the engineer capabilities that reside predominately in the Reserve Component may need to be shifted to the Active Component and vice versa. The Army's Active Component will provide rapidly responsive, agile, and expeditionary forces that typically respond in the first thirty days of an operation. The Reserve Component will provide strategic depth to reinforce the warfight. They will also conduct stability operations and support operations (SOSO) and lead our efforts to protect the homeland.

The Active Component will provide the embedded early-entry capability in the maneuver UAs to meet the immediate needs of the warfighters. They will also initially provide the baseline/foundation capabilities (C2, combat engineers, and construction) that are required above the embedded capabilities in the maneuver UAs and those required by the combatant commander. The USAR will provide effects-based modules to augment the baseline forces to provide the breadth of required engineer capabilities. The ARNG will continue to lead homeland security efforts and augment when and if needed by the Active Component and USAR. Secondary to that effort, they will provide the strategic depth of foundation capabilities to support major combat and SOSO on a rotational basis. The USAR will sustain the provision of effects-based modules to the ARNG baseline forces to sustain the breadth of engineer capabilities.

Force Management Concept

The default condition of our operational environment has become one of continuous conflict. Major portions of our Army will repeatedly be deployed and employed. As a result, the senior leadership of the Army has recognized that we must alter our force management practices to reduce turbulence and account for the strain that more frequent deployments will have on force modernization efforts, soldiers, and families. They have designed three stabilization models that aim to achieve continuity in training, stability of leadership, unit cohesion, enhanced unit readiness and combat effectiveness, and greater deployment predictability for soldiers and their families.

One initiative requires that soldiers, both enlisted and officers, report to an installation and remain on that installation through their time as a squad leader or company command equivalent. They will attend the Basic Noncommissioned Officer Course or Captain's Career Course and return to their home station. This improves stability and predictability and is the stepping- stone to life cycle unit manning.

Another initiative allows leaders and soldiers to assemble, train, and employ together throughout the unit's operational cycle. This forms the basis for rotations of fully deployable units while increasing stability and cohesion. This also results in more depth of experience and increased family stability and predictability. Embedded engineer units will be managed in this manner in conjunction with the maneuver UA to which they are assigned. Baseline engineer units will also be managed using this approach. Individual engineer brigades and their assigned baseline engineer battalions enter the cycle simultaneously. Leaders and soldiers assemble and conduct training and certification. The brigade is not available during much of the train and release phases. Once certified, the brigade and its subordinate units are then allocated to the TPC for employment. As needed, the engineer brigade or its subordinate elements are deployed to support ongoing operations, peacetime military engagements, or deterrence on a rotational basis. Once the employment phase is completed, the brigade and its subordinate battalions enter the release/rebuild phase. During this phase, the preponderance of the unit is released and reassigned to other units. A core cadre of personnel remains to receive replacements and the brigade reenters the train phase to begin the cycle again.

The final initiative is the most effective method for sustaining units and mission module forces. The unit, once manned, enters a continuous sustain-employ-sustain cycle. Leader and soldier assignments are synchronized with sustainment phases. During sustainment phases, the unit experiences a 15 to 30 percent turnover of personnel. This model is used since most of these mission module forces are low-density, high-utility skill sets. This reduces the inflow and outflow of personnel units to very discrete time periods. Mission module force engineer brigades will offset the employ and sustain phases of assigned mission modules, and perhaps battalions, to ensure that they continuously maintain a full array of ready and deployable mission modules.

Each of the force management concepts ensures that the Future Engineer Force is capable of providing the full range of required engineer capabilities. The engineer brigade remains the cornerstone of force management.

The role of the Engineer Commands (ENCOMs) is significantly more multifunctional in the new force management concept. They will be responsible for training readiness of the engineer forces, will decide what force is "in the ready rack" and which unit will be deployed, and could work for the UEy commander as a joint deployable headquarters. All around, the new force management concept will allow for the utmost flexibility.

Achieving the Vision

Achieving the future vision discussed in this White Paper may seem like a time-consuming and lofty goal. But we owe it to past, present, and especially future engineers to design a way ahead that is achievable, realistic, and timely.

Our initial effort will be the establishment of an expeditionary force pool that is capable of supporting the entire joint force. With this effort, we will challenge the C2 structure as we know it today and convert groups and corps engineer brigades into

expeditionary engineer brigades that will be capable of commanding and controlling the baseline engineer battalions, other service engineer forces, and even other proponent forces, if required.

The role of baseline engineer forces is to enhance the engineer capabilities of the maneuver UAs. This baseline force pool will consist of two early-entry basic engineer capabilities—combat and construction. The new design will impact the Active Component as well as the Reserve Component structure. As part of this initial effort, we must rethink how we train and equip these baseline battalions so they can respond quickly to specific changing missions. This change will involve training from initial entry to command preparation. These mission module forces will be fixed organizations with a discrete set of capabilities. To improve the way our forces are equipped, we will step up efforts to procure modern and common construction engineer equipment so that the Active and Reserve Components are identically equipped. Additionally, we are studying how to put more of the decisions on leased equipment at the commanders' level. Our leased equipment must be consistent with sister service lease agreements so we come closer to commonality of engineer capabilities.

A simultaneous but supporting effort in achieving our vision is to accelerate the enablers of the embedded engineer forces. We will improve, through training and procurement, how our forces detect and neutralize hazards. We will ensure that our engineer soldiers are placed on platforms that are as survivable and mobile as the maneuver UAs they support, by designing capabilities for the FCS that are consistent with our capabilities environment. This supporting effort will also include finding new ways to train and fight in urban terrain so that engineers are the first soldiers called when a unit approaches a built-up area. Our modular design will allow us to have a just-in-time assault bridging capability that allows the maneuver UA commander to maintain momentum in any environment.

These monumental changes in the Engineer Regiment call for new management techniques that allow an organized approach to providing engineer forces to the joint force commander. We will accomplish this through a force management system where ENCOMs are responsible for tracking the unit readiness and deployability of every engineer unit assigned to their regional alignment. We envision two and possibly three ENCOMs under the purview of the U.S. Army Corps of Engineers that provide forces through U.S. Army Forces Command to a joint force commander. This concept could include an ENCOM responsible for forces capable of responding to homeland security issues.

Last, but certainly not least, in this effort to transform our Regiment is the dialogue with our sister service engineer forces. The end state of all our efforts is the "Color Purple." Our senior leaders must begin discussions now with other service leaders on accomplishing commonality in equipment and training and interdependency in mission sets. The end state is an engineer force that is fully integrated, expeditionary, networked, decentralized, adaptable, decision superior, and effective.

> *"The joint force, because of its flexibility and responsiveness, will remain the key to operational success in the future. The integration of the core competencies provided by the individual services is essential to the joint team, and the employment of the capabilities of the Total Force (active, reserve, guard, and civilian members) increases the options for the commander and complicates the choices of our opponents."*
>
> *—Joint Vision 2020*

The Future Engineer Force . . . Relevant and Ready

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Endnotes

[1] The Way Ahead, 26 November 2003.

[2] "An Army at War - A Campaign Quality Army With a Joint and Expeditionary Mindset (Draft)", 17 February 2004.

[3] General Peter Schoomaker, 8 January 2004.

Reference

Unit of Employment (UE) Operations White Paper, Version 3.0, 5 March 2004.