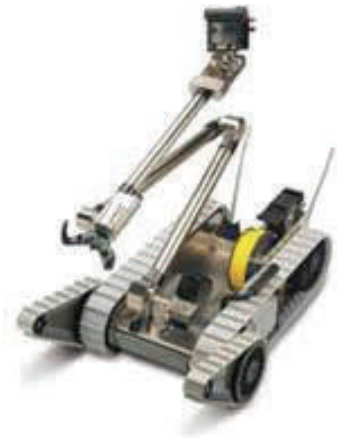
VISION ORDNANCE

In the Army's vision, the war of the future is increasingly combat by mouse clicks. It's as networked as the Internet, as mobile as a cell phone, as intuitive as a video game. The Army has a name for this vision: Future Combat Systems. The project involves creating a family of 14 weapons, drones, robots, sensors and hybrid-electric combat vehicles connected by a wireless network. It has turned into the most ambitious modernization of the Army since World War II and the most expensive Army weapons program ever.

(The Washington Post, Dec. 7, 2007)

As the Army seeks balance while continuing to Sustain, Prepare, Reset and Transform, the Ordnance Corps looks ahead — remaining steadfast in its core competencies of maintenance, munitions and EOD.



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An EOD Soldier takes "the long walk."

The road ahead...

Today's Ordnance Corps is incredibly strong and vibrant as it undertakes the essential missions asked of it. As the Army stands up the Logistics Corps for logistics officers and begins to transform Combat Service Support (CSS) training to the new Sustainment Center of Excellence at Fort Lee, Va., fundamental Ordnance Corps skills have never been more paramount.

This Ordnance Vision attempts to demonstrate how Army Ordnance's core competencies -- Maintenance, Ammunition, and EOD – will remain essential and must evolve in order for the Army to successfully execute simultaneous full spectrum operations in the future. The premise is that for the next several decades the Army will remain involved in a series of complex protracted conflicts.

The recently published Army Posture Statement notes several key concepts that help frame our future foundation.

First, the "Soldier" remains the strength of our Army. Emerging technology, new equipment, organizational structure changes, training opportunities, and the greater institutional Army base structure all support the Soldier serving on point for our nation.

Second, the Army must achieve "Balance" to maintain the momentum it needs to fight in a persistent conflict. The Army must maintain its balance as we Sustain, Prepare, Reset and Transform to meet future requirements.

Advanced technology will certainly make Ordnance formations more agile; however, the individual Ordnance Soldier and individual Ordnance leader will define our success.

The Regimental Crest pinned to our chests breathes vitality into the Ordnance Corps. Though change is inevitable and is, indeed, now taking place, Ordnance Soldiers are prepared to evolve with this historic institution and continue to meet emerging requirements.

Ordnance Warriors of the future

The Ordnance Warrior ethos of providing **"service to the line, on the line, on time"** is as true today as it was in the past and will be in the future. Ordnance Warriors provide combat power to the Joint Services and U.S. Army during peace and war.

Ordnance Warriors develop, produce, acquire and sustain our nation's weapon systems, ammunition, missiles, electronics and ground mobility materiel. To do so they:

* Leverage new technologies.
* Are good stewards of the nation's resources.
* Continue to evolve skills, talents and competencies to support new force designs that adapt and respond to changing threats.
* Are imaginative and adaptable to support new equipment and materiel being fielded, enabling our forces' ability to fight while economizing support forces in the battle.
* Are deliberate and precise in support actions. Ordnance Warriors always sharpen their skills.
* Remain vigilant -- the enemy is cunning and determined to destroy us, using all possible means.
* Are prepared to counter the enemies' attacks at our weaknesses.
* Are responsible and quickly identify and resolve weaknesses.
* Work with civilians (Department of the Army Civilians and contractors) toward the common goal of supporting our forces, absorbing the knowledge, skills and services they offer.

If American forces are to be faster, more lethal and more precise in 2030 than they are today, we must continue to invest in and develop new capabilities. This Vision will discuss the Army's ongoing transformation and its efforts to harness those capabilities.

Looking to 2030… and beyond

The Ordnance Vision

In this time of unprecedented change in our Army, as we transform our Combat Service Support (CSS) Operating Force, our CSS Personnel Management System, and our CSS Generating Force, the Ordnance Corps remains proudly resolute in our three core competencies: Maintenance, Munitions and Explosive Ordnance Disposal (EOD).

Our Vision is to establish and enable a responsive, agile institutional support network for all Ordnance and Logistic doctrine, organization, training, materiel, leadership development, personnel, and facilities (DOTMLPF) functions associated with our missions in support of our Army and our nation.

We will do this by leveraging technology, employing mechanisms such as the eOrdnanceU Lifelong Learning portal, and by continual aggressive engagement by the Office of the Chief of Ordnance to keep up with the personnel needs of the branch. We must continue to employ state-of-the-art training and be ever responsive to our Ordnance Soldiers in the field.

Challenges abound as Ordnance evolves

Today's Army recruits, organizes, trains and equips Soldiers who operate as members of joint, interagency and multinational teams; provides logistics and other support to our joint and interagency partners; and supports civil authorities in times of national emergencies.

To do this, our nation is building an expeditionary and campaign-quality Army -- an Army capable of deploying rapidly and conducting operations in any operational environment, anywhere in the world, and sustaining operations as long as necessary.

The current focus is to prepare forces and build readiness for counterinsurgency operations in Iraq and Afghanistan. Simultaneously, the Army must be ready to provide commanders with Soldiers and capabilities for operations ranging from peace-time military engagements to major combat operations.

Examples of recent or ongoing Army operations include:

- The defense of South Korea, Japan, and other friends, allies and partners
- Peacekeeping operations in the Sinai Peninsula and the Balkans
- Multi-national exercises that reflect our longstanding commitments to alliances
- Continuing engagements with foreign militaries to build partnerships and preserve coalitions by training and advising their military forces
- Helping to secure our borders and conducting operations to counter the flow of illegal drugs
- Supporting civil authorities in domestic emergencies, including natural disasters and threats at home and abroad
- Supporting interagency and multi-national partnerships with technical expertise and critical support after natural disasters, and promoting regional stability
- Supporting operations to protect against weapons of mass destruction and block their proliferation

The Army must perpetually ensure that units and Soldiers have the right capabilities to accomplish operations in the 21st Century. Continuous modernization is key to enhancing and maintaining the technological advantage over any enemy our Army may face.

Our maxim:

We never want to send our Soldiers into a fair fight.

Future Combat Systems (FCS), the core of the Army's modernization effort, will provide Soldiers an unparalleled understanding of their operational environment, increased precision and lethality, and enhanced survivability. These improved capabilities cannot be achieved by upgrading current vehicles and systems. FCS will use a combination of new manned and unmanned air and ground vehicles, connected by robust networks, to allow Soldiers to operate effectively in the complex threat environments of the 21st Century. FCS capabilities currently being tested at Fort Bliss, Texas, are proving to be valuable in the current fight as they are now being fielded to Soldiers in Iraq.

Maintenance Vision 2030

The Vision of the Maintenance Corps is **to be the lead Maintainer for Joint Land Forces, with the mission of being the Department of Defense Executive Agent to approve sustainment support for new procurements, manage, repair and maintain all Joint Land based systems in a high state of materiel readiness in support of the National Security and Defense Strategies.**

Maintenance Warriors of 2030

In the year 2030, persistent conflict will still drive our Army as the Global War on Terrorism and extreme ideologies continue to threaten the United States, our Allies and world interests.

To combat this protracted confrontation, the Soldier will continue to be the centerpiece of our Army formation. The Ordnance Soldier, now transformed as an Ordnance Warrior, will remain the centerpiece and focus of this Corps competency – Maintenance.

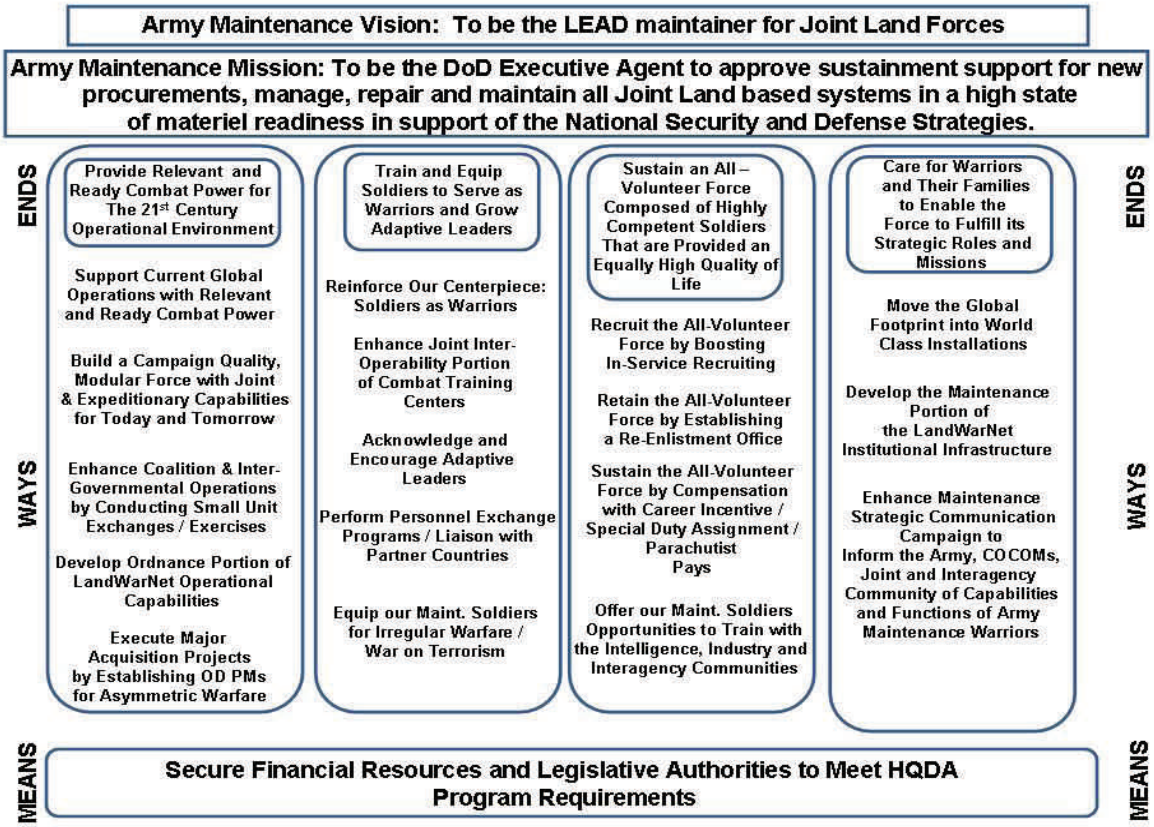
The Army's strength is the Soldier – therefore our strength remains in the maintainer – the Ordnance Warrior.

The Ordnance Warrior in 2030 will not look like the Ordnance Warrior of today. The Warrior of the future will don a multifunctional uniform made of smart, interactive textiles and other materials that will be able to sense and react. For example, the uniform will sense the Warrior's surroundings and change color to blend in with the environment, or detect and repel chemical agents. It will also act as a "data bus," passing data and information from, for example, a wrist-mounted diagnostic computer to the helmet-mounted display.

The Ordnance Warrior will be a walking digitized wireless Warrior connected to the Sustainment Enterprise.

Force Protection and Survivability will remain the focus for our Ordnance Warrior, who will benefit from advances in nanotechnology, the ability to manipulate materials on an atomic or molecular scale. This technology will improve the strength and durability of textile fibers, leading to vastly improved ballistic protection.

The Warrior of 2030 will wear a helmet 40 to 60 percent lighter for protection against fragmentation threats. A bulletproof helmet will be developed that may be somewhat heavier but greatly increases survivability, and will protect the Soldier's face and eyes from all threats, including environmental, energy, and chemical, biological and ballistic. Nanotechnology will also advance the sophisticated headgear subsystem, to include a high-resolution display for the Warrior to view not only technical data and troubleshoot procedures, but also tactical/situational data, maps and current positions of friendly and enemy units.



The headgear's communication system will allow the Ordnance Warrior to send and receive information from his maintenance supervisor and other members of this maintenance team. He will tie into other squads, remote sensors or unmanned aerial vehicles performing reconnaissance as he performs maintenance forward on the battlefield.

The Ordnance Warrior of 2030 will have a micro climate-conditioning subsystem incorporated into his belt to warm him in cold weather and cool him in warm weather. A physiological monitoring system will determine if he is dehydrated or sleep-deprived, with the data possibly being transmitted to a medic, unit commander or both. Ordnance Warriors of 2030 will be highly skilled in the art of close combat, and fight alongside of their Combat Arms comrades with the same equipment and expected to perform at the same level. Ordnance Warriors will continue to embrace the Warrior Ethos and live by the Army Values.

The Ordnance Warrior of 2030 will be a fully digitized maintainer, capable of troubleshooting and isolating faults – repair and replace – on both track and wheeled vehicles with a full complement of turrets and armament. They will be skill trained and linked to a diagnostic query system that will enhance their ability to work on a variety of equipment. This future "band of brothers" will be smaller in numbers, travel in highly mobile vehicles with state-of-the-art survivability and, once on scene, step into an exoskeleton for increased lift capability to remove and replace items that now take external lift to accomplish.

Those who argue with this technology have not walked the streets of Baghdad in 140-degree heat with trash above their ankles with one-third of their body weight strapped-on as ballistic protection while looking for something out of the ordinary that could mean life or death for them or other Warriors walking point with them, all the while smiling at young children and waving to the elderly we are there to protect. Technology will be extremely important, but war remains a contact sport. Ordnance Warriors remain our most precious asset.

"The Ordnance Warrior of 2030 will be a fully digitized maintainer, capable of troubleshooting and isolating faults – repair and replace – on both track and wheeled vehicles with a full complement of turrets and armament."

Equipment

The Ordnance Soldier of the future will be highly mobile, technologically enabled, technically and tactically trained and able to perform field/sustainment missions with greater efficiency and technical capability than today. These gains will further prove relevance as the Joint Land Force (JLF) maintainer using the Two-level Maintenance concept.

Digitization - As the DoD procures new equipment that feature advances in technology, the Ordnance Corps must be congruently aligned to provide sustainment services.

As the JLF maintainer, computers and other digital equipment will be enablers that link the maintainer to the systems. The maintainer will diagnose, repair, service and provide maintenance management without geographical boundaries by leveraging portable and wireless personal computers/ transmitters. These computers will be linked to remote digital libraries/repositories that will contain technical and historical information, Interactive Electronic Technical Manuals (IETM) and other information necessary for the Soldier to diagnose, repair and service the equipment of the future.

To further enable the joint vision, computer systems will feature open architecture where strategically, operationally and tactically feasible. Open architecture will also lend itself to potentially facilitating combined and coalition endeavors in the Joint Operations Area (JOA).

Preventative Maintenance Checks (PMC) - Equipment digitization will enable each operator to conduct operator-level PMC in a fraction of the time now needed. The Health Monitoring System (HMS) on manned and unmanned equipment will keep the operator informed of all monitored system status and will pass the information to a maintenance manager to leverage the supply system to minimize down-time and assist the commander in making decisions.

Recovery - A frequent failure on the battlefield is equipment recovery. Like-vehicle towing is ideal because it quickly removes soldiers and equipment from a potentially hostile situation and allows the commander to continue the march if it is warranted. However, it also removes another vehicle from the fight.

Like-vehicle towing requires the use of a tow bar. Towbars are interspersed throughout units and may not be readily available to facilitate quick like-vehicle towing. The Future Force will have single leg towbars on each vehicle that becomes a complete system when combined with the leg from another vehicle.

Helmet Sensors measure impact

The Army is reporting on a new helmet sensor that might lead to better helmets in the future.

The sensors gather data on impacts ranging from a dropped or kicked helmet to a vehicle crash to a nearby weapon firing or explosion. They measure two specific actions: the energy wave generated by the "event," and the acceleration or jolt that follows.

In the short term, data collected through the sensors is expected to help the Army improve the helmets and other protective equipment it provides its Soldiers.

A longer-term application is to use impact data to help diagnose traumatic brain injuries.

Recovery vehicles will have robotics, voice-activated remote controls, position/navigation equipment, off-vehicle communications and provide efficient, compact, mobile sources of power to operate portable, versatile tools.

Diagnostics/Prognostics - Onboard Health Monitoring Sensors (HMS) will conduct remote diagnostics to test, detect and isolate faults to a single ambiguity group (Line Replaceable Unit, Line Replaceable Module, Shop Replaceable Unit). An onboard prognostics system will predict equipment failure and allow maintenance managers to coordinate personnel and supply and repair the fault before it becomes non-mission capable. This will also enable the recovery process by providing the correct replacement part prior to dispatching the recovery vehicle.

Repair - Field Maintenance personnel will be 100 percent mobile to fix forward as much as possible, and will have secure communications to maintain situational awareness and understanding. Their platforms will incorporate Pit-Stop design to minimize mean-time-to-repair (MTTR) to accommodate effective command planning and minimize non-mission capable time.

Services - With the advent of (HMS), the concept of 'Service' will be redefined. With most equipment providing accurate prognostic data, services -- as currently defined -- will require significantly less manpower, equipment and time, or be eliminated all together.

Tools - The Ordnance Corps will employ an integrated work force of military and civilians to meet the Army's need for a flexible force. Technological advances and future warfighting doctrine will require fewer tools. The operator/ maintainer or combat maintainer will carry basic tools and limited special tools. Tools will be reduced as the Army transforms and should be independent of the organizational structure. Though there are different approaches to Joint Two-Level Maintenance (JTLM), this vision sees a need to reduce Shop Sets, Kits and Outfits. The Ordnance Corps' ability to synchronize, prioritize, direct, redirect, integrate, and coordinate with cross-service logistics commodities and functions shall have the lead to manage logistics assets and processes in the area of operations.

The operator/maintainer or combat maintainer will be responsible for maintenance of the platform which they are operating. Operator maintainers are critical in reducing the tool requirement. Tools that are required shall provide the maintenance capability to sustain itself. The operator/ maintainer will perform 80 percent of repairs; the other 20 percent will be conducted at Sustainment Level.

Organization

The Army modernization program has Brigade Combat Team (BCT) centric war fighting organizations in 2030 comprised of Heavy, Light, Stryker, and Future Combat System (FCS) Brigades. Army maintenance organizations supporting these BCTs in 2030 will be joint-capable, conducting field-level repair primarily at the battalion and company level. These organizations will still be Brigade Support Battalions and Forward Support Companies with respective maintenance teams providing habitual maintenance support to maneuver companies. Although future supported equipment may still be based on current platforms, components will have embedded prognostics and diagnostics and be condition-based maintenance enabled, significantly reducing the required maintainer footprint. As spin-out technologies for the FCS BCT begin to populate the existing force, maintenance organizations will adapt accordingly with the required personnel and equipment to meet the new requirements.

At echelons above brigade, Army maintenance organizations will be modular and tailored to meet future force maintenance requirements. These organizations will be primarily field-level focused providing area maintenance support. The civilian workforce managed by Army Materiel Command will primarily execute sustainment maintenance for repair of components and return to the supply system.

Training

As advances in emerging technology are incorporated into new Programs of Record, facilitating changes in the domains of Doctrine, Organization, Materiel, Personnel, and Facilities, the training domain must evolve to posture the future Ordnance Warrior for success.

Current Training Strategy - Current training strategy entails remove and replace/correct malfunction tasks in Advanced Individual Training (AIT), followed by diagnostics in the Basic Noncommissioned Officer's Course (BNCOC), and advanced diagnostics in the Warrant Officer Basic Course (WOBC). Due to the number of divergent accession enlisted MOSs into the majority of our Warrant MOSs, a significant portion of our Warrant Officer Basic Courses are by necessity redundant from the comparable BNCOC.

Future Training Strategy - Between now and 2030, the Ordnance Corps will implement Skills Based Training as the building block of all skill level one courses, focusing primarily on diagnostics. This methodology leverages advances in instructional design and proven science of learning practices, and will be designed to capitalize on the existing knowledge of new recruits, i.e., the use of consumer goods that capitalize on the latest advances in technology. Some other plans for future training strategies include:

—A sequential and progressive training program tied to core competencies for each MOS/Skill Level (what do they need to know, when do they need to know it).

— Not tied directly to any specific end item, but rather focused on the skill sets necessary to effect diagnoses and repair of systems encountered within the battlespace. The focus of this strategy, as it relates to newly fielded systems, will be the new technology being leveraged, not the fact the system is "new".

There is potential for DoD to standardize CSS/Logistical operations and processes across all services; this opportunity facilitates the initiation of "Joint Universities" for Ordnance Warriors and their counterparts from other services. Today, there are currently several courses which are conducted (at least partially) with certain services. We see the establishment of purely joint universities as a natural evolution.

In order to keep pace with the projected continued high operational tempo (OPTEMPO), the ability to rapidly affect changes to programs of instruction is essential to ensure our training keeps the Ordnance Warrior relevant to the needs of the Ordnance Corps and the Army. Future considerations to update training must incorporate materiel readiness data of affected system; in other words, what is failing on equipment in the force, and what skill sets are needed to address those failures?

Our training programs must be so efficient, both in their design and execution, that they become the envy of the corporate community for their ability to impart an extensive body of knowledge expediently while still maintaining long term retention.

"Between now and 2030, the Ordnance Corps will implement Skills Based Training as the building block of all skill level one courses, focusing primarily on diagnostics. This methodology leverages advances in instructional design and proven science of learning practices, and will be designed to capitalize on the existing knowledge of new recruits, i.e., the use of consumer goods that capitalize on the latest advances in technology."

Depending on the future role of the warrant officer, our training strategy should aim toward a graduate of the Warrant Officer Advanced Course being awarded a Bachelor's degree in Mechanical Engineering (915E). This strategy would also require some level of guided self-development.

Training Compensations - As advances in the training model become available, another challenge is the ability to retain Ordnance Warriors. A method of linking compensation to technical proficiency, either through civilian certification testing (ASE/ETA, etc), or some other method is needed. As in our training strategy, this compensation must be sequential and progressive. NCOs must be driven to a higher level of performance than junior enlisted Soldiers, and warrant officers even higher.

Training linked to Promotions - Although the Ordnance Corps has made great strides, today there are still occasions when a Soldier performs in duty positions well before he or she has received the training needed to perform those duties. In the future, Maintenance Warriors must be postured for success by incorporating the sequential and progressive philosophy mentioned earlier, and delivered prior to that knowledge being required. We must move away from the Infantry philosophy of promoting from leadership duty positions. Ordnance Warriors require and deserve outstanding leadership, and promotion boards must select leaders based on proven performance in a balance of leadership and technical duty positions. Our training strategy must support this approach by ensuring our courses also strike a balance.

Training Domains – Today's three domains of institutional, operational, and self-development are expected to remain part of our training strategy in the future. Success relies upon each of these domains complimenting each other while serving a specific purpose.

Not all learning occurs within the schoolhouse. Much of what an Ordnance Warrior learns will occur in the other two domains (operational and self-development). We must incorporate a means to both identify and reward knowledge gained in those domains when the Warrior returns to the institutional domain either by accelerating training (resulting in early graduation) or providing the Warrior with a menu of topics available for training based upon his specific needs, resembling the selection of electives at a university.

-- Institutional Doman: The resident schoolhouse will continue to be the primary source of knowledge for the Ordnance Warrior of 2030. Facilities designed specifically for the learning environment, live equipment coupled with training aids and devices, in addition to planned advances in instructor development all result in an environment hard to replicate in the operational domain.

-- Operational Domain: The relationship between the schoolhouse and the operational force is a partnership that is often not in synch and unsupported. While the impact of real world experience on the development of the Ordnance Warrior cannot be underestimated, we must provide operational force leaders with the tools necessary to facilitate the professional growth of their subordinates. The use of distributed learning materials specifically designed for sustainment training will be expanded, as will the implementation of other knowledge management tools discussed elsewhere in this document. Leaders must understand they have a reach-back capability to leverage the knowledge base in the institutional force. Mobile Training Teams will continue to be utilized in order to export training to home station when necessary.

-- Self-development. The future Ordnance Warrior will be required to possess a wide body of knowledge, technical and tactical, simple to complex. Although our training strategies will be designed to maximize the use of time spent in the schoolhouse, the training environment will still be constrained for the foreseeable future. In light of these constraints, self-development will be critical to the Ordnance Warrior remaining proficient in their MOS. The topics identified for self-development must be clearly defined, easily accessed, and professionally developed in order to maintain the Warrior in his or her band of excellence. In addition, we must identify a means to track the Warrior's progress in completion of these identified tasks that is not cumbersome.

Reach Back

Ordnance Warriors and units in 2030 will have worldwide reach back using Joint Department of Defense network systems that will maximize their capabilities, effectiveness and efficiency. Data will be gathered from all spectrums of the joint common operating picture, stock and demand information, forecast conditioned-based maintenance requirements, access training and educational libraries, and extract/access joint materiel command information. Maintenance units will be equipped with Joint Department of Defense networked STAMIS, capable of searching multiple stock control data bases to determine the closest location to fill their demand – all displayed on the Ordnance Warrior's heads-up display.

The Ordnance Corps of 2030

In the future, Ordnance Soldiers will support highly agile, adaptive, and responsive Modular Forces of joint and coalition elements that are deployed and dispersed at strategic distances, possibly in austere environments and engaged with the enemy.

Future Modular Forces will control and maintain large, complex areas of responsibilities while simultaneously responding to evolving mission parameters. Maintaining, sustaining and supporting future forces will be a challenge, but will be met with the right skills, training, organization, leadership and equipment.

Ordnance Soldiers will need relevant, responsive and accurate information, and must be able to receive, assimilate and disseminate knowledge quickly. They must be trained in fundamental and enduring principles and will need up-to-date training and education. And they must know where to find information and reach subject matter expertise.

Defeating the enemy is not solely a military product. On the battlefield, commercial products are part of the fight. Ordnance Soldiers need to be armed with the tools and principles to rapidly repair commercial products on the battlefield.

Berkeley Lower Extremity Exoskeleton, 2004

Contractors have had important roles throughout U.S. Army history and will continue in these roles in the 21st Century. Ordnance Soldiers need to understand, manage and employ features contractors provide in the scope of meeting its support mission.

The Ordnance Soldier must realize that a problem occurring in a platform system that uses subsystems and components is just one entity. Future systems will have self-healing capabilities. However, a system may operate with system scars and may not operate correctly. Artificial Intelligence will be needed to triage the system.

Ordnance Soldiers no longer operate alone. They will be able to send voice, information, and visual data to maintenance repair advisers/technicians who can immediately collaborate with the Soldier and render instructional aid. Instructions can be projected through communication devices to instruct the Ordnance Soldier how to conduct a specific operation. Information from these interactions will be recorded, interpreted and used to update training instructions/procedures.

The robot/mechanic/helper will conduct mechanical support. Ordnance Soldiers will identify and prioritize specific repairs that robots will conduct. Large robo-repair systems may be developed to independently provide Battle Damage Assessment & Repair (BDAR) or repair damaged combat systems near the fight. Robotic repair systems will scan the condition of the damaged platform and determine remote maintenance instructions from afar. Robots may be used to repair singular platforms (field level maintenance) or conduct production overhaul and repair or fabrication (sustainment level maintenance). Robot repair systems may be the transport system for the Ordnance Soldier and provide area security as well.

Robotic field level repair operations will be conducted at battalion level and higher. Robotic sustainment level repair will be conducted at brigade level.

Ordnance Soldiers have always operated heavy equipment, and repair speed has been hampered by the sheer weight of the component. Ordnance Soldiers will need to use lifting devices with tool and diagnostic repair capability like the Exskelton with mechanic attachments.

The pace of new equipment and materiel arriving in the battlefield will be an educational challenge for the mechanic on the ground. Ordnance Soldiers will access remote simulation training on portable devices (such as a PDA) as part of the Soldier's basic equipment issue.

The 21st Century fight does not care about the time of day. Conducting repairs, issuing supplies or providing services will take place 24/7. Night operations have historically limited Ordnance support operations. Current night vision devices are bulky and awkward. Flood lights often come on at night to facilitate rapid Ordnance support. To overcome this security weakness, Ordnance Soldiers will be equipped with better light enhancement devices. Scanning optics to troubleshoot systems at night may be incorporated.

Over time, man has armored himself for protection. Ordnance Soldiers, frustrated with uncomfortable, bulky protective gear, will more often than not remove personal protection systems to get the mission done quickly. A more flexible armor, such as the Dragon armor, will allow the Soldier greater freedom to perform his or her mission.

Munitions Vision 2030

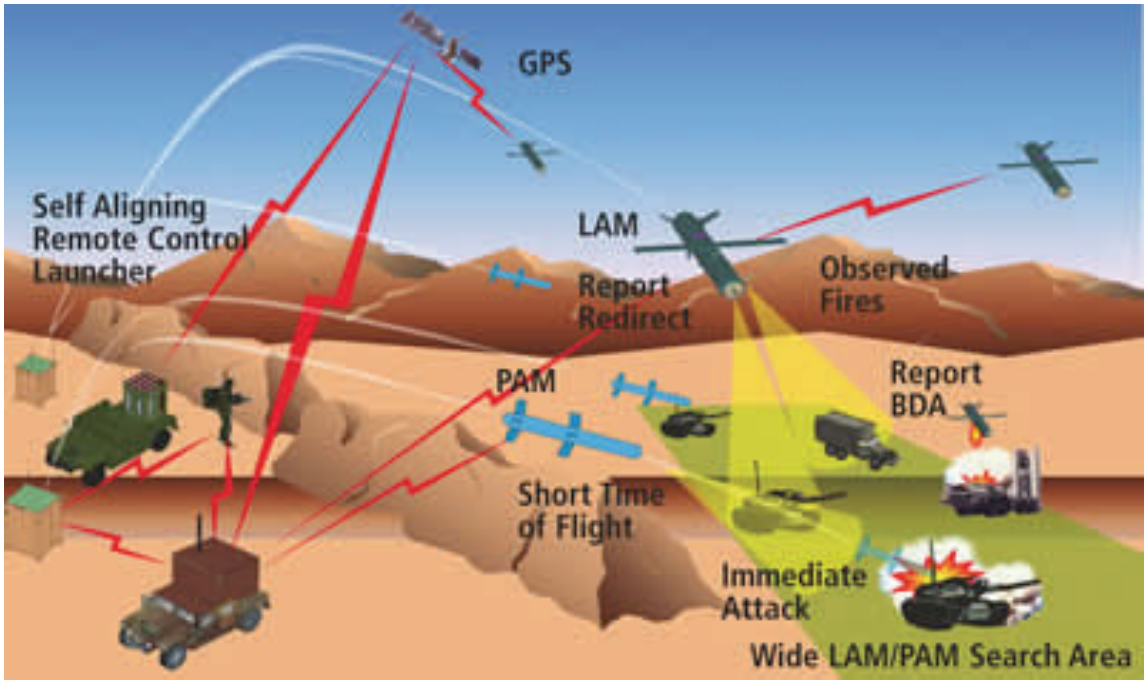
The Vision of the Munitions Corps is **to provide our Joint Warfighter with full spectrum munitions support ranging from research, development and explosive safety to accurate and on time delivery of critical munitions and munitions advice to the battlefield. The munitions warrior includes Soldiers and DoD civilians located in Tactical, Strategic and Operational Commands. Successful munitions support also relies heavily on commercial industry. The munitions warrior is enabled with a career long education system, near real-time visibility and health monitoring systems, state of the art transportation, MHE, APE, TMDE and packaging to safely and successfully execute his mission.**

Munitions Warriors of 2030

Soldier, Civilian, Contractor - The Munitions Warrior is an Officer, Warrant Officer, Noncommissioned Officer, Enlisted, DA Civilian and Contractor. Each with differing areas of responsibility and subject matter expertise but all with a solid tactical and technical understanding of munitions and munitions support systems (e.g. capabilities/functioning, automation, MHE, APE, production, etc.). Expertise will be gained through progressive levels of education and mission accomplishment. MW is a Subject Matter Expert (SME), advisor, mentor, executor, trainer, and strategic "partner" with a common goal of providing the Joint and coalition warfighter with the tools necessary to successfully engage and defeat our adversaries across the full spectrum of conflict in a future asymmetrical war fight.

This MW will have 360 degree near real time awareness of all munitions and their capabilities from the tactical to strategic levels (including in transit) as well as a common operating picture of the battlefield, munitions requirements and priorities, automated near-real time expenditure rates, and resupply capabilities.

Throughout their carefully managed careers these soldiers and civilians will undergo standard Soldier training commensurate



with grade and position as well as career long technical certification and recertification at a Joint Munitions School of Excellence (JMSCOE). Only those capable of mastering the rigorous tactical and technical requirements will progress in this field. The JMSCOE is not limited to logisticians but is also open to master gunners from various CA and CS Schools of Excellence as well as OGA, Allies, Coalition Partners, etc.

Officers - MW Officers are advisers to tactical, operational and strategic Joint and Coalition warfighters on all aspects of munitions including how best to use munitions to leverage and support the warfight. These leaders will operationalize munitions issues and will be sought out by decision makers for their knowledge in lethal and non-lethal effects. MW Officers will be identified with munitions additional skill identifier (ASI).

Warrant Officers - MW Warrant Officers are technicians of the highest caliber and understand technical munitions issues at all levels. They are the munitions managers, and teachers, and mentors for all levels of warriors in the munitions field.

Non-Commissioned Officers - MW Non-Commissioned Officers are the executers of the 2030 munitions mission and will advise all informal chain of command leaders at all levels regarding the safety, security, storage, issue and receipt of munitions. These warriors represent the last tactical mile and present the face of munitions to the end user.

Department of the Army Civilians - MW Department of the Army Civilians (DAC) are technical experts that augment and support the Munitions structure through years of training and progressive munitions assignments that ensure munitions production and logistics are safe, economical, and ready at a moment's notice for employment. In many cases the MWDAC represent the continuity in many critical munitions areas.

Commercial Ammunition Service Providers (Contractors) - Commercial munitions providers, or contractors, will provide a myriad of services that will encompass all levels of munitions production and logistics from development, procurement and maintenance of critical munitions components and end items to designing, managing and improving munitions automation.

Equipment

The 2030 Munitions Warrior is responsible for precision munitions with scalable effects (highly lethal to non-lethal), extended range, low signature, minimal energetic materiel, and extended/predictable shelf life. These easily transportable munitions will support modular lethality, precision and reliability upgrades, embedded AIT, Joint HERO standards, and UXO, IM and environmental requirements. Additionally they will contain embedded sensors to provide near real time health assessment. In 2030 numerous munitions are common to more than one service and system or combat platform. While supporting these improved munitions, the Munitions Warrior must continue to maintain SME in legacy Joint and Coalition munitions at all levels.

All Materiel Handling Equipment (MHE) and Ammunition Peculiar Equipment (APE) associated with munitions must be an integral part of existing and future combat systems and incorporated as part of soldier training. It must be multi-functional, agile, energy efficient, and able to operate in all terrain/environmental conditions.

"In 2030 numerous munitions are common to more than one service and system or combat platform."

The MW's equipment, enablers and packaging must be rugged, lightweight, scalable/modular, aligned properly and tailored towards minimal handling, automatic upload and meeting mission requirements. It is imperative that this equipment function in all environmental conditions be adaptable to support Joint and Coalition operations, and support movement via existing ground, air and sea transportation platforms.

Systems IT - A single, web based, Joint Ammunition Information System will provide near real time visibility of all munitions from strategic to tactical (platform level including intransit) and include anticipated munitions procurement, production and projected government acceptance, near real time combat/training expenditures, as well as accountable, technical and surveillance information. System will track munitions from procurement to expenditure or demil and include health assessment tools. This system will include applications that will provide the logistician and operator with the ability to rapidly develop, design, and deliver combat loads to maximize operational effectiveness.

Transportation - Innovations in storage and transportation technologies and munitions development will significantly reduce the munitions logistics footprint while increasing MW safety and force protection. All equipment will be future force compatible across all services.

Storage - All munitions storage areas and transportation systems will be equipped with advanced defensive security, safety, protection and environmental conditioning systems. Storage systems will additionally support near real time visibility and health monitoring systems**.**

Ammunition Peculiar Equipment (APE) – will be managed with the same level of management as other critical handling equipment and be relevant and focused with the highest priority given to operational needs. APE must be self contained, energy efficient, survivable, and mobile.

Industrial Plant Equipment (IPE) – must be modular, automated, flexible, and maintained. IPE is critical to all munitions production and must be of the most updated available technology available to ensure its efficiencies.

Test, Measurement, Diagnostic Equipment (TMDE) - TMDE must be portable, rugged and multifunctional to give munitions personnel maximum capability to perform diagnostics in the field and while the commodity is in its original packaging. TMDE must support a wide array of embedded sensor technology for diagnostics and prognostics of munitions.

Munitions Packaging and Handling - Modular packing will continue to evolve with light weight, all weather, reusable, recyclable, easy opening containers to ease access and reduce weight, while maintaining munitions integrity and safety. Unitization will continue to develop along with air, land and sea based support platforms for movement that will significantly minimize munitions handling. Munitions handling systems will evolve to reduce manual munitions movement and loading by soldiers until the rounds are ready for use. Large caliber and missile systems will support "auto-loading" of weapons directly from containers to weapon platform thus reducing or eliminating damage, accident and injury.

Organization

The 2030 MW will reside in all organizations responsible for Army specific and service common munitions and missiles from tactical to strategic levels including all those responsible for full life cycle munitions functions (RDT&E to demilitarization). At the tactical and operational levels this will include maneuver and maneuver support organizations and structures. In 2030 munitions support structures are flexible enough to support a high OPTEMPO, full spectrum, asymmetrical warfight.

Tech trends for survivability on the battlefield

TROPHY, being produced by RAPHAEL, maintains a 360-degree field of view with its radar, picking up incoming threats and, with some complicated physics and mathematics, finds the bearing of the incoming threat. Once identified, TROPHY calculates the time and angle to fire its shotgun-like pellets to repel the threat. The system can engage multiple threats simultaneously from different directions and is designed to work against all incoming anti-tank missiles and rocket-propelled grenades. Also, the ability to fire upon incoming threats on the move gives infantry vehicles and tanks equipped with the TROPHY system the ability to evade the enemy while under attack. TROPHY may not completely alleviate the need for reactive armor installation as it is not capable of defending against land mines, artillery, anti-tank guns, or IED attacks.

They are joint, modular, split based, retail and wholesale Battalion, Company and platoon level organizations. Operational/Theater Joint and Coalition staffs will include MW SME's.

A truly Joint Munitions Command (JMC) will include a single Central Munitions Materiel Management Agency, CONUS and OCONUS storage locations, production facilities/installations and will maintain strategic partnerships with the commercially owned and operated munitions industry.

Training

Throughout their career, the future Munitions Warrior will train at a tactically and technically focused Joint Munitions School of Excellence (JMSCOE) that will focus on core munitions competencies. This training will be oriented, and based, on a career long path of certification and recertification of increasing complexity, depth and breadth. All JMSCOE training will be followed by mandatory field assignments (where possible) for all military and civilian munitions warriors.

On-line, virtual training tools will be used to augment classroom training and will be distributed annually based on changes to munitions, weapons, tactics, techniques and procedures, safety, automation, policy, etc.

Soldiers and civilians will recertify on a periodic basis or lose advancement potential and munitions certification status. Training will offer exchange opportunities with other services, allied nations and commercial industry. CONUS and OCONUS Depots are designed and operated to support habitual reoccurring training relationships with AC and RC ammunition units.

Training curriculum - Training and certification will include but not be limited to:

-- Capabilities, effects and functioning of all munitions and energetics including non-lethal and energy weapons

-- Joint and coalition weapons, combat platforms and combat loads, including current and legacy

-- Issue/receipt/storage/inventory procedures (field and garrison conditions)

-- All aspects of munitions identification, safety, malfunction reporting, etc.

-- Munitions transportation (Strategic, Operational and Tactical)

-- Munition requirements development and forecasting (Training, Operational and Pre-positioned)

-- All aspects of munitions support during combat and peacetime requirements

-- Requisitioning of munitions

-- Basic knowledge of the organic and commercial munitions Industrial base

-- Inspection criteria for munitions

-- Basic munitions maintenance, handling, packaging requirements and procedures

-- Munitions automated information systems and technologies

-- Munitions diagnostic and prognostic enablers

"Throughout their career the future Munitions Warrior will train at a tactically and technically focused Joint Munitions School of Excellence that will focus on core munitions competencies. This training will be oriented and based on a career-long path of certification and recertification of increasing complexity, depth and breadth."

-- Planning munitions retrograde operations

-- Munitions Program Management

-- Captured enemy munitions disposition

-- Munitions Contract support

-- Legal issues associated with munitions use

-- Roles and responsibilities of the key players in the development of munitions requirements and priorities as well as logistics support

-- Key regulations, Policy and Regulatory documents, and publications governing munitions management

Reach Back

The Munitions Warrior will have the reach capability to a truly Joint Munitions Command that is responsible for all aspects of munitions from RDT&E to expenditure or demilitarization. To effectively manage munitions, this JMC will have a military presence, with field experience, at all levels.

This reach back support will include organizations responsible for maintaining safety, training, development, engineering technological edge over adversaries and include an organic "rapid developmental" capability. Reach back enablers will include tele-presence, tele-maintenance, and knowledge collaboration/management through Avatar.

Joint Munitions Command - JMC will manage/own a responsive, modern, competent, scaleable (GOGO, GOCO, COCO) industrial base, capable of organic production of all munitions, components, subcomponents and materiel's. JMC will influence the development of strategic SPOD/APOD to ensure these ports are designed to easily support rapid munitions surge while minimizing explosive limitation issues and movement bottlenecks. JMC will also manage strategic pre-positioned munitions, which will be configured in bulk, combat and mission configured loads. These will be built at the ready brigade level and based on Strategic Planning Guidance and within COCOM planning parameters.

EOD Vision 2030

Explosive Ordnance Disposal (EOD) Soldiers are **the Army's preeminent team of explosives experts—warriors who are properly trained, equipped and integrated to attack and defeat explosive ordnance (EO) by rendering safe explosive devices and exploitation of forensic material of EO networks across all operational environments. The EOD mission is to defeat the Global Improvised Explosive Device (IED), Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives (CBRNE), and Weapons of Mass Destruction (WMD) threats. The EOD warrior will protect forces from EO and support maneuver forces by providing relevant and ready explosives experts in full-spectrum military operations, Joint and interagency operations, and support civil authorities in support of national security objectives.**

There are no "safe" procedures for rendering safe and disposing of UXOs, IEDs, CBRNE devices or other explosives, merely a procedure that is considered the least dangerous.

AR 75-15 Policy for Explosive Ordnance Disposal

EOD Warriors of 2030

The EOD Warrior is a double volunteer, first for the Army and then for EOD, one of the most challenging professions in the Army.

The EOD Warrior is trained as the Army's tactical and technical explosive expert. From the beginning he is trained how to mitigate or eliminate the hazards of conventional unexploded ordnance (UXO) and improvised explosive devices (IEDs). He is as skilled at rendering safe CBRNE devices as he is with tactical and mobility skills. This combination of technical and tactical skills, coupled with the EOD Warrior's unconventional problem-solving abilities, makes him a unique asset to all commanders in today's dynamic operational environment (OE).

The EOD Warrior is capable of executing his mission across the full spectrum of tactical, operational, and strategic environments. He is a diverse Soldier equally comfortable supporting a Special Forces Patrol in rugged mountains or urban terrain as providing support to US Secret Service Presidential Protection Details. He is adept at interacting with joint service or coalition partners and providing support to any brigade. EOD teams routinely operate across the OE, often away from their chain of command and with little more than a mission statement and commander's intent.

Asymmetric Warfare and Contemporary Operating Environment are not new concepts for the EOD Warrior; they are his profession.

The EOD Warrior is the culmination of the best tactical and technical training the Army and civilian academia can provide. He is trained from his first day to manage risk in all operations. The EOD Warrior moves into the enemy's kill zone fully understanding the myriad of hazards it presents.

— He **analyzes** the situation and decides the best course of action based on the mission of the unit he is supporting, his in-depth knowledge of ordnance and IEDs, and, most importantly, his experience from dealing daily with EO/IEDs.

— He **exerts control** over the threat area, building a cordon on the ground, restricting the air space to ensure friendly force safety, and dominating the electromagnetic spectrum to preclude enemy control of the threat device.

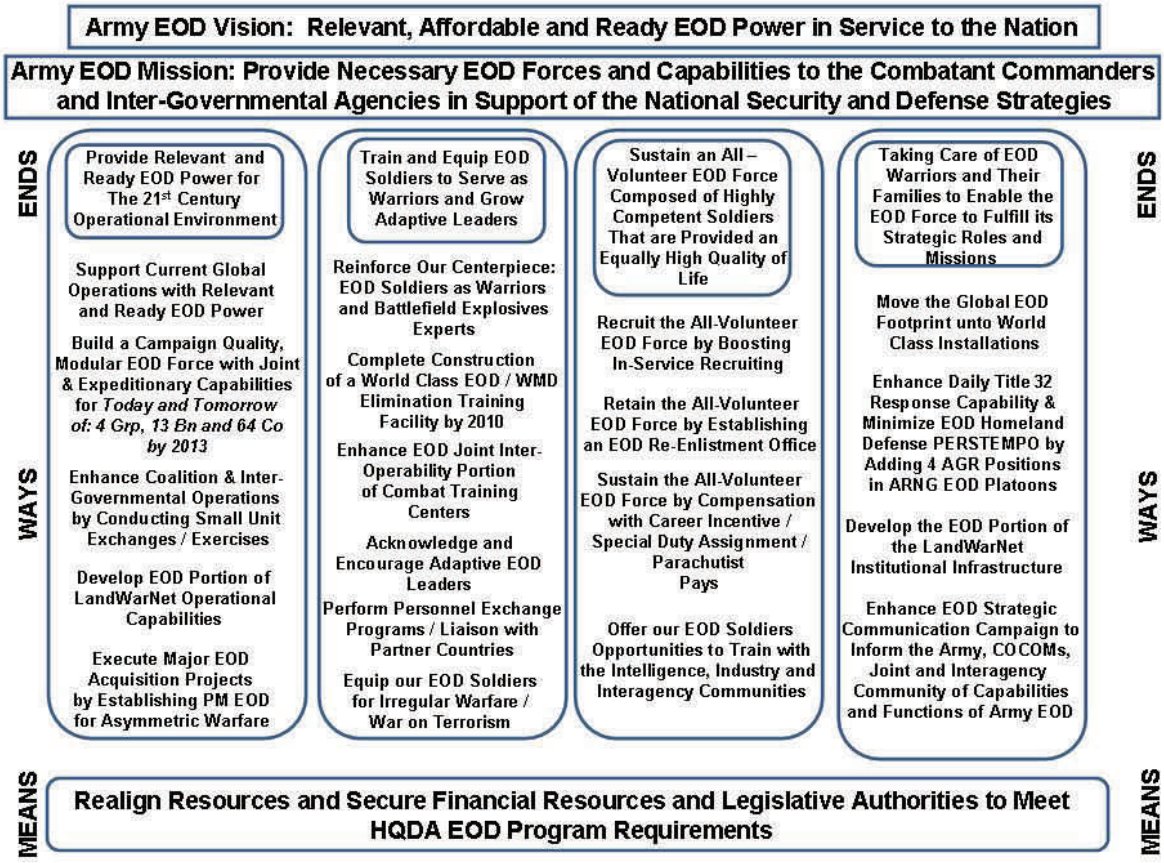
— He **takes action** to meet the supported commander's intent while, to the maximum extent possible, protecting the commander's personnel, equipment, supplies, and material.

The EOD Warrior is a master of sophisticated technologies in remote diagnostics, robotics, and electronic counter-measures; however, he understands that his greatest weapon will always be his mind. When the tactical or physical environment requires it, he will take the "long walk" in a bomb suit in order to defeat and exploit the enemy's preferred weapon system.

"The EOD Warrior is a master of sophisticated technologies in remote diagnostics, robotics, and electronic counter-measures; however, he understands that his greatest weapon will always be his mind."

Once the explosive threat has been rendered safe, the EOD Warrior collects and analyzes the threat ordnance or device. He provides an assessment to the supported unit and through the EOD chain of command. These reports are used to refine equipment and tactics, techniques, and procedures (TTPs) such as improved electronic countermeasures, new armor, or educating friendly forces in how the enemy fights. The technical intelligence and assessments are used to develop actionable intelligence for targeting the bomb maker and his support network. The EOD Warrior understands the importance of offensive action—targeting the enemy's bomb making network; if the sophisticated bomber is allowed to continue his operations unabated, there will be no end to the attacks.

Whether in CONUS assisting in Homeland Defense missions, defeating IEDs and WMD around the globe, or assisting our interagency and coalition partners, EOD Warriors will continue to be the world's preeminent explosives operators in the service of the nation.



Equipment

The EOD Warrior and future EOD units, down to platoon/team level, will be equipped with the best standoff and remote platforms available. These platforms may be vehicle mounted, automated, robotic, or aerial. The equipment will be capable of providing advanced identification of CBRNE threats, including the identification of threat triggering systems, high-precision render safe, and exploitation capabilities. Modular, integrated, and interoperable capabilities allow information sharing and reporting between the EOD knowledge systems and the knowledge systems employed by the Joint Operational Forces. To ensure team/platoon mobility, equipment must be of minimum cube, weight, and space. Each EOD team, platoon, and company will have the modular and integrated capability to safely maneuver to and access mission locations and operate within the EOD team and platoon mission sites with a full spectrum of physical and electronic security measures to protect against the EO and attack threat.

Stand-off detection, identification, render safe, and exploitation of EO, IEDs, and CBRNE/WMD components and hazards, to include toxic industrial chemicals/toxic industrial materials requires application of state of the art directed energy technology, robotic and unmanned aerial vehicle (UAV) technology, and x-ray and imaging technology. Explosive-protected vehicles and EOD Warrior personal protective equipment will require a suite of sensing and reconnaissance systems. The EOD Warrior will have equal capabilities with a personal suite of sensing and reconnaissance systems

To ensure the interoperability of the EOD forces with the supported maneuver battalion, the EOD team/platoon/company must be provided the same equipment capability in communications, force protection, mobility, and individual equipment.

The EOD force must be provided with the tools and techniques at every level that enables them to provide timely and accurate intelligence on all CBRNE/WMD, IEDs and EO. The EOD Warrior will require a "single-source" database provider to collect, assess and disseminate information. This database must be capable of integration and interoperability with intelligence networks across all services and agencies.

EOD SOLDIERS ARE:

- battlefield tactical explosive experts;
- the action arm of the nation's global IED Defeat campaign;
- confident in their understanding of fusing, firing, munitions, explosive effects, know how to collect biometric and forensic intelligence;
- team members able to provide commanders practical, innovative and technically sound solutions to counter and defeat threats;
- trained and resourced to operate across all levels of war and execute missions across the full spectrum of conflict;
- an all-volunteer force specially selected and trained to withstand the rigors of extended combat opera tions

EOD FORCES:

- assist in finding, fixing and engaging threats to maneuver forces;
- advise commanders on explosive operations;
- provide expertise for technical and tactical site exploitation in order to collect actionable intelligence to "get left of the boom;"
- protect maneuver forces before, during and after operations;
- provide support to Home and defense activities, VIPSA and CONUS area support activities;
- provide regional theater engagement through "Mil-Mil Engagement Programs ("EOD Family");
- provide proactive engagement and expertise every where to the "E" of CBRNE.

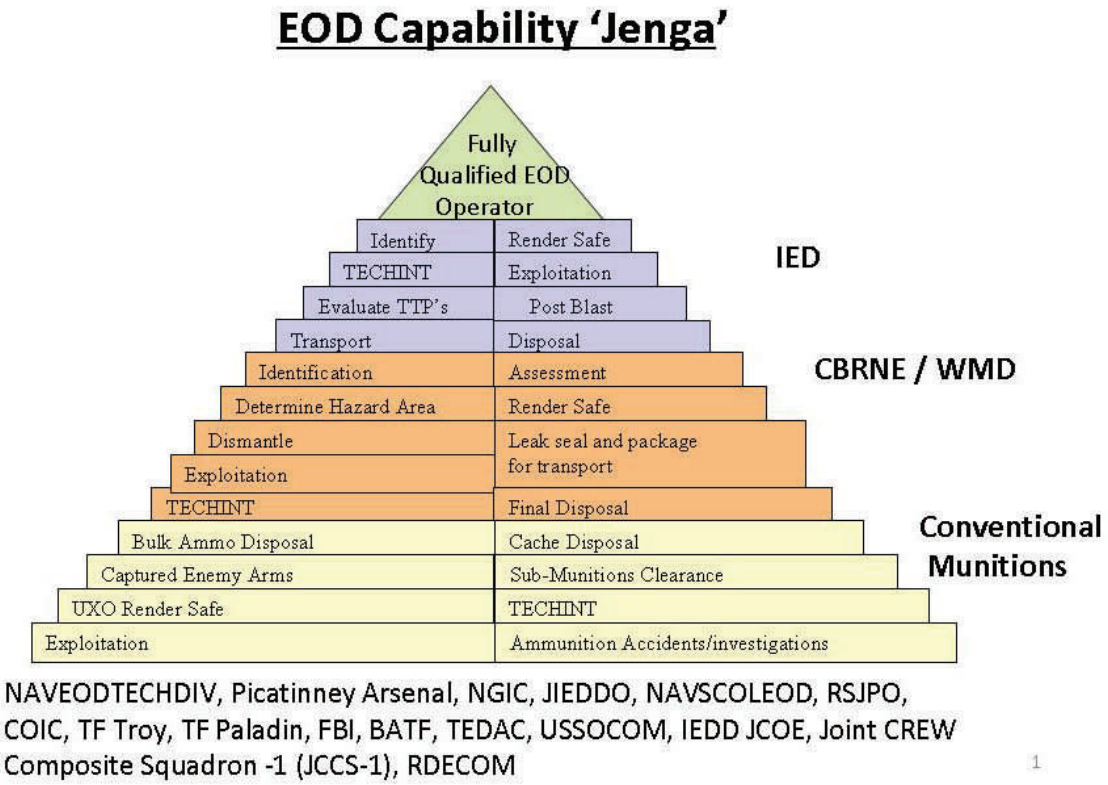
Organization

The modular EOD company will be the centerpiece organization of the EOD Force. In conventional EOD and specialized companies with an EOD component, EOD Warriors will hone their EOD craft as well as their Soldier skills to become highly trained, capable, and skilled in individual as well as collective tasks. Functional battalions and groups as well as a support command will effectively supervise and manage the lower level echelons and balance the myriad of mission requirements amongst the units. Geographical combatant commands, Army Service Component Commands, and corps and division staffs include EOD personnel staff/liaison officer positions. This ensures complete integration and coordination between EOD and the maneuver commands; ensuring comprehensive operations planning and incorporation of EOD considerations and functions into mission operations. A network of EOD personnel assigned to critical institutional organizations and governmental agencies will effectively coordinate issues and influence decisions affecting maintenance and development of the institutional Army EOD program.

EOD forces are organized to provide the following specialized capabilities: Counter-WMD (CWMD), CBRNE, and intelligence collection and analysis regarding weapons systems and EO. EOD battalions and groups will resource EOD companies and be strategically located in CONUS on major projection platforms and OCONUS in support of combatant commanders. This level of command will provide command and control of EOD companies' specialized mission capabilities in support of Homeland Defense/Civil Support, CWMD, and CBRNE operations.

Institutional organizations, such as the DA EOD program office, provide oversight and resources to ensure EOD forces are properly manned, trained, and equipped. In the future a separate EOD branch and proponency should be established to provide management and integration of EOD across the concepts, doctrine, organizational, training, material, leader development, personnel, and facilities (C-DOTMLPF) spectrum.

The DA EOD program office and EOD proponency will ensure coordination and interoperability within the joint/intergovernmental/interagency/multinational (JIIM) environment in order to integrate Army EOD forces.



Training

EOD Warriors are immersed in a continually evolving training environment. Individual and team training is conducted in a world class EOD training center of excellence. Units conduct collective training through integration with maneuver forces at combined training center (CTC) rotations, local training events, and networked/full immersion distance learning training environments. Army Phase 1 EOD training immerses Soldiers and Officers into the EOD ethos and culture, fully preparing the EOD Warrior for the "Long Walk" and Defeat the Network missions. The world class training center maintains the individual through professional development programs of instruction for EOD core competencies. Deploying EOD companies receive training on specialized mission skills through functional courses at the training center of excellence, culminating with integration and training with the maneuver forces at CTCs. EOD battalion and groups participate in division and corps level exercises as they refine staff drills and theater-specific requirements.

Training priorities include establishing an Army EOD Center of Excellence that will integrate Army Phase 1 EOD training with NAVSCOLEOD, conduct officer and NCO professional military education, partner with industry for civilian education/training opportunities, conduct functional training for specialized mission requirements, conduct C-DOTMLPF development / analysis, and integrate EOD with Army Schools and Centers and other services across the C-DOTMLPF

We must reach out to DoD and academia for enhancement training in the field of explosives, munitions development, and safety for enlisted and officers. We must also work to develop relationships with NATO and other allied EOD organizations to increase technical knowledge and to enhance interoperability capabilities of Army EOD assets.

Reach-Back

The operational environment requires that EOD teams have immediate access to and receive information from a variety of subject matter experts (SMEs), often simultaneously. The complexity of emerging weapons systems requires EOD teams to have comprehensive reach back capabilities up to the DoD and national levels. Additionally, EOD teams must have reach across and feedback capabilities to provide and receive near real time, relevant reporting on weapons systems, EO, and trends in order to populate a database with the most current information for collection and evaluation. For effective reach back capability, EOD teams require near real time secure and non-secure mobile communications allowing for conferences single or multiple SMEs.

Key priorities include establishing and augmenting an organization that provides management, integration, and interoperability of a knowledge base consisting of relevant data and analysis of weapons systems, EO, and IEDs. We must perpetually develop a real time, standardized, integrated, and interoperable knowledge base. We must integrate reach back, reach across, and feedback training into TTPs throughout the EOD force, the institutional training base, DOD, and national agencies and organizations.

The future is now...

Big Dog of War

Meet Big Dog, a mechanical mutt that does more than snare Frisbees and irrigate fire hydrants. It totes hundreds of pounds of gear so Soldiers won't have to, and it will never spook under fire. Developed by Boston Dynamics with funding from the U.S. military, the Big Dog prototype is arguably the world's most ambitious legged robot. Its stability and awareness of its own orientation make it the first robot that can handle the unknown challenges of the battlefield. The Great Dane-sized robot can trot more than three miles an hour climb inches of terrain in seconds, and is impervious to hot and cold. *(Photo by John B. Carnett)*

Toss and view

360-degree surveillance

The Surveillance Video Ball Camera is a compact wireless 360-degree mobile display system, designed to be used in tactical operations where security personnel need to see the situation before entering a building, floor or room. The Surveillance Video Ball Camera is rugged, allowing it to be rolled, tossed, lowered or thrown as applications demand. It features an omni-directional camera, near infared illumination up to 9 yards, captures video up to 25 yards and audio up to 5 yards, and transmits streaming video up to 200 yards. Purchase price is about $5800 and it can be rented for about $1500 per week.

The Ordnance Corps Vision is on the web:
www.goordnance.apg.army.mil

For information and/or questions pertaining to the Ordnance Corps Vision contact:

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