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26 MAR 2001

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Special Operations Technology Objectives (SOTO)

1. I am delighted to release this first United States Special Operations Command (USSOCOM)- developed listing of long-range technology objectives (enclosed). A dramatically shifting national security environment throughout the world underscores the need for continuing investment in science and technology. In spite of budget pressures to the contrary, special operations forces (SOF) continue to depend on investment in new technologies to provide SOF warriors with the advantage their missions demand. The SOF community depends on applied technology to expand and enhance the unique abilities of the individual and we in Special Operations Acquisition and Logistics Center (SOAL) ensure they retain that critical advantage with a strong commitment to technology development.

2. Title 10, USC, gives USSOCOM the authority to develop and acquire special operations-peculiar equipment to support SOF. Although SOAL is interested in a broad spectrum of technology, our Directorate of Advanced Technology concentrates on areas with potential benefit to the SOF operator in the near to mid-term. The SOTOs reach out two decades or more beyond our current programs to provide a baseline for SOF 2020. I believe these objectives describe capabilities and technologies enabling SOF to achieve and maintain the operational advantage in the technologically advanced threat environments of the future.

3. As with all aspects of our society, the world of advanced technology development has changed greatly. Today's military depends heavily upon commercial research and development to advance the state of the art in science and technology. I encourage the broadest possible distribution of the SOTOs within the R&D community. We enlist your cooperation and invite you to become a partner with SOF as we shape the forces that will carry us into the 21st century.

Harry E. Schulte

HARRY E. SCHUL TE
Acquisition Executive

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INTRODUCTION

Special Operations

Special operations have been a part of our military history since the colonial era. In every conflict since the Revolutionary War, the United States has employed special operations tactics and strategies to exploit an enemy's vulnerabilities. Specially trained people, with a remarkable inventory of skills, have carried out these operations.

More recent history has caused the United States to maintain specialized forces capable of performing extremely difficult, complex, and politically sensitive missions on short notice, in peace and war, anywhere in the world. In 1987 Congress mandated the creation of the U.S. Special Operations Command (USSOCOM) with the responsibility to prepare and maintain combat-ready special operations forces (SOF) to successfully conduct special operations, including civil affairs (CA) and psychological operations (PSYOP).

Characteristics and Capabilities

U.S. SOF provides unique capabilities not found in other elements of the U.S. armed forces or those of other nations. While other U.S. military units can conduct special operations, and some other nations have special operations capabilities, no other force in the world has its range of capabilities, including land, air, and maritime forces employed either as joint or single-service units.

Today's SOF is the product of an evolutionary process. The lessons learned from past operations and events, as well as the requirements of current missions and operations, have brought about a unique force with distinctive characteristics and capabilities as well as limitations.

SOF Characteristics

- Mature professionals with leadership abilities
- Specialized skills, equipment, and tactics
- Regional focus
- Language skills
- Political and cultural sensitivity
- Small, flexible, joint-force structure

The characteristics of SOF personnel are shaped by the requirements of their missions and include foreign language capabilities; regional orientation; specialized equipment, training, and tactics; flexible force structure and an astute understanding of the political context of their mission. These characteristics make SOF unique in the U.S. military and enable SOF personnel to work as effectively with civilian populations as they do with other military forces to influence situations favorably toward U.S. national interests. Because of these characteristics, SOF can be formed into small, versatile, self-contained units having a number of important capabilities. They can:

- organize quickly and deploy rapidly to provide tailored responses to many different situations
- gain entry to and operate in hostile or denied areas
- provide limited security and medical support for themselves and those they support

- communicate worldwide with unit equipment
- live in austere, harsh environments without extensive support
- survey and assess local situations and report these assessments rapidly
- work closely with host nation military and civilian authorities and populations
- organize indigenous people into working teams to help solve local problems
- deploy at relatively low cost, with a low profile and less intrusive presence than larger conventional forces

Across the Spectrum of Conflict

Based on these capabilities, SOF provides the nation with rapidly deployable and flexible joint task forces for both war and peacetime activities. In peacetime, SOF can assist a nation in creating the conditions for stable development — thereby reducing the risk of or precluding armed conflict. By training indigenous forces to provide their own security, and using integrated CA and PSYOP programs to strengthen government infrastructures, small teams can help prevent local problems from developing into threats to internal and international stability. SOF works closely with the host nation government, military forces and the indigenous population assisting them in resolving their own problems. Their efforts to resolve or contain regional conflicts or respond to natural disasters may preclude, in some cases, the need to deploy large conventional forces.

These same SOF teams often forge strong links with the military establishment and civilian groups with whom they come in contact. This can be of inestimable value to U.S. forces if they have to work later with these same organizations, either as coalition partners, or in localized combat operations. SOF contact with foreign military hierarchies is also an effective, low-cost means of cultivating respect for human rights and democratic values.

In war, SOF conducts operational and strategic missions directly or indirectly supporting the joint force commander's (JFC's) campaign plan. SOF missions originate with the JFC – often with the advice of the joint force special operations component commander (JFSOCC) – and are directed toward exactly the same ends as the operations of conventional forces. It is as an integrated part of a joint or combined force that SOF proves of greatest assistance to the conventional commander.

SOF can help the JFC seize the initiative, reduce risk, facilitate maneuver, and achieve decisive results by attacking operational and strategic targets. SOF also can carry out PSYOP to deceive and demoralize the enemy. As force multipliers, SOF work with indigenous forces to increase their contribution to the campaign plan, and conduct coalition support to help integrate multinational forces into a cohesive, combined task force to carry out coalition goals. Additionally, CA and PSYOP can contribute directly to the commander's maneuverability by reducing the number of civilians on or near battlefield areas.

Additionally, SOF plays a vital role in post-conflict operations. Many of the talents used in pre-conflict situations are applicable after fighting has ceased, and are directed toward establishing (or re-establishing) the infrastructure

required for a peaceful, prosperous society. SOF training skills, coupled with CA and PSYOP expertise, help speed the return to normal conditions, thereby allowing conventional forces to quickly re-deploy.

SOF also can conduct stand-alone operations in situations where a small, discreet force provides the nation's leaders with options that fall some-where between diplomatic efforts and the use of high-profile conventional forces. Moreover, the relatively small size and the capabilities of highly trained, joint SOF units enable them to react rapidly and provide the United States with options that limit the risk of escalation, which otherwise might accompany the commitment of larger conventional forces. Unconventional warfare, direct action, and special reconnaissance missions, such as insurgency, counterterrorism, counterdrug activities, surgical counterproliferation, and counterinsurgency may be handled best by such a force.

Counterproliferation of weapons of mass destruction (WMD) is USSOCOM's highest operational priority. SOF can enhance the effectiveness of U.S. military, other government agencies, and international organizations in deterring proliferation of WMD and reacting appropriately should deterrence measures fail.

Against a growing security challenge, SOF also offers a wide variety of skills to combat terrorism. One area of focus includes defensive antiterrorism measures, such as training and advising of security techniques, procedures, and systems reducing vulnerability. The other major element of SOF operational capabilities centers on offensive counterterrorism measures directed at preventing, deterring and vigorously responding to terrorist acts against U.S. interests, wherever they occur.

Limitations

As with any highly specialized capability, it is equally important to understand the limitations of SOF. Some points to bear in mind are:

- SOF operators require extensive training, often years in duration. They cannot be replaced quickly and their capabilities cannot be expanded rapidly. Squandering scarce SOF resources on inappropriate missions or inordinately dangerous tasks runs the risk of depleting the SOF inventory early in a conflict.
- SOF is not a substitute for conventional forces; they provide different capabilities expanding the options of the employing commander. SOF should not be used for operations whenever conventional forces can accomplish the mission.
- SOF is not the solution to peacetime operations. SOF has a role to play in peacetime operations, just as they have a role to play in war. Peacetime operations almost always require an integrated, interagency approach to solve the problems encountered. SOF alone cannot do this.
- SOF logistics support is austere. A large number of SOF units generally cannot maintain themselves for extended periods of time without significant support from the conventional support structure.

Missions and Activities

Special operations are characterized by the use of small units in direct and indirect military actions focused on strategic and operational objectives. These actions require units with combinations of specialized personnel, equipment, training, and tactics that go beyond the routine capabilities of conventional military forces. The enduring, overarching purposes of SOF are derived from historical experience, congressional legislation and the evolving security environment. In support of the national military strategy, SOF are currently organized and trained in nine principal mission areas.

Based on their unique capabilities, SOF are also frequently tasked to participate in other activities that are not principal SOF missions. These collateral activities tend to shift in response to the changing international environment. The principal missions and collateral activities of SOF are listed below.

Principal Missions

- **Counterproliferation (CP)**
- **Combating terrorism (CBT)**
- **Foreign internal defense (FID)**
- **Special reconnaissance (SR)**
- **Direct action (DA)**
- **Psychological operations (PSYOP)**
- **Civil affairs (CA)**
- **Unconventional warfare (UW)**
- **Information operations (IO)**

Collateral Activities

- **Coalition support**
- **Combat search and rescue (CSAR)**
- **Counterdrug (CD) activities**
- **Humanitarian demining (HD) activities**
- **Humanitarian assistance (HA)**
- **Security assistance (SA)**
- **Special activities**

PREFACE

To shape and harness future technology for military use, joint and Service programs must focus on three fundamental requisites: first, our armed forces must stay abreast of the leading edge of national and international science and technology so the promise of new developments can help provide more effective alternatives to satisfy future military requirements. Second, we identify those deficiencies that will persist until some breakthrough provides either a new technology or a new approach to the problem. Although we need to encourage the civil sector in these areas, government-sponsored Research & Development is appropriate and should be given high priority. Third, viable technologies for military application must be both reliable and survivable in a "field" environment. Often commercial development falls short of this requirement and advanced engineering development is needed to allow the technology to mature.

Although these requisites apply generally to military R&D, they apply particularly to special operations that make more stringent demands on the warfighter. Special operations require exhaustive operator-level planning and detailed intelligence. Success depends on speed, flexibility, and the ability to survive in austere/physically challenging environments. Missions are often conducted at great distances from the supporting operational bases, rely on sophisticated communications systems, and frequently require discriminate and precise use of force. The SOF operator requires a combination of standard military training and specialized skills to achieve operational proficiency. Equipment standard for other Department of Defense forces often fails to meet the performance thresholds for special operations.

Special Operations Forces (SOF) are organized, trained, and equipped specifically to accomplish nine principal missions: direct action, special reconnaissance, foreign internal defense, unconventional warfare, combating terrorism, psychological operations, civil affairs, counter proliferation of weapons of mass destruction, and information operations. These principal SOF missions are enduring and change infrequently. SOF elements are normally integrated into theater and contingency plans, as much a part of a given campaign plan as logistics. On the other hand, SOF can operate unilaterally in support of very limited objectives, but the missions remain unique to special operations. Success depends on individual and small unit proficiency in a multitude of specialized, often non-conventional combat skills practiced with adaptability, improvisation, innovation, and self-reliance. Reliable, ruggedized, state-of-the-art equipment is an absolute necessity in this environment.

SOF air, sea, and land possess common traits. Each element is *strong, light, fast, stealthy,* and possess that very special intangible referred to by the French as *élan.* Special warfare elements not only want iron bodied and iron willed personnel, but they need equipment that is *strong* enough to withstand unusually rough use and still function as it was designed. Special Forces want their equipment to be *light* and this trait applies to all SOF operators. The equipment they carry and the mobility platforms that they rely upon to move them through the battlespace must be lightweight. Light equipment is always preferred over systems that add weight. Special forces want *speed*. For them, speed can be

a life or death matter—it is never an optional attribute while executing a mission. Special Forces want *stealthy equipment* and *stealthy bodies*. The ability to be quiet or to have low/extremely low visibility counts heavily in the survivability equation for SOF operators. Lastly, SOF wants its personnel to possess that which can't be manufactured or produced in a lab or on the factory floor, but is the essential compliment of *strong, light, fast and stealthy*—it is that intangible, *élan,*—the special spirit animating special operators since the world first heard of the Revolutionary War hero Francis Scott Marion, the Swamp Fox who depended first on his wits and then on his musket. Special operators know they are members of the best SOF fighting unit(s) in the world. With rigorous training, specialized *strong, light, fast, stealthy* equipment and élan, they will meet every challenge and conquer every obstacle.

Based on this understanding of the forces—the community we support—the USSOCOM Directorate of Advanced Technology began the task of compiling Special Operations Technology Objectives (SOTO). Each of the 40 objectives that follows is a specifically named area of technology where USSOCOM has identified interests and future required capabilities. Each SOTO groups enabling technologies and thus provides potential solutions for SOF needs, and continued enhancement of SOF unique capabilities in a future force. These objectives are not aimed at resolving the challenges we face in today's force—solutions are already underway to meet near-term needs. SOTOs reach out two decades or more to provide what we believe is a disciplined approach to catalogue future needs and use that information to guide basic research.

In this effort the SOF community is seeking to embrace the future with all its uncertainty and ambiguity. One cannot say, with any degree of surety, what the future holds for warfare and SOF in particular, but that is not to say we cannot look to what we know about the future and make "best military" judgements. This is the approach taken by the authors of the SOTOs. A central judgement or assumption relative to these objectives is basic tasks/needs confronting the SOF warrior of today will in fact persist, to a greater or lessor degree, in the future. The key is to isolate BASIC needs and tasks. For example the SOF operator on a reconnaissance mission may need to know what is on the other side of a wall. Today our options are to go over, under, or through it. In the future we may have other options but the SOF operator will still have the same basic need . . .to "see" through the wall. That knowledge can help guide basic research in a variety of technologies to our benefit if the needs of the SOF operator are understood. The SOTOs link technologies and groups of technology applications to broad capability statements. The combination is intended to allow the research and development community an opportunity to visualize and analyze future opportunities in terms of their benefit to SOF. This is a strong paradigm since the SOF standard is among the most demanding military standard in the world.

The future of our country and the world is uncertain. It is this uncertainty SOF must embrace as we seek to apply our "best military judgement" to the future. SOF must lead the way in supporting military use of "soft sciences" (those areas of technology where an item of equipment is NOT the centerpiece . . . if in fact any physical "thing" is produced). Our future research must also embrace the non-physical sciences. USSOCOM must realize focusing on the material is just half of the "new science" equation. SOF must certainly care about the physical tools of tomorrows warriors and pursue the latest technologies to arm and

protect them, but it must also care about the non-physical—the mind—and what we as humans can't even express in words as regards the spirit—the animating force of mankind. Napoleon said it best: " . . .the moral is to the physical as three is to one." Of course, like us today, he never dreamed one day mankind would be able to harness the full, or near full, potential of the human mind . . .that the "moral" (the unseen, the unheard, the untouchable) would someday eclipse (by three) those physical tools (the one) of combat that heretofore have been the centerpiece of efforts to wage and win wars.

SOF must adapt or be overcome by the new frontiers of technological change. Genetics, Nano-technology and Robotics (GNR) will sooner, rather than later replace Nuclear, Biological and Chemical (NBC) as entities defining operational imperatives. SOF will have to adapt to these entities or become irrelevant to the National Command Authorities and to our military establishment. SOF certainly has the ability to lead the way, and we believe the community has the will to leap ahead in technological (not necessarily physical) change. These changes may include inexpensive mini, macro or even nano weapons and platforms; a whole new class of biological weapons and countermeasures; greatly enhanced volumetric explosives; impossible to jam optical communications and navigation systems; "do-everything" sensors and an increasing emphasis on electronic information operations. The SOF community has always prided itself as the leader in adopting leading edge technologies to garner an operational advantage over its adversaries. Unfortunately the world is changing at a rapid rate. This rate of change will bring with it new challenges—new frontiers for SOF to conquer. We must not fail to welcome change—to embrace it, and then use it to our benefit. The very existence of our nation may hang in the balance.

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EDITORS NOTE

The 40 SOTOs are to be used in conjunction with the Component Capabilities/ Future Concept Working Group (FCWG) Concept Statements. The numbers in the “Capabilities Objectives” portion of the SOTOs represent a corresponding number in the Component Capabilities/FCWG Concept Statements. There is also an AFSOF/NSW “non-material” portion included. These represent “non-material” capabilities from the Air Force Special Operations Forces (AFSOF) and the Naval Special Warfare Command (NSWC). The non-material capabilities are NOT included in the “Capabilities Objectives” portion of the SOTOs, but nevertheless represent stated Component Commander capabilities with no current “material” fix.

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SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 01

TITLE: Lasers and Laser Protection for Personnel and Sensor Systems

SCOPE: The SOF operator, because of unique missions, will be subjected to a variety of directed energy weapons, intentional and unintentional eye hazards. He must be protected from the use of chemical, electrochemical, Electro-Optical (EO), and laser energy. The SOF operator will also use laser energy for missions such as target designation and attack, as well as medical surgery including cutting, coagulation, closure, and stabilization. SOF EO systems must be protected against detection and countermeasures. These goals must be realized while reducing the visual and sensor penalties associated with traditional and near-term protection technologies.

APPLICABLE TECHNOLOGY: Near- and mid-term laser protection technologies include **dye**, **rugate**, **enhanced dielectric**, and **tristumulus** band-pass and band-reject filters and absorbers. Combinations of these technologies, including **ballistic protection**, are technically feasible and near fielding status, but are very costly using present manufacturing techniques. New technologies are required which will produce eyewear and EO protection that are compatible with heads-up displays, night vision goggles, and helmet-mounted displays. Man-portable blue-laser Light (LASER) Direction and Ranging (LIDAR) based systems can be used for swimmer intrusion detection systems**.** These Blue lasers may also be useful as an underwater Low Probability of Intercept/Low Probability of Detection (LPI/LPD) communications system particularly for use with Advanced SEAL Delivery System (ASDS) and the SEAL Delivery Vehicle (SDV) with swimmers and host platforms. Far-term laser protection can be obtained through the use of optical shutters that rapidly blacken when exposed to high-energy laser input. This technology uses what are termed bistable materials that are transparent at low light levels and then rapidly (on the order of femtoseconds) switch to black when exposed to incoming high power light. Laser based retina scan display technology is also being pursued. For sensor systems, technologies are required that provide laser and EO protection for fielded and proposed EO systems with minimal degradation to sensor system performance. Advanced sensor hardening technologies that can be retrofitted into

When Suit Sensors Detect a Laser Environment, the Suit Material Changes to a Reflective/Absorbing Material

existing systems with no or little change to the external package and minor changes to internal optics are required in the near term. More robust sensor hardening approaches responsive to multiple wavelength threats is the longer-term goal. Next generation advanced protection technologies are required for panoramic night vision goggle (PNVG) and for staring sensors suitable for SOF specific mission profiles. Candidate technologies include **sensor hardening**, **gated power supplies**, **filmless detection tube architecture**, and **tunable liquid crystal filters**.

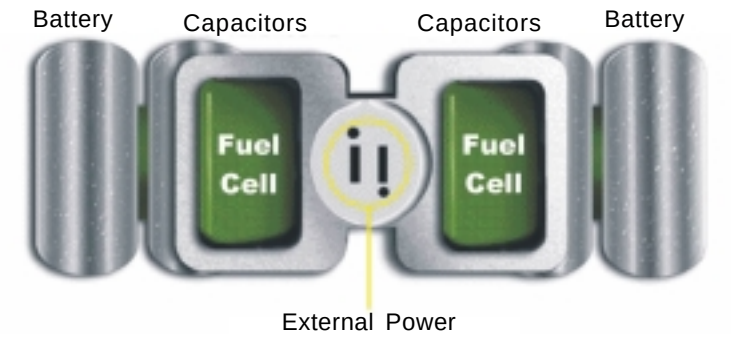
CAPABILITY OBJECTIVES:

USASOC: 129; **NSWC:** 1, 7, 9, 20, 22, 29, 31, 36, 40, 55; **AFSOC:** 2, 17, 22, 26, 28, 29, 31, 32, 41, 45, 48, 49, 50, 54, 57, 58, 61, 62, 63, 66, 68, 69, 76, 77, 80, 101, 102, 104, 105, 106, 129, 130, 158, 171, 173, 192, 198, 208, 212, 223; **FCWG:** 169

OPERATIONAL CONSIDERATIONS:

Lasers and laser protection will increase in importance for the SOF operator in the future. The major payoff is continued mission capability in the face of and presence of evolving laser and EO threats. The goal is to protect the SOF warriors and their sensor systems from electro-optical and infrared energy radiated or emitted by an adversary or friendly force. SOF warriors, either ground or aircrews, require protection from multiple wavelength lasers, including rangefinders, illuminators, designators, and dedicated, frequency agile, antipersonnel laser weapons. Lasers also may be used by SOF medical personnel to cut, coagulate, close, and stabilize wounds of SOF personnel. In addition, SOF forces both on the ground and in the air require the ability to detect an adversary's use of EO (laser) energy on the battlefield and to protect themselves and their equipment from these threats and countermeasures. Laser countermeasures may also be used to protect aircraft sensors and aircraft electrical In-put/Output (IO) systems. SOF operators will also require the ability to determine if an operator has been exposed to laser radiation during (and after) a mission. SOF operators, once they determine they are being lazed, need the means to reflect laser energy. Additionally, lasers will be used to assist underwater navigation for SOF submersibles. Lasers will be used to detect presence of NBC components as well as used in LPI/LPD communications. Lastly lasers will be used to detect buried objects as well as target designation.

PERSONAL POWER PLANT



SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 02

TITLE: Advanced Materials/Manufacturing Processing & Test Technologies

SCOPE: Advanced materials for SOF are characterized by lightweight and high-strength materials that will be able to perform in all environments and climatic conditions. These materials range from protection of vital organs of the body including protection from fragmentation, ballistic impact, chemicals, and laser energy, to signature reduction of each operator and his mobility platforms. Advanced materials will provide for the fabrication of components for high strength, lightweight land, sea, and air vehicles that not only reduce the vibration and stress to the SOF operator, but also provide greater speed, range, and protection to and from the operational area.

APPLICABLE TECHNOLOGY: This SOTO identifies those materials providing specific advantage to SOF. These technologies include materials engineered to defeat an enemy threat and functional materials needed to preserve the capability of high-performance hardware in daily operations. **Armor materials** include those materials and material systems specifically designed to protect equipment and personnel from enemy threats. Antiarmor materials include those materials for projectiles used to defeat enemy armor. **Superconducting electrical materials** provide the capability for lightweight, compact, high-power motors, magnets, and energy storage systems. **Magnetic materials** provide military applications in

magnetic shielding, **sonar**, and **high-speed power supplies**. **Optical materials** are critical to the reliable transmission of electromagnetic radiation to surveillance sensors, weapon guidance systems, or for countermeasures purposes while protecting the associated electronic componentry from the environment. **Structural materials** are used for the fabrication of military systems and are subdivided into (1) high-strength materials—those used for fabrication of SOF vehicles and (2) high-temperature materials—those used primarily for propulsion purposes. Special function materials used as **high-temperature lubricants**, **hydraulic fluids**, and **antifouling coatings** are required for SOF hardware to operate reliably at superior levels of performance. Develop **Spider Silk** technology for lightweight, flexible bulletproof vests. New materials are also being developed for use against thermobaric weapons for protection from overpressure effects.

CAPABILITY OBJECTIVES:

USASOC: 30, 32, 34,131; **NSWC:** 1,13, 14, 15, 16, 25, 26, 28, 35, 37, 41, 42, 43, 44, 49, 50, 51, 56, 57, 63; **AFSOC:** 2, 14, 15, 21, 26, 29, 30, 37, 38, 40, 41, 43, 46, 50, 59, 60, 66, 76, 84, 85, 88, 92, 93, 94, 95, 98, 99, 102, 103, 105, 106, 107, 110, 120, 129, 130, 132, 133, 136, 146, 147, 172, 176, 191, 198, 208, 210, 212, 216, 228 ; **FCWG:** 247, 267

OPERATIONAL CONSIDERATIONS:

Advanced Materials will give the SOF operator a decidedly qualitative advantage over any potential adversary. For example, new materials will give the operator unequaled body protection in the form of protective vests, helmets, and improved knee and elbow guards. All these will not only protect the wearer from the effects of flak and high-ballistic impact, but also be floatable and give buoyancy/neutral buoyancy to the operator. New materials will allow the operator to move about the battlefield with near impunity as a result of uniforms significantly reducing the visual and aural signature(s). Further, personal equipment such as canteens, holsters, rifle and pistol magazines, flashlights, and load bearing equipment harnesses will be lighter while at the same time stronger. Materials in the form of new uniforms will protect the operator from the effects of NBC agents, as well as allow him to operate in all environments, extremes of climate and terrain with safety and comfort. In addition, materials will enhance all types of engine performance, while concurrently eliminating corrosion for SOF aircraft,

boats, and ground vehicles. At the same time, these new materials will reduce the IR signature of those same high-performance engines and vehicles. New materials will allow most, if not all, operational equipment to be waterproofed to two atmospheres (66 feet), thus allowing the SOF operator to move in environments where the adversary cannot go due to operational as well as physical restrictions. Lastly, SOF relies on the use of small, tactical boats for clandestine operations. The hulls of these boats must be able to withstand extremes of vibration and shock in rough seas while at high speed.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 03

TITLE: Mobile Sensors (Robotics)

SCOPE: Mobile sensors (robots) will play an increasingly important role for the SOF operator in the future. SOF will use them to go to and into places that are impractical, impossible, or too dangerous for the operator. SOF will use small, lightweight robots that crawl, fly, and swim to look at things/places that are of interest to the operator and/or his controlling headquarters. Mobile sensors will be able to detect the presence of NBC components/production/storage and report that presence to the operator in the field. In addition, mobile sensors will be able to detect the presence of personnel, weapons, and ancillary equipment at increasingly greater range. Small and lightweight, the

mobile sensors will be able to perform their missions in all environmental and weather conditions and may be recoverable/expendable or both.

APPLICABLE TECHNOLOGY:

Various technologies such as **microelectronics**, **Microelectromechanical Systems (MEMS)**, **smart materials**, **advanced packaging**, **energy storage**, **biologically inspired systems** enable micro, miniature, and small robots to be fabricated at relatively low unit cost. The ability to integrate sensors, locomotion, power, communications, and sufficient intelligence on a compact, man-portable platform to provide a semi-autonomous system capable of penetrating denied areas and serving as an extension of the human soldier is required. SOF focus is on **small reconfigurable robots**, **systems of robots**, **biologically inspired designs**, innovative methods of robot control including innovative interfaces, and methods of implementing pooled capabilities and/or **layered intelligence**. Challenges are balancing individual robot capability and pooled or multiple robot capability. Further challenges are between individual robot intelligence and **layered system intelligence**, developing architectures, control functions, interface approaches, and physical mechanisms that allow unit modules to dynamically and automatically configure themselves into a more complex robot. In addition, numerous **robots collaborating in parallel** can perform certain tasks in much less time and at lower cost than single, more complex robots. The development of micro and miniature robots offers a variety of technical challenges. Chief among these are mechanisms of **locomotion for low-mass devices**, **integration of low-power electronic control and payloads**, energy sources, and **human robot control**. Control architectures and human interface technology are needed for successful mission accomplishment.

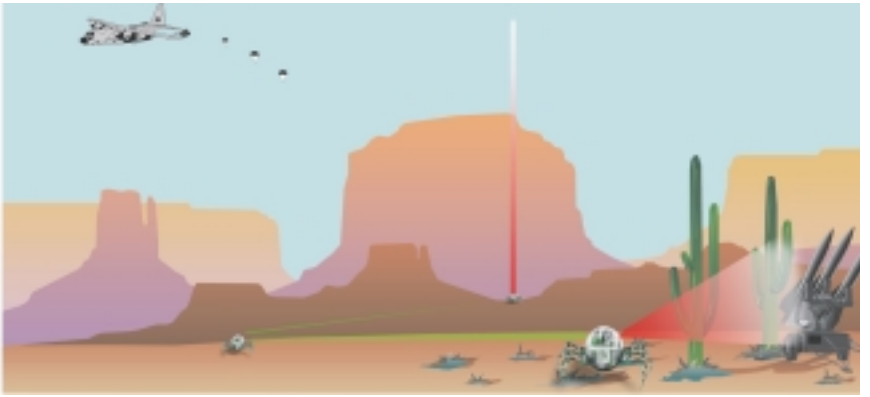
CAPABILITY OBJECTIVES:

USASOC: 8,14,15,25, 26, 59, 61, 94,111,114,144; **NSWC:** 5, 6, 7, 9, 28, 30, 32, 39, 40, 41, 45, 47, 53, 54; **AFSOC:** 15, 18, 19, 21, 29, 50, 52, 55, 58, 59, 60, 61, 64, 65, 68, 73, 74, 85, 97, 104, 105, 106, 120, 133, 139, 146, 165, 167, 172, 186, 187, 192, 194, 208; **FCWG:** 35, 50, 226, 343, 351, 417, 442

OPERATIONAL CONSIDERATIONS:

SOF operators need small, lightweight robotic vehicles to go places, and perform tasks that are simply too impractical, impossible, or dangerous for a human. From viewing the inside of a Deep Underground

structure (DUG), to an urban setting, to determining whether an area is mined, boobytrapped, has active NBC agents on it, or is covered by sensors, the necessity of increasingly more sophisticated robots will increase in the coming years. Robots are not, however, to be confined for use on the ground. Tactical air and sea robots will allow the SOF warrior to determine whether areas are safe to traverse for humans or vehicles. Moreover, they will allow the SEALs to more easily detect bottom or buried mines and look at ship hulls in shallow/very shallow water, while having the capability to communicate, image, and sense all underwater environmental conditions. Robots will be able to clandestinely determine whether buildings are occupied by enemy forces and then report their presence. Flying robots can be used to accurately deliver leaflets to the targeted audience in an overall integrated PSYOP campaign. Mobile robots will even be used to determine whether a facility has NBC production capability without actually hazarding a human. Robots will even be able to clandestinely emplace other sensors as well as act as a communications relay. Robotics should explore the ability to magnify human senses and abilities as well as be made to electronically look like other objects, i.e., planes, helicopters etc. Robotics, no matter the environment (land, sea, air, or transitioning from one to the other) should have built in anti-tampering/anti-handling/destruction mechanisms built into them. This will preclude the enemy from reverse engineering the technology should it fall into their hands. The bottom line for mobile sensors is they must be small (can easily fit in a rucksack) and extremely lightweight. They may be delivered/emplaced by UAVs, UVs, boats and by parachute.



SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 04

TITLE: Manned Platform Sensors

SCOPE: Manned platform sensors include all sensors/devices that are a part of a larger system (like an aircraft, boat, or ground mobility vehicle). They play very prominently in offensive and defensive systems for aircraft and boats, allowing them to penetrate enemy territory without being detected. Manned platform sensors can help detect and identify bottom or buried mines in addition to providing detection and avoidance for low flying aircraft or the presence of antihelicopter mines. Identification of Friend and Foe is yet another use of manned platform sensors as is the ability to detect, and thus avoid or operate unimpeded in, adverse weather. Maritime platforms will require imaging or sensing capability for surface, subsurface and air targeting.

APPLICABLE TECHNOLOGY: SOF is a user of a wide variety of sensor systems including **electromagnetic**, **acoustic**, **mechanical**, **chemical**, **biological**, **nuclear**, **environmental**, and **temporal**. These sensors are strongly constrained by the physics of the phenomena to be sensed, and hence the size, shape, material, and configuration are matched to the sensitivity required. Some of the technology trends that are common to all classes of sensors are the shift to **solid-state electronics**, a movement toward **atomic-level devices (quantum wires and dots)**, **digital implementation**, **distributed system implementation (networking**, **data fusion**, **and societies of microsensor)**, **multidimensional signatures (multispectral**, **hyperspectral**, **and data fusion)**, and **multifunctional sensor systems**. The critical technologies common to all sensor classes are **semiconductors**, **superconductors**, **digital computers**, and **algorithms**. The growth in these critical underlying technologies will determine the sensor capabilities available in the future. A significant change is anticipated in the use of sensors, as known today. Currently, a conventional sensor system is composed of a sensing element and one or more processing elements. Each element is discrete, relatively expensive, and subject to component failures. In the near future, this situation will move to **smart monolithic sensor systems**, enabled greatly by new technologies such as **MEMS**. These **sensors-on-a-chip** will be inexpensive, mass producible, and highly reliable and will contain far more intelligence and decisionmaking capability than today's sensors. In the

distant future, it is expected that distributed societies of these **smart monolithic sensors** will form **metasensors** that cooperate and provide much more information about the operational environment and an adversary's capabilities.

CAPABILITY OBJECTIVES:

USASOC: 48, 76; **NSWC:** 1, 6, 7, 9, 20, 28, 30, 32, 39, 40, 41, 47, 53, 54, 58; **AFSOC:** 1, 7, 14, 15, 19, 21, 22, 24, 25, 29, 41, 44, 48, 50, 57, 58, 60, 61, 62, 63, 64, 65, 66, 68, 76, 92, 97, 100, 103, 104, 105, 106, 108, 109, 110, 111, 120, 143, 145, 146, 148, 149, 154, 155, 158, 162, 163, 164, 166, 167, 171, 187, 192, 194, 201, 205, 206, 207, 212, 217; **FCWG:** 277

OPERATIONAL CONSIDERATIONS:

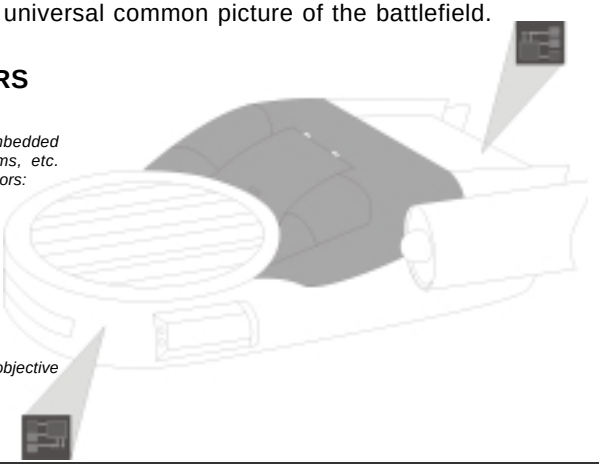
Operational Considerations for SOF when using manned platform sensors include avoiding enemy detection and physical destruction while flying; detecting/avoiding antihelicopter mines; detecting/ avoiding adverse weather while flying; detecting and identifying sea bottom and buried mines (not mine hunting in the classic sense but detecting and identifying maritime mines in the course of infiltration/exfiltration operations); and detecting and attacking targets from SOF rotary winged aircraft. Additional payoffs include having a reliable coalition Identification Friend or Foe (IFF) device for aircraft, having an effective obstacle/ collision, detection/avoidance system for aircraft and having electronic countermeasures while flying. Having a device capable of eliminating IR, visible, laser, RF, acoustic, and the electromagnetic signature of craft/ personnel/outboard motors, as well as locating and tracking man-portable air defense weapons are additional examples of the Operational Considerations for manned platform sensors. Manned platform sensors must be able to be fused with other C3I2 systems for a universal common picture of the battlefield.

ADVANCED SENSORS

Thousands of Nano-Sensors are embedded into the skin of vehicles, uniforms, etc. Example of 150,000 embedded sensors:

1 in 5 = Chemical/Bio
1 in 5 = Mine Detection
1 in 5 = Laser
1 in 5 = Infrared/ultraviolet
1 in 5 = Frequency

This allows 35,000 sensors for each objective



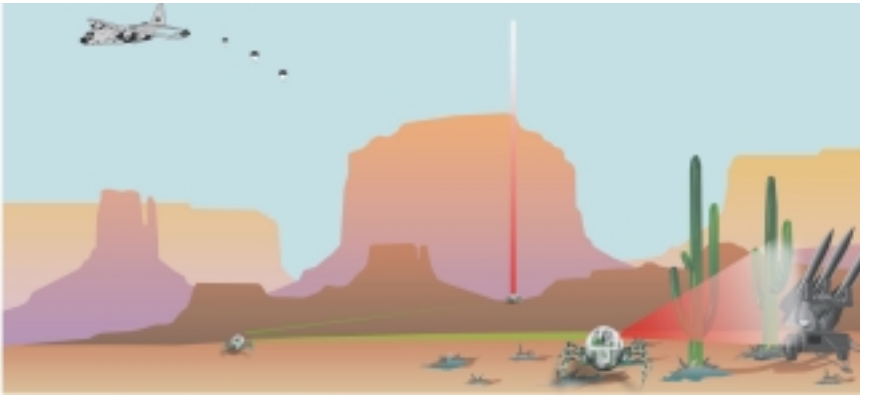
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 05

TITLE: Remote Sensors

SCOPE: Remote sensors can be delivered by aircraft, by underwater manned and unmanned vehicles, or they can be carried or hand emplaced by the SOF operator. These remote sensors must be able to detect/identify a variety of targets including NBC agents, mines, sensors, boobytraps, underwater mines and objects and WMD. Remote sensors must also have the ability to mark, tag, and track mobile weapon systems, and to distinguish personnel with and without weapons in another room. Some sensors may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. SOF may also employ sensors parasitically or non-cooperatively by covert attachment to third-party or enemy personnel and equipment.

APPLICABLE TECHNOLOGY: **Infrared antennas in focal plane array format.** Target discrimination is enhanced and provides avoidance of decoys and immunity to countermeasures for IR imaging and tracking systems. Application of this technology accomplishes a no moving parts, low-mass solution to the need for **hyperspectral imagers** and **imaging polarimeters**, especially in small, airborne vehicles such as **autonomous airborne platforms**. **Unattended Ground Sensors (UGS):** Air deployed or hand emplaced, **UGSs** consist of various **passive**, **low-cost**, **small sensor technologies** for robust, short-range detection, identification, localization, and tracking of ground and airborne targets. The primary sensors for these **expendable UGS** are **acoustic and seismic**. Coupled with short-haul communication, they can be deployed in mass quantities to create a **web of networked sensors** for area surveillance and situational awareness. Furthermore, **UGS** can be designed to sense other discriminates such as temperature, vibration, etc.

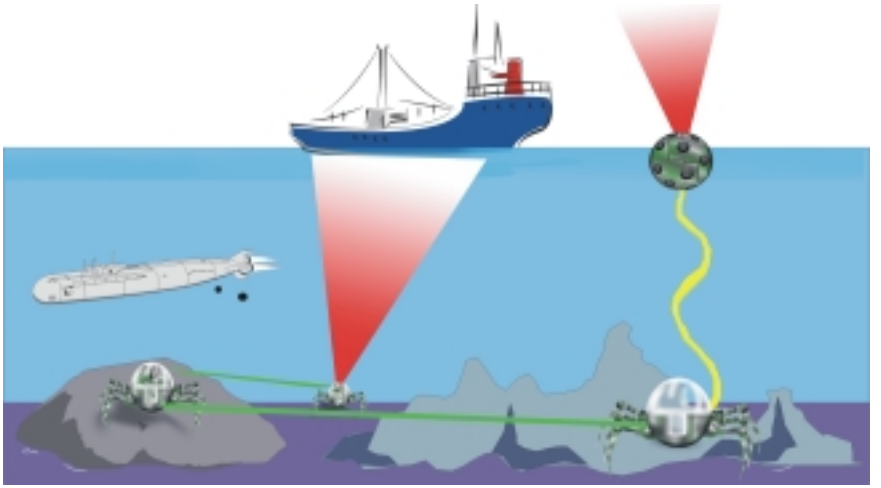
CAPABILITY OBJECTIVES: **USASOC:** 14, 15, 25, 26, 59, 61, 63, 94,111,114; **NSWC:** 5, 6, 7, 9, 28, 30, 32, 39, 40, 41, 47, 53, 54; **AFSOC:** 19, 21, 26, 27, 31, 32, 37, 38, 50, 52, 58, 64, 65, 66, 68, 82, 97, 103, 104, 105, 106, 109, 120, 146, 155, 165, 167, 186, 187, 192, 204; **FCWG:** 50, 190, 218, 246, 371



OPERATIONAL CONSIDERATIONS:

Remote sensors encompass all devices that, for the most part, are hand emplaced by the SOF operator or are parachuted into enemy territory. This does not rule out other methods of emplacement, however, such as from undersea, on the surface or by land vehicles and may include individual sensors as well as sensor arrays. Robots or other remotely piloted vehicles may also emplace them. They include sensors detecting weather conditions in Areas of Interest and reporting them back to a controlling headquarters or directly to the operator in the field. This information transfer may be either in burst data mode or continuously streaming data mode as well as passive or active communication(s). In addition, remote sensors may be emplaced in or around facilities, roads, trails, and other areas the SOF operator desires to clandestinely monitor. These sensors are designed to gather information and transmit it back to a headquarters to be analyzed and turned into intelligence. Remote sensors must be lightweight, include anti-handling/anti-tampering capability and able to be camouflaged to blend into the terrain in which they are placed. They must be capable of both remote activation as well as asynchronous activation. The power source for the remote sensor must be powerful and long lasting. Various remote sensors must be able to detect production of chemical or other NBC agents without actually having access to the production site, as well as possess the capability for sensing bioluminescence in water. Remote sensors must have the ability to detect, mark, tag, and track mobile weapon systems on or under water. Remote sensors can also be used to clandestinely conduct surveillance on harbors, ships, or industrial facilities. These sensors may be deployed in mass and remain in the standby mode, thus saving

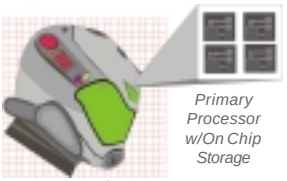
power, until queued by command, time, or on-board sensors and would then have the capability to communicate directly with operators as well as designated networked headquarters. Sensors sensing other sensors and hyperspectral detection are other capabilities required by SOF. The bottom line is remote sensors allow battlespace characterization and situational awareness for SOF operators. Some sensors may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. Simplicity of use and minimal maintenance/ sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Sensors may have to be packaged for covert emplacement, or allow for non-cooperative or parasitic employment on unsuspecting personnel or vehicles. Sensors may require the ability to automatically or on-command self-destruct/ inactivate when tampered with or mis-used, without causing damage or casualties to the user.



SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 06

TITLE: Individual Sensors

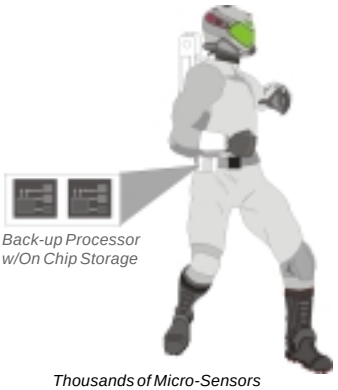
SCOPE:



HELMET SENSOR ASSEMBLY
Redundant Mini Processors Process Personal Sensor Information. Powered by Suits Power source

Individual sensors encompass all those devices enhancing the innate senses (smell, sight, touch, taste, and hearing) of the SOF warrior. Included are such items as night vision devices, day/night sniper scopes, devices to see through obscurants, and devices to assist in navigation while executing High Altitude, High Opening parachuting. Also included are sensors capable of seeing underground for buried mines, boobytraps, and enemy sensors. Additional devices might include scanners to assist in searches without actually entering facilities or vehicles as well as devices detecting friend from foe, NBC components, and enemy electronic or physical presence. These sensors must be able to work in all environments and weather conditions, and consideration must be made on how much each of these sensors will weigh.

APPLICABLE TECHNOLOGY:



Thousands of Micro-Sensors Embedded into Suit Material relay Environmental Information into Prime and Back-up Computer Mini-Core.

Solid-state image-intensifier technology: Current image-intensification night-vision devices operate mainly in the visible spectrum and extend into the near infrared (NIR) by a very small amount. They are not operationally sensitive in the **Short Wavelength Infrared (SWIR)**. Imaging devices that have significant sensitivity in the NIR and SWIR regions have important new capabilities that will extend the capability of photo-optical devices. They have better camouflage penetration and can see through glass and buildings. **Technology for the 1,000 to 2,000nm wavelength region** is important because new families of "eye-safe" laser illuminators and target designators are being deployed operationally. The new lasers are limited to a narrow bandwidth in the 1,000 to 2,000-nm wavelength region and are invisible to conventional intensified systems or human eyes. The ability to pulse the new lasers allows range-gated viewers that are capable of viewing through fog and smoke screens. **Uncooled IR array technology: Advanced Focal Plane Array (FPA)** technology provides sensing for detecting dim and camouflaged targets in background clutter and improves sensitivity/resolution while maintaining low cost, weight, and power consumption. The **integration of IR and low light level FPA imaging** in a single package will improve nighttime weapon

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sight effectiveness and allow the development of low-cost missile seekers. SOF applications include smart munitions, hand-held and helmet-mounted systems, vehicle driver's viewers, perimeter surveillance systems, and rifle sights. SOF operators may also employ chemical "sniffers" detecting/identifying various chemicals based on their spectral or mass properties. High-speed three-dimensional **(3D) imaging** of objects and targets is a very important functionality of advanced sensor systems. This capability can provide advances in target detection, identification, classification, tracking, and kill determination. Current **3D imaging** techniques can only provide **3D** measurement of single point or single line on objects, in one measurement. None of these current **3D** imaging systems can provide "snap-shot" full-frame **3D** images in real-time at a video rate. Scanning **laser-based 3D imaging** technology is able to acquire full-frame **3D images** of objects in a scene at **Charged Couple Device (CCD)** camera's frame rate (30 fps or faster).

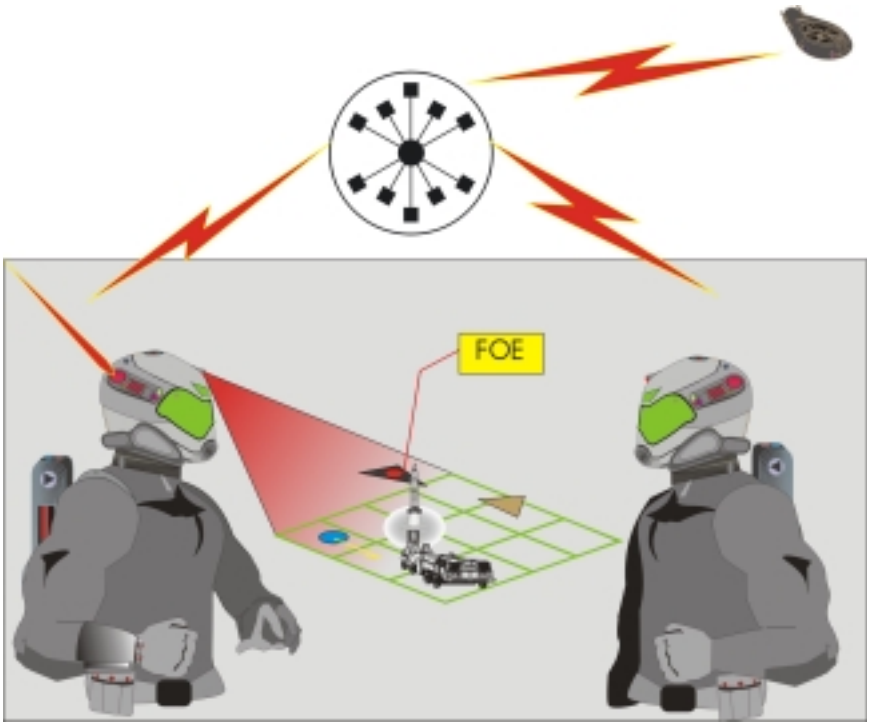
CAPABILITY OBJECTIVES:

USASOC: 7, 11, 68, 71, 72, 102, 111, 118, 119; **NSWC:** 1, 5, 6, 7, 9, 18, 25, 30, 32, 39, 40, 41, 47, 51, 53, 54; **AFSOC:** 2, 21, 26, 29, 31, 32, 36, 38, 45, 46, 48, 50, 52, 54, 60, 82, 84, 97, 102, 103, 104, 105, 106, 107, 109, 120, 129, 130, 133, 146, 155, 163, 167, 172, 192, 197, 198, 204, 205, 206, 207, 208, 213, 217, 218, 223; **FCWG:** 158, 159, 160, 169, 170, 171, 192, 194, 232, 262, 277, 346

OPERATIONAL CONSIDERATIONS:

Individual sensors include those that are carried and personally used by the SOF operator in the context of his assigned mission. Individual sensors include night vision devices (including those for underwater use), NBC detection devices, Identification Friend or Foe devices, binoculars, sniper scopes, and portable scanners. These scanners will be used to search vehicles and facilities, from standoff ranges, to preclude the necessity of the operator to actually go to/into the area being scanned. In addition, these individual sensors will be able to help the SOF operator see through walls, into compartments of ships without entry into the space, as well as allow him to see at extended ranges the details of people, places, and facilities. Individual sensors also include such items as a device allowing a SOF operator to determine the load bearing capacity of a road, to determine if it is suitable/safe to land an aircraft. Individual sensors will

be made with the thought of maximizing the innate senses (sight, smell, touch, taste, and hearing) of the individual SOF warrior, while at the same time being sensitive to the weight of the device. Individual sensors would also include the capability of fusing information from various sensor sources. A day/night sniper scope with a built-in power source, for example, would not be worth the operational trade-off if it weighed more than the rifle upon which it was to be placed. Lastly, fusion of lightweight lowlight sensors, laser illuminators and multi-spectral sensors into a single sensor, for increased imagery enhancement, will give the SOF operator a decided operational advantage over potential adversaries. Any individual sensors designed for designated SOF forces must be able to withstand immersion in (salt)water to at least 66 feet and still remain functional both underwater as well as on land.



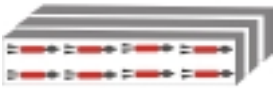
SHARING INFORMATION ACROSS THE GLOBAL NETWORK

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 07

TITLE: Individual/Crew-Served Weapons

SCOPE:

Medium Explosive, Semi-Armor Piercing, Caseless, Programmable, Sensor Tracking ammunition. Enclosed in a degenerative silicone or plastic shell.



Fin-Stabilized, Electronic Guidance, Caseless ammunition encased in a degenerative silicone or plastic shell

Individual and crew-served weapons must allow SOF to attack, kill, neutralize, or suppress individuals and/or targets during day or night and in all weather conditions as far as the SOF operator can see/be directed to by other targeting means. Some important capabilities are: first round hit capability; an optical scope with both day/night capability, and terminally guided smart rounds as well select or dial an effect (controlled lethality). The SOF operator must be able to effectively destroy bridge supports, concrete structures, and command bunkers with a man-portable, shoulder-fired weapon from a confined space with little or no signature. He must be able to do this with kinetic as well as non-kinetic weapons. Some weapons may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF.

HE-AP SMART MUNITION
(High Explosive-Armor Piercing)

APPLICABLE TECHNOLOGY:

Technologies include revolutionary, ergonomically designed systems, kinetic and/or energy projectiles, high-explosive air bursting munitions, smart sights, incorporating state-of-the-art electronics, advanced materials, and small arms technologies while improving the packaging and design of conventional ammunition. Advancements also include cased telescoped ammunition, when compared with conventional cartridge ammunition that is 30 percent smaller in volume, yet offers higher performance and is easier to handle. The introduction of Cased Telescoped Ammunition and Gun Technology (CTAGT) into gun systems allows for smaller, more reliable handling mechanisms with fewer parts. Shoulder fired rail guns that can accelerate projectiles to hypersonic velocities may be used for better penetration weaponry.

CAPABILITY OBJECTIVES:

USASOC: 35, 39, 46, 54, 69, 70, 71, 79, 80, 87, 88, 112, 113, 115, 116, 117, 142, 143; **NSWC:** 6, 11, 13, 20, 22, 29, 48, 49, 50; **AFSOC:** 2, 26, 38, 58, 60, 61, 62, 63, 68, 80, 108, 146, 159, 171, 192, 197; **FCWG:** 209, 217, 257

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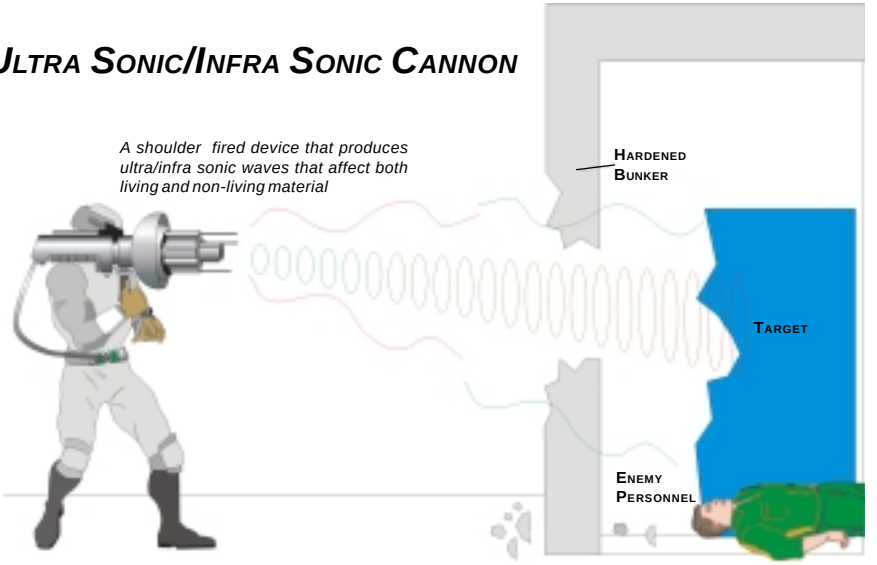
ULTRA SONIC/INFRA SONIC CANNON

A shoulder fired device that produces ultra/infra sonic waves that affect both living and non-living material



OPERATIONAL CONSIDERATIONS:

SOF forces need a wide range of individual and crew-served kinetic/non-kinetic weapons that have both lethal and non-lethal effects. These weapons include those for use on the ground as well as those for surface and subsurface use. Not only is there a requirement for a sniper to be able to hit his target at extended ranges, at night, and in all environmental conditions, there is also a requirement for that same SOF warrior to fire his weapons at extremely close range (less than 5 meters). Both situations require the same outcome. He must always hit the target the first time with either a lethal or non-lethal effect. In addition, warriors need lightweight personal and crew-served weapons allowing them to fire at targets while producing no aural or visual signature. Crew served and individual weapons need to consider laser, directed energy, ammunition with loiter capability, "smart" rounds as well as caseless ammunition (reducing weight) technology when designing future SOF weapons. SOF needs to be able to attack and kill/neutralize both armor and reinforced concrete bunkers as well as have a weapon designed specifically for operations within a built-up area (city). The SOF warrior needs to be able to blow a man-sized hole in reinforced concrete bunkers (at least 1 meter square) as well as fire through walls or hulls of ships to deliver a warhead that will combust and start a fire. Further, they need to have the ability to engage both area and point targets with terminally guided smart rounds fired from the shoulder that have

enhanced penetration capability. Weapons need to be designed for use by SOF forces while they are underwater. Lastly, the SOF warrior must possess light mortars and machine guns that can accurately return enemy indirect fire. Mobility, portability (small) and versatility (lightweight without sacrificing accuracy and range) are important factors when designing weapons for SOF**.** Some weapons may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. Simplicity of use and minimal maintenance/sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Such weapons should either be low-tech with a high yield or effect on target, or high-tech weapons with a transparent/intuitive user interface. Weapons may have to be packaged for covert transportation. Weapons may have to include tagging devices to be covertly tracked and/or require the ability to automatically or on-command self-destruct/inactivate when mis-used, without causing damage or casualties to the user.

ADVANCED CREW WEAPON

This weapon provides the capability to attack hardened facilities as well as armored vehicles. The weapon uses either Hyper acceleration or small rail gun properties. The weapon is an integrated option and is powered by the combat suit's power plant.

ADVANCED INDIVIDUAL WEAPON

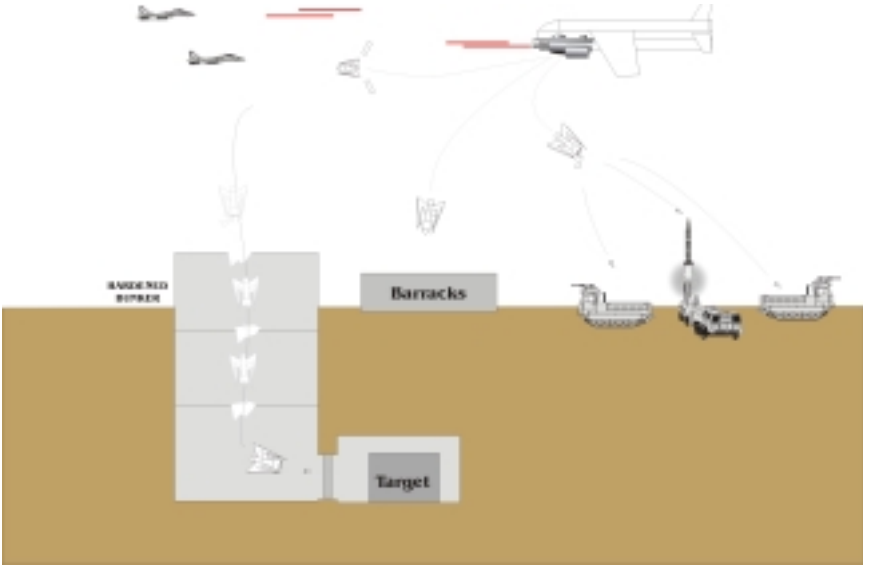
An enclosed personal weapon that utilizes the combat suit personal targeting system.

The System has two modes up close to medium range and sniper mode (as shown) with an extended barrel.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 08

TITLE: Platform Weapons

SCOPE: Platform weapons encompass a number of technologies focused on land, sea, and air platforms operating in extreme environments and all climatic conditions. These weapons range from centralized remotely fired weapons systems for NSWC combatant craft (air defense and surface-to-surface missiles) to kinetic energy weapons on SOF land vehicles. Further, it includes weapons systems on gunship rotary and fixed wing aircraft that can engage both surface targets as well as those that are deeply buried and hardened. Whatever the future platforms are in physical form, the driving force for all weapons technology is the desired effects on target.

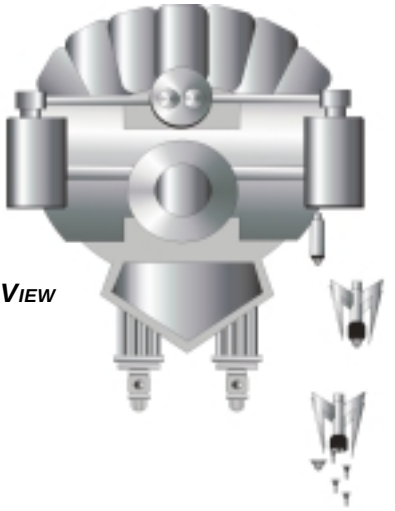


APPLICABLE TECHNOLOGY:

Fire support from the sea. Future SOF operations will require weapons from the sea capable of delivering area munitions against soft targets such as troops, trucks, or depots; precision munitions with **unitary warheads** against hardened fixed or stationary targets; and **smart submunitions** for use against mobile targets and targets with relatively unique signatures. **Air-to-surface weapons:** In the future, a greater percentage of air-to-surface ordnance delivery will be accomplished with **standoff air-to-surface weapons**.

These weapons will be capable of receiving target information from **off-board sensors** and will have **autonomous capabilities** to continue their attack even in the face of countermeasures leading to target sensor information dropouts. **Air-to-air weapons:** The emerging concept of **networked integrated sensors** providing fire-control quality information to all potential antiair weapon launch platforms represents a fundamental shift with broad implications for air-to-air weapons. One nonmissile option is the concept of an active close-in self-protection capability based on **solid-state laser technology**. **Negation of hard-to-defeat targets:** The use of high-velocity **kinetic-energy penetrators** containing **explosive directional warheads** is included in the logical hierarchy of approaches to destroying hard, buried targets and minimizing the collateral damage. In addition, the use of **multiple penetrating weapons** with near-zero circular error of probability (CEP) that enter the target area at the same point and from the same direction can be used to gradually dig out a deep facility. **Offensive mine warfare:** A **networked underwater sensor field** (interconnected by acoustic communications), when coupled with an **Autonomous Unmanned Vehicle (AUV)** that can attack any target in the sensor field will be an effective approach for offensive mines to sanitize a fairly large volume of water.

CAPABILITY OBJECTIVES: **USASOC:** 13, 54, 117; **NSWC:** 6, 11, 13, 20, 22, 27, 29, 48, 49, 50; **AFSOC:** 57, 60, 61, 62, 63, 80, 108, 146, 159, 171, 192, 197, 235; **FCWG:** 209, 217



TOP VIEW

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OPERATIONAL CONSIDERATIONS:

Platform weapons encompass all those weapon systems that are an integral part of another SOF air (rotary and fixed wing aircraft), maritime, or ground vehicle. First round hit/kill, at ever-increasing ranges, including deeply buried targets is the goal for all such weapons. To accomplish this goal, all weapon systems (to include remote fire mounts) must be stabilized to correct for the movement of the platform, the target, and the trajectory of the round. Additionally, they must be fully integrated into the platforms systems such as weapon keying, aiming, stabilization and fire control. Further, SOF maritime subsurface craft must have the capability to fire lethal and non-lethal weapons for self-protection and direct action missions. Because of the nature of the SOF, mission platform weapons need to mask/reduce/eliminate firing signature. Weight is a primary consideration in any platform weapon. The lighter the better. Platform weapons need increased accuracy to minimize collateral damage especially in urban environments. Increased standoff capability will also aid in the survivability of the platform. "Dial – an-effect" capability is also critical for SOF, and the weapons of the future must not only be lethal but also be able to be "tuned" for non-lethal application of force. The ability to start with active denial effects in the low intensity conflict and rapidly graduate to lethal force as required give SOF the flexibility required to maximize effectiveness in uncertain scenarios like peacekeeping, Non-Combatant Evacuation (NEO) and area defense where the threat situation can quickly change.

SIDE VIEW

FRONT VIEW

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SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 09

TITLE: Hand Emplaced Munitions/Fuzing

SCOPE: Provide SOF with a single or family of similar design, expendable item(s) with a standardized Safe & Arm (S&A) design concept and fire train that will be used for all present and future SOF munitions. These munitions and fuzing technologies must give SOF the capability to rapidly prepare and emplace munitions on any target (including water depths to 66 feet) in all weather conditions and environments. The operator requires a universal demolition kit enabling him to tailor his munitions and their fuzing and initiation for a variety of missions, targets, and to be adaptable to changing mission circumstances. Also required is the capability to remotely activate, reprogram, and initiate, munitions and explosives. These explosives should be insensitive as well as moldable and pourable. Whatever technology advances are adopted, they must reduce the overall size and weight the ground SOF operator must carry. Some munitions may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. SOF may also employ munitions and fuzes parasitically or non-cooperatively by clandestine attachment to enemy personnel and equipment.

Two non-volitale compounds that combine "when the ARM button is pushed" to create a high explosive compound.

Infrared and radio controllable

Built-in scanner that analyses the thickness and material to ensure the correct placement to get the desired explosion.

APPLICABLE TECHNOLOGY:

The goal is to make available to SOF the advantages of leap-ahead technology via continual infusion into munitions and initiator/fuze design. A second goal, equally important, is to enable effective accommodation of changes in availability of technology, anticipate industry de-sourcing, and quickly respond to changes in operational requirements and potential adversaries' threats. Potential areas of technology insertions are: improvements in power sources e.g., high-density energy sources and high-efficiency voltage/current converters; **moderate voltage/high current components**, e.g., low energy Exploding Foil Initiators (EFI), high Q/high efficiency capacitors, miniaturized charging circuits and near ideal switches; **low power communications devices; controllers; digital signal processors; power management & sensors; improved energetic materials; robust** and **EMC/EMI-compliant wireless communications i.e.,** no requirement for theater frequency allocations, 5-mile range in urban, desert, and tropical environments supports high data rate with efficient code structure and LPI/LPD; **sensors** e.g., motion of target or initiator, approach of a moving target/selective attack, sympathetic detonation, radiation (RF, light, nuclear / rays), intruder and tamper detection, and ability to distinguish noncombatants and combatants; **accurate clocks for all operational environments** e.g., synchronous function of hand emplaced munitions in different environments and accuracy maintained over 30-day period w/o updates; **microcontrollers and digital signal processors;** e.g., act on commands and sensor inputs in microseconds, hierarchical sensor input processing, power management and support for 30-day missions.

CAPABILITY OBJECTIVES:

USASOC: 16, 74, 93,131,145; **NSWC:** 24, 26, 49, 50; **AFSOC:** 38, 58, 60, 61, 62, 63, 68, 84, 197

OPERATIONAL CONSIDERATIONS:

To maintain current USSOCOM technological advantage over potential adversaries via continual infusions of new and enhanced capabilities, SOF operators need state-of-the-art explosives, munitions, and their selected activation mechanisms that can be modified or adapted for surgical destruction. The explosives must be lightweight, tamper proof, insensitive, and compatible with easy to use adhesives that work both above and below water. Once the explosives are attached to their intended target, they must remain until the intended time of explosion. Hand

emplaced munitions must also be versatile enough to be easily moldable or pourable into whatever shape the operator needs to complete his mission objectives. Munitions, explosives and their detonators/initiators must survive operational depths underwater and perform reliably no matter the environment or climatic conditions. The SOF operator needs a universal demolition kit that has all the necessary ancillary equipment and explosives, but does not excessively weigh down the operator who, for the most part, has to carry the explosives on his back. The SOF operator must be able to detonate explosives remotely, and those explosives and explosive trains must be impervious to enemy jamming or spoofing. Some munitions may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. Simplicity of use and minimal maintenance/ sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Munitions may have to be packaged for covert emplacement, or allow for non-cooperative or parasitic employment on unsuspecting personnel or vehicles. Fuzes may require the ability to automatically or on-command self-destruct/inactivate when tampered with or mis-used, without causing damage or casualties to the user.

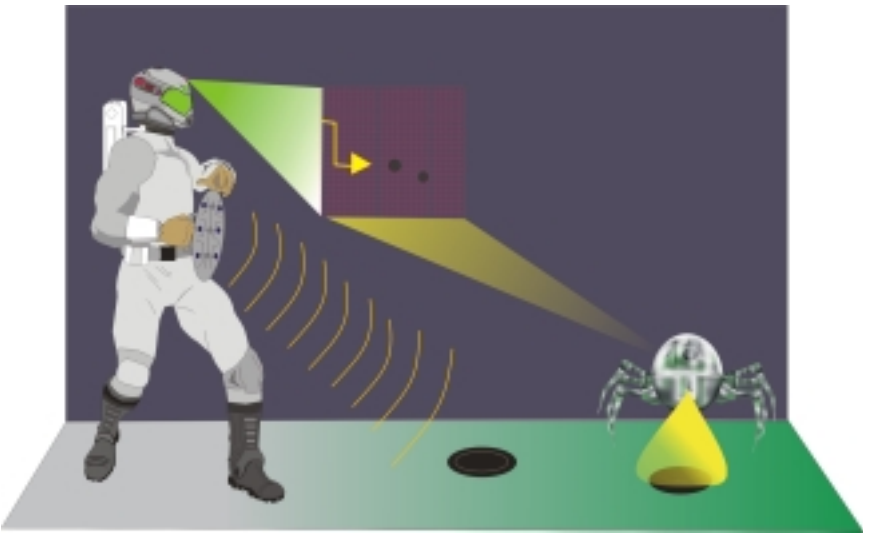
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 10

TITLE: Demining Technologies & Surface/Underground Explosives Detection

SCOPE: The SOF operator must be able to penetrate minefields and clandestinely detect and neutralize a wide variety of mines and boobytraps, both metallic and nonmetallic, buried in all types of soils. He must be able to detect and neutralize mines and obstacles in the surf-zone as well as bottom and buried mines so as to be able to continue the mission with as little impact as possible. Ideally the SOF operator needs a sensor and information system capable of detecting, identifying, and classifying mines and minefields, to include antihelicopter mines as well as determining if a room is boobytrapped. Some sensors may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF

APPLICABLE TECHNOLOGY:

Standoff-minefield detection may apply biotechnology using **enzymes auxotropic for TNT** that will bioluminesce, or systems that can distinguish polarization differences between laid mines and undisturbed ground reflections. **Passive IR**, **and side-looking Synthetic Aperture Radar (SAR)** are also candidates. **Vehicle-mounted and hand-held mine detection** may use **Ground Penetrating Radars (GPR)**, **passive IR detection**, **neutron-activation techniques** and **detection of vapor-particles.** EMI techniques with use of time constants associated with the rate of decay of the signal generated in the target material are also possible technologies. **Man-portable minefield detection and neutralization** are an urgent and unfulfilled technology area critical to future SOF. **Sea and littoral mine countermeasures include Airborne LIDAR mine-detection systems**, **magnetic-field sensors, Superconducting Quantum Interference Devices (SQUIDS)**, **and superconducting magnets** to project magnetic flux densities sufficient for shallow water minesweeping and neutralization. **Electromagnetic and acoustic sensors** are being utilized for detecting buried mines in very shallow water environments. **Range gated lasers**, **laser line scanners**, and **laser sensors for fluorescence detection** of plastics are used for mine identification and other anthropogenic compounds dissolved in seawater. **Expendable fiber-optic tethered vehicles** with sonar and video links that could be deployed from airborne vehicles to hunt and kill individual mines with shaped charges are being developed. **Super-**



cavitating projectiles and **precision-guided submunitions** fired from airborne platforms have been proposed to neutralize sea and beach zone mines and obstacles.

CAPABILITY OBJECTIVES:

USASOC: 15, 76, 114; **NSWC:** 17; **AFSOC:** 84, 104, 133; **FCWG:** 173, 256

OPERATIONAL CONSIDERATIONS:

Demining technologies and surface/underwater explosives detection are important parts of SOF capabilities. SOF operators, by the inherent nature of their mission, go where mines are emplaced. SOF operators, operating clandestinely, need a way of detecting, identifying, mapping, and as a last resort making mines inert to continue the mission. The detection of underwater mines as well as those on land is the most important part of this operational capability. SOF must have the capability to detect buried/hidden mines and boobytraps in all environments and in all climatic conditions. Then they need the capability to quickly identify and subsequently safely disarm those mines that cannot be bypassed. The use of robots, marine mammals, and specifically designed mine hunting vehicles, some of which will be operating in shallow and very shallow water, will enable the operators to deal with this threat more effectively. Some sensors may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. Simplicity of use and minimal maintenance/sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Sensors may have to be packaged for covert emplacement, or allow for non-cooperative or parasitic employment on unsuspecting personnel or vehicles. Sensors may require the ability to automatically or on-command self-destruct/inactivate, without causing damage or casualties to the user.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 11

TITLE: Individual and Equipment NBC Protection

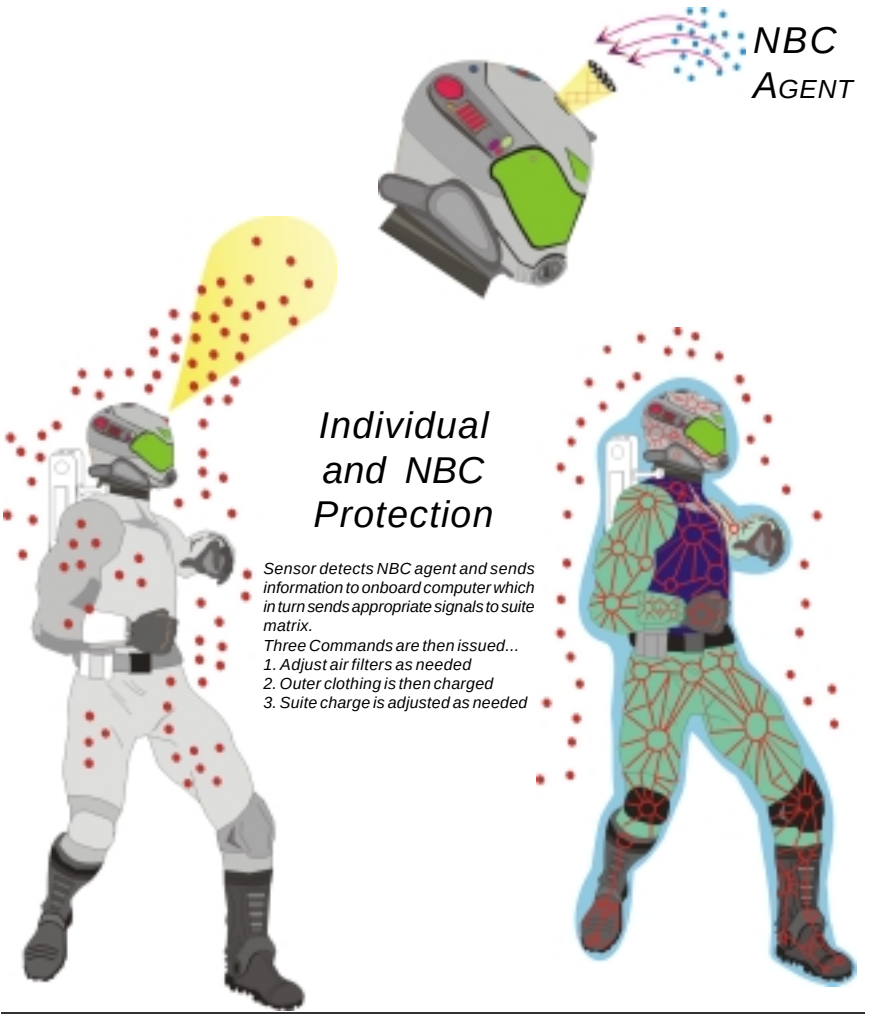
SCOPE: Individual NBC protection and equipment technologies must enable SOF to operate with very limited degradation of performance, in all environments, for long periods of time without immediate resupply of NBC protective clothing and equipment. Ultimately the SOF operator should be able to operate in all NBC conditions without the need for special clothing. These technologies should focus on such areas as lightweight, low-volume, washable, reusable chemical suits with an integrated mask and ancillary equipment compatible with the Future Warrior system; topical skin chemical protective cream; treatment and prophylaxis for pre-exposure to NBC agents, and treatment of the SOF operator for NBC contamination and wounds. SOF operating forces need easily portable, very accurate, and logistically nimble detection equipment allowing for identification of chemical/biological threats before the operator is affected. Additionally, SOF operators should have genetic engineering to inoculate themselves against selected chemical and biological agents. Indigenous, surrogate, or allied forces under the direction or training of U.S. SOF may require protection from NBC threats. All systems for use by these forces must be as simple, universal in design and fit, and as sustainable in the field as absolutely possible.

APPLICABLE TECHNOLOGY: The following areas are critical to increasing individual and group protection and survivability: **Pharmaceuticals and performance enhancers** will protect the combat force from endemic disease. **Biological tests** will decrease combat morbidity and mortality. These include **analysis and assessment of food**, **water**, **and** other **environmental factors. Biomarkers** for toxicant/stress exposure. The use of **active vaccinations** against biological agents or infectious agents endemic in deployed areas will continue to be a growth area. Medical advances will result in long-term **prophylaxis against NBC agents. Nonaqueous techniques** will be developed for decontamination of electronic equipment and other materials sensitive to current procedures. **Combined filter/oxygen supply capabilities** with appropriate sensors will be developed for long-term performance in potentially contaminated areas. Soldier clothing will

be embedded with **miniature sensors** that warn of NBC hazards. Continued research will occur in the use of **active nanoparticles** that adsorb both chemical and biological agents. Currently in dry powder, these particles could be embedded into clothing eliminating special clothing requirements. No protective clothing would be needed at all with a genetic toolbox to allow rapid contaminant analysis and generation of counteragents.

CAPABILITY OBJECTIVES:

USASOC: 18, 30, 62, 65, 103, 104, 107, 108, 109; **NSWC:** 4, 17, 35, 41, 56; **AFSOC:** 2, 3, 20, 26, 29, 31, 32, 38, 42, 52, 59, 84, 96, 129, 130, 133, 146, 155, 170, 198, 204; **FCWG:** 261, 26



TOC

OPERATIONAL CONSIDERATIONS:

SOF must be able to operate successfully in chemical/biological-contaminated environments, terrain, and conditions. Further, he must have a reusable NBC suit, therapeutic creams for pre-exposure, prophylaxis protection for all known NBC agents as well as the ability to handle and dispose of hazardous materials without harm to himself or others in his team. The ultimate goal for SOF forces is to be able to operate in an NBC environment without any special equipment/clothing. He must have the latest in detection equipment with interchangeable or universal power sources. The AFSOC forces must not be overlooked in this effort. They too will work in contaminated environments. They must be able to clean aircraft, ground equipment, and personnel as well as fly missions in contaminated areas. Preferably, the aircraft and ground equipment can be coated with a substance making them all but invulnerable to NBC contamination. While some SOF forces are largely maritime in nature, they must not be overlooked in the individual NBC detection arena. Maritime SOF operators need the capability to detect and protect themselves, even underwater, against known and emerging NBC threats. Lastly, the treatment/decontamination of NBC causalities (i.e., Non-Combatant Evacuees including their carry-on cargo, as well as SOF operatives) must be of a high precedent within the SOF S&T community. SOF forces must be able to efficiently and effectively treat those contaminated. Indigenous, surrogate, or allied forces through the direction or training of U.S. SOF may require protection from NBC threats. Simplicity of use and minimal maintenance/sustainment are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Requirement may include families, even livestock of indigenous personnel. Protective systems and clothing should be universal in fit, extremely simple to use, and disposable or self-decontaminating. Decontamination systems should use commonly available chemicals and materials and not require large amounts of power generation.

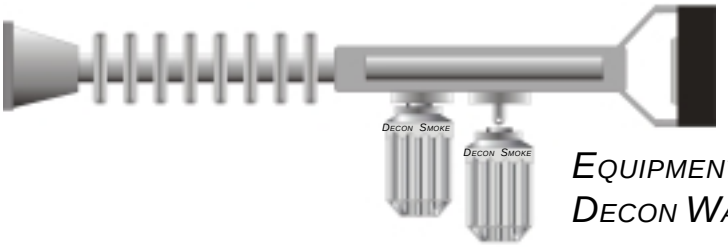
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 12

TITLE: Individual and Platform NBC Decontamination Systems

SCOPE: The SOF operator, to facilitate mission success, must be able to decontaminate himself and his equipment to include mobility platforms such as boats, ground vehicles, and aircraft. He must be able to render all NBC agents harmless in all environments and climatic conditions. The desire is to have a non-water based decontamination system, and ultimately a cream that will decontaminate an operator after he is contaminated with NBC agents.

HAND HELD DECON WAND

APPLICABLE TECHNOLOGY: Technologies of critical importance will restore full combat power rapidly; enable rapid, **decentralized decontamination**; provide on the move small unit SOF-specific decontamination capability; **decontaminate sensitive equipment** such as electronics and avionics; and have the capability to decontaminate large areas. Goals for decontamination are technologies that **remove and/or detoxify contaminates** from individuals, equipment, and platforms without injuring personnel, damaging equipment, disabling platforms, or harming the environment. An equally important goal is to reduce the logistical burden required of aqueous decontamination. **Waterless and less corrosive decontaminates** are also objectives. Possible technologies include **threat-specific enzymes**, **catalysts to improve reactivity**, decontaminants that are effective in fresh or salt water and environmental extremes, **reactive coatings**, **and improved reactive**



EQUIPMENT DECON WAND

TOC

sorbents. Potential **replacements for DS2 and Supertropical Bleach (STB)** for use on combat equipment, as well as decontaminates for personal gear and skin. Another goal is technologies or systems that can measure the degree of decontamination of personnel, equipment, and closed spaces. **Advanced modeling and simulation** and **interactive training tools** are required to allow leaders and units to realistically face and overcome the complex environment of NBC. These requirements range from large-scale joint simulations to train leaders at command levels while being adaptable to SOF operators at the individual and team levels.

CAPABILITY OBJECTIVES:

USASOC: 57, 92, 105; **NSWC:** 4, 17, 41; **AFSOC:** 2, 3, 20, 26, 29, 31, 32, 38, 42, 52, 59, 84, 96, 129, 130, 133, 146, 155, 170, 198, 204; **FCWG:** 255, 282

COMPRESSED DECON SMOKE CANISTER

OPERATIONAL CONSIDERATIONS:

One of the big differences between SOF and regular forces is simply a function of distance from available decontamination stations. The SOF operator must be able to continue the mission unimpeded even though he has no access to traditional decontamination capabilities. He must, therefore, possess the ability to decontaminate himself, his men, and all equipment while deployed far from home station. SOF forces need this capability, without the use of a great deal of water, to decontaminate themselves and their equipment/ vehicles. Personnel additionally need the ability, through creams, lotions, sprays, and/or electronics, to render all known NBC agents harmless. Lastly, they need a power source for all NBC decontamination equipment that requires either a power source that may be regenerated or one that draws power from batteries/power cells the SOF operator already has on hand.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 13

TITLE: NBC Detection, Warning, and Identification

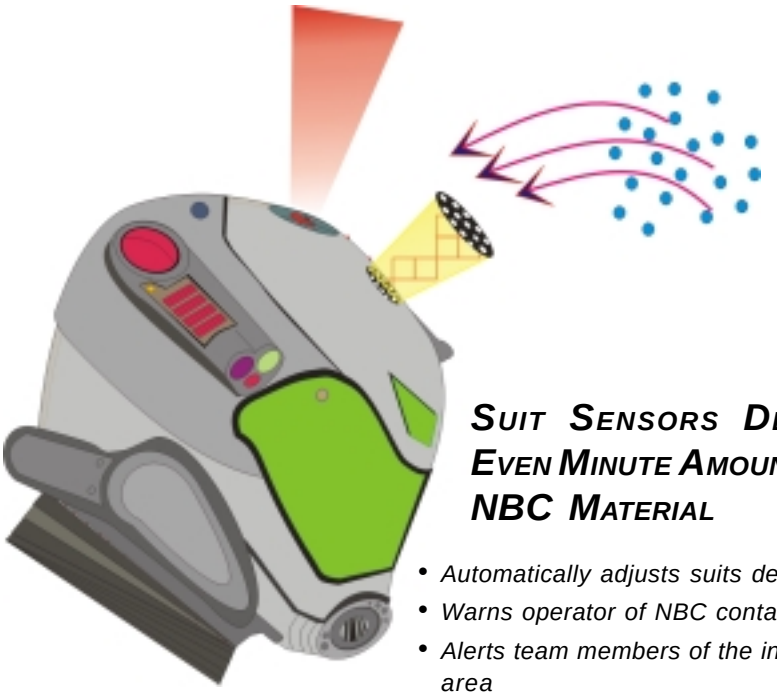
SCOPE: NBC (in the air, on the land and on and under the water) detection, warning, and identification technologies must allow SOF to detect, identify, and avoid NBC contaminants with personal equipment that operates in all environments, climates, and NBC conditions. They must have reliable equipment that predicts NBC dispersion patterns for known terrain and all weather conditions and performs initial analysis on NBC agents. In addition, the SOF operator must be able to detect the production of NBC agents without internal access to production facilities. Indigenous, surrogate, or allied forces under the direction or training of U.S. SOF may require protection from NBC threats. All systems for use by these forces must be as simple and as sustainable in the field as absolutely possible.

APPLICABLE TECHNOLOGY: NBC agent detection and identification has undergone an accelerated development in the last decade, in large degree because of the explosive growth in photonic and electronic technologies and miniaturization. The most promising of these new technologies are: **Ion Mobility Spectrometry (IMS):** IMS systems offer the capability of point detection of general classes of agents in the field. **Mass Spectrometry (MS):** MS uses an ionizing source to split the measured molecules into a number of charged components that are then measured on a detector. **Gas Chromatography (GC)—Ion Mobility Spectrometry (IMS):** The combination of GC with IMS provides partial identification of low levels of chemicals in the field. **Surface Acoustic Wave (SAW):** SAW technology could prove extremely useful in surveying suspected contaminated environments. The system operates autonomously with a simple gas sampling system and without the need for support gases. **Nano-Particles** have both the ability to destroy chemical/biological agents by an active adsorption process, and detect a contaminated area. **Field Ion Spectrometry (FIS):** FIS is a new technology that has been developed for trace detection of narcotics, explosives, and chemical warfare agents. **Passive Infrared (IR):** IR detection measures the characteristic absorption bands for a gaseous substance. **Absorption LIDAR:** LIDAR

measures the composition of a cloud by firing a laser or lasers into a cloud and measuring the characteristic absorption from the vapor components. Applications for atmospheric trace gas sensing include the identification of underground or concealed bunkers and warehouses, the detection and identification of chemical warfare agents, and remote sensing of emissions from ballistic missiles and low-observable aircraft. **Spectroscopy (electro-optical properties):** Spectroscopy is the next generation of detection technology. Spectroscopy could enable detection of chemical and biological agents simultaneously.

CAPABILITY OBJECTIVES:

USASOC: 17, 26, 58, 59, 60, 63, 95; **NSWC:** 4, 17, 25, 35, 41, 47; **AFSOC:** 2, 3, 20, 26, 29, 31, 32, 38, 42, 52, 59, 84, 96, 129, 130, 133, 146, 155, 160, 170, 198, 204; **FCWG:** 157, 468



SUIT SENSORS DETECT EVEN MINUTE AMOUNTS OF NBC MATERIAL

- *Automatically adjusts suits density*
- *Warns operator of NBC contaminates*
- *Alerts team members of the infected area*
- *The teams electronic map data base is automatically updated for future use*

OPERATIONAL CONSIDERATIONS:

All SOF operator(s) deployed deep in enemy territory, or as a member of a ground crew for fixed wing aircraft, need timely detection, warning, and identification of NBC attack. In addition, SOF forces need the capability to predict NBC dispersion patterns, as well as collect and analyze potentially hazardous material. Further, SOF needs the capability to detect the production of NBC components without internal access to the production facility and then, if required, to capture and transport the components safely out of the country/ enemy territory. SOF needs to be able to mark areas of known contamination with a taggant providing a visual or UV indication of the area/personnel as well as using unattended, air-delivered sensors to detect the presence of NBC agents. All SOF equipment used for NBC detection, warning, and identification must work in the extremes of environment and climatic conditions. Some NBC sensors may be employed by indigenous, surrogate, or allied forces under the direction or training of U.S. SOF. Simplicity of use and minimal maintenance/ sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Sensors may have to be packaged for covert emplacement, or allow for non-cooperative or parasitic employment on unsuspecting personnel or vehicles. Lastly, underwater SOF forces need the capability to detect chemical and biological agents on top of as well as under the water.

Note: Upon alerts from remote sensors or personal detector, all local team members are alerted to the area and regional area maps are updated.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 14

TITLE: Hard-Target Defeat Technologies

SCOPE: Hard-target defeat encompasses a number of technologies focused on defeating deeply buried and hardened targets by SOF operators. These technologies must enhance SOF capabilities for penetrating and destroying hardened underground complexes as well as personnel and material within; determining the makeup of a facility, i.e., walls, floors, and equipment to include personnel; remotely viewing and determining presence or absence of hazardous material; detection of nuclear devices with a hand-held system and the ability to capture Weapons of Mass Destruction/Nuclear, Biological or Chemical (WMD/NBC) components and transport these out of country.

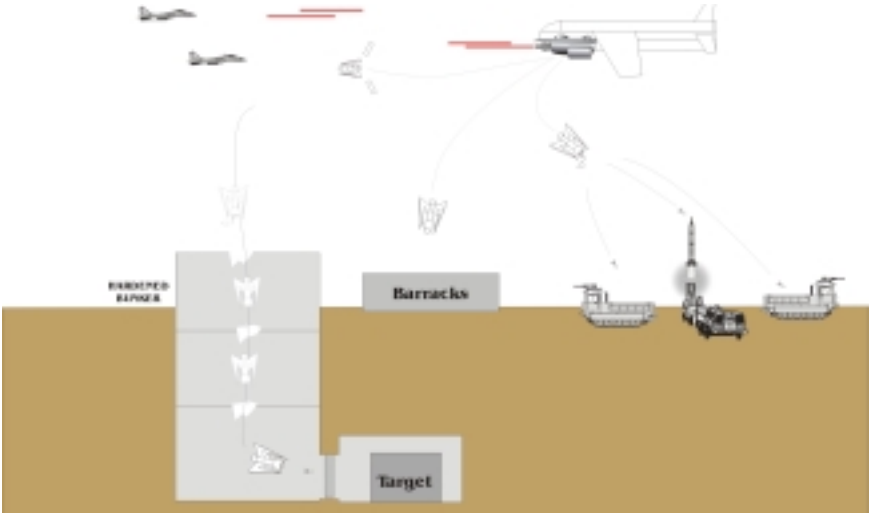
APPLICABLE TECHNOLOGY: SOF will need **fuzes and munition bodies** that will survive deep penetration into hardened underground structures and intelligently correlate and utilize multiple sensor inputs to determine optimal warhead detonation point(s). Fuzes could then be set to trigger warhead detonation by counting layers of earth/air interstitially plied with reinforced concrete or by calculating depth of penetration [integrating acceleration data]. These fuzes and munition bodies could be combined with **high-velocity kinetic-energy penetrators** containing **explosive directional warheads** and utilize advanced fuses that will enable weapons employment options that maximize lethality and/or control collateral effects. Enhanced payloads will explore **alternate warhead options** to conventional blast/fragmentation with the objectives of minimizing collateral effects associated with dispersal of WMD materials while also minimizing the number of weapons required to functionally defeat WMD facilities. **Electronic and telemetry packages that will survive deep penetration** into hardened facilities will enable collection of intelligence grade data from targets not otherwise assessable. Non-GPS or other external signal dependant **personal navigation and position indicating** systems will enable individual SOF to move and maneuver in underground or other obscured facilities.

CAPABILITY OBJECTIVES:

USASOC: 6, 8, 13, 14, 61, 95, 96, 113, 114, 115, 118; **NSWC:** 23, 25, 28; **AFSOC:** 59, 104, 105, 106; **FCWG:** 346, 390, 442

OPERATIONAL CONSIDERATIONS:

Hardened targets, whether underground or free standing, pose a formidable challenge to the SOF community. SOF must have personal sensors that operate regardless of darkness or obscured media, as well as the ability to see minute details at extreme ranges. SOF must have a way of blasting into a facility where the normally used entry control point is too heavily guarded or access is impossible because of physical barriers. Further, SOF needs to be able to defeat the most sophisticated intrusion detection devices surrounding hardened targets to gain entry clandestinely. In addition, SOF needs the capability to navigate and communicate underground as well as operate in a confined area (or underground) in contaminated air. The ability to see what is on the other side of a manmade wall or natural barrier (either optically or electronically) will give the SOF operator an operational advantage over his potential adversary. If it is determined that the target must be destroyed from the air, SOF must possess the capability to defeat the most deeply of buried targets. Robotic platforms may be used by SOF to perform portions of reconnaissance and surveillance where it is impractical, impossible, or too dangerous to use a human.



HARD TARGET DEFEAT TECHNOLOGIES

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 15

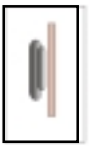
TITLE: Individual Performance Enhancement

SCOPE: Individual performance enhancements include all physiological, physical, mental, psychological and intellectual means to identify and counter the degradation of the SOF operator caused by the demands of sustained operations and extreme environments. Ultimately the SOF operator should exhibit human performance characteristics, i.e., speed, mobility, strength, intellectual ability and physical endurance significantly above those of the enemy.

APPLICABLE TECHNOLOGY: The enhanced effectiveness and applicability of recent **pharmaceutical products for treatment of physiological**, **neurological**, **and psychological disorders** are impressive even for drug development using conventional chemistry. With the advent of drug development using **combinatorial chemistry and genetic-engineering methods**, guided by the recent unraveling of the human genome, entirely new, specifically targeted pharmaceutical products will cascade onto the market. Knowledge derived from **human genome research** is particularly important to military medicine because of its positive impact on resource allocation, military medical practices, and preventive care. The intense concentration on viral infections as a result of the AIDS epidemic has greatly increased knowledge of **cell biology** and facilitated **drug-design procedures** that reduce drug development

Specifically engineered Inert Nano Technology encased in non-digestable material is swallowed prior to mission. Once activated remotely by the body monitor, release their prescribed chemicals and/or travel to injured areas of the body and begin reconstruction of the affected part.

risk and side effects while improving efficiency and efficacy. The development process is further enhanced when **modern molecular design and synthesis techniques** are employed. Proceeding in parallel are innovative, **insitu diagnostics**, **drug delivery**, **micro-encapsulation**, **implants**, **and controlled release mechanisms**. These technologies will also enable development of **multicomponent**, **multivalent vaccination systems**. Ongoing research indicates that gene-therapy techniques will be applied to correct certain genetic disorders and/or reduce the onset of hereditary problems. **Laparoscopic orthopedic and cardiovascular examinations** and treatments are being applied to lessen damage and risk. These techniques, coupled with **robotics technology** and reliable, **wideband global communications**, pave the way for **sophisticated telemedicine**. Recovery from surgery and other injuries will be quicker and less debilitating because of continual improvements in **rehabilitation methods and rejuvenating drugs**.



Body Monitor implanted under the skin is used to trigger chemical release for use in Body Regulation

CAPABILITY OBJECTIVES: **USASOC:** 7; **NSWC:** 34, 37; **AFSOC:** 8, 31, 32, 38, 41, 51, 52, 53, 59, 102, 130, 146, 150, 197, 204, 218; **FCWG:** 273

OPERATIONAL CONSIDERATIONS: Individual performance enhancements must maximize the physiological, physical, mental, psychological, and intellectual performance of a SOF operator. The SOF operator works in the most intense of environmental conditions. He must be physically and mentally prepared to carry heavy loads, pull high G forces and swim long distances in cold water. Intensive study and testing of the SOF operator, while in training, will identify his optimum nutritional and fluid intake, sleep patterns, ways to acclimatize faster, ability to alter metabolism and shed bodily waste products, etc., thereby maximizing his physiological individual performance/capabilities. In addition, modular food systems allow an individual SOF operator to design his food ration packet to meet his unique daily nutritional as well as specific mission requirements. Furthermore, ergogenic substances will be used to manage environmental and mentally induced stress and to enhance the strength and aerobic endurance of the operator. Other physiological enhancements might include ways to overcome sleep deprivation, ways to adjust the circadian rhythms to reduce jet lag, as well as ways to significantly reduce high altitude/under water acclimatization time by the use of blood doping or other methods.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 16

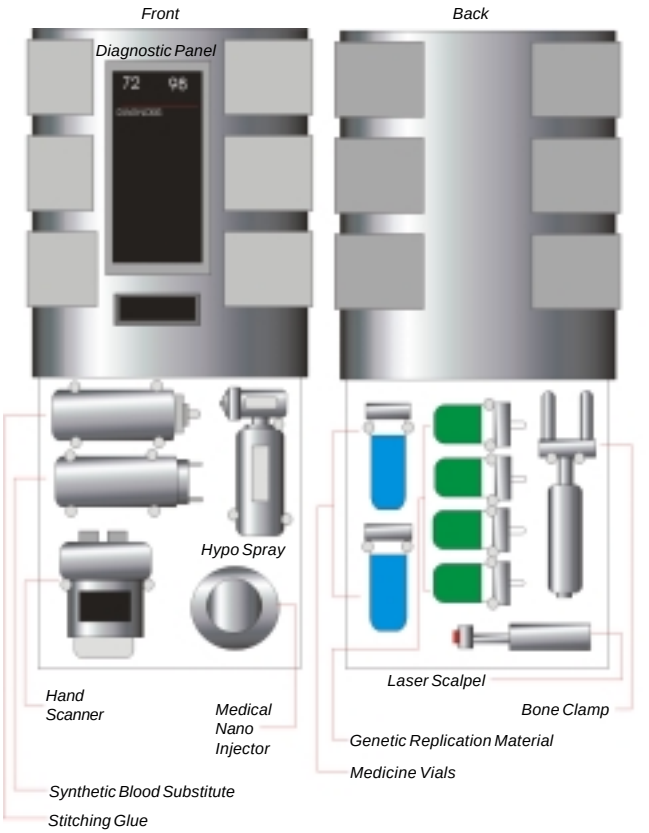
TITLE: Field Medicine Technologies

SCOPE: Special Operations Forces require technological advancements to address Non-Battle Disease Injury (NBDI), Combat Casualty Care/Trauma, Chemical/ Biological, Nuclear, Industrial and Occupational environments/threats. SOF also requires the need to locate/detect casualties, including DNA identification, resuscitation and stabilization of casualties, a means for rapid differential diagnosis and treatment of disease/injury as well as a rapid casualty recovery device/means and marked improvements/capabilities in reducing evacuation delays. The SOF operator working in austere environments and climatic

conditions is far removed from modern medical facilities. Additionally, medical evacuation capabilities are limited and delays in evacuation are to be expected. These technologies will significantly enhance SOF capabilities in such areas as prophylactic interventions, ergogenics, pharmaceuticals, tissue regeneration, hemostatic agents, dressings, whole blood substitute, rapid card-based disease diagnostics, miniaturized medical monitoring, field analgesia and anesthetics, hand-held laser instruments for cutting, devices for coagulation and closure, blunt trauma behind body armor, advancements in tissue salvage/surgery life detectors for the battlefield recovery of exposed wounded, hand held diagnostic devices (X-ray machines), and devices to control hemorrhage

APPLICABLE TECHNOLOGY:

Biomarkers: The use of new technology biomarkers may assist in determining profiles of human susceptibility to disease and chemical/biological/ industrial toxicant exposure. A biomarker is an indicator of exposure of persons to particular agents, toxicants, or physiological stress. **Sensors** may be developed **to identify these markers** so that the psychological fitness of individuals can be monitored and predicted. **Telemedicine:** A telemedicine approach is of increasing importance in situations where SOF is deployed in small units at a site distant from primary care. The technologies included in this area are: **medical surveillance, diagnostics, consultation, expanded multimedia medical databases**, **virtual reality presentations (visual**, **auditory**, **haptic)**, **telepresence surgery**, **Life Support for Trauma and Transport (LSTAT)**, **microsensors and passive transmitters**, **and sensate liners** in which both coverings contain sensors. Telemedicine technology requires a **sophisticated telecommunications system** that includes video, audio, and haptic interfaces from medical evacuation platforms and forward field medical units. **Traumatic injury treatment:** Rapid detection of vital signs can be greatly enhanced by future **"tricorder" technology**. In its current form, the "tricorder" is a **radio-frequency radiation** (IR or MM wave) **device that will locate or detect casualties, vital signs, heartbeat, and pulse/respiration**. It has a distant life-signs scanning capability originally built for detecting vital signs through chemical warfare protective clothing, and can detect life signs through brush, structures, or collapsed buildings. A **mass casualty respirator** capability to sustain survivability



has recently been explored. This technology consists of **high-frequency ventilation** capability from a central source, but with multiple stations such that overall ventilation will be sufficient for 80–95 percent of casualties. Hemostatic agents, Fibrin glues, and sealant that promote rapid coagulation wound healing, analgesia and assist in prolonged stabilization. Ergogenic and prophylactic Interventions will both enhance and protect the SOF operator, as well as offer solutions to treating blunt trauma. Enhanced improvements in wound management, reduced evacuation times and improvements in enroute care are essential. In the long term, research to find methods to treat wounds is related to the understanding and development of growth hormones that trigger wound healing.

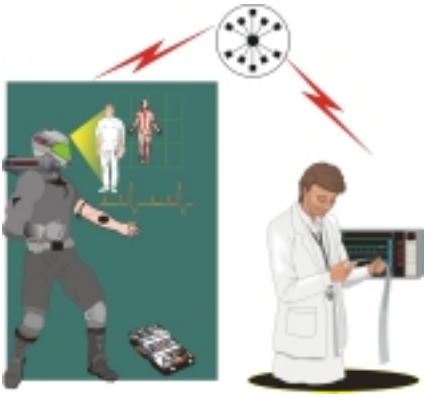
TOC

CAPABILITY OBJECTIVES:

USASOC: 49, 67, 81, 82, 83, 84, 85, 86, 139, 140, 146; **NSWC:** 4, 37, 38, 41, 62; **AFSOC:** 8, 20, 26, 30, 31, 32, 38, 39, 42, 51, 52, 53, 54, 55, 59, 86, 96, 127, 130, 134, 135, 136, 137, 146, 155, 170, 197, 204, 221; **FCWG:** 34, 274, 281, 329

OPERATIONAL CONSIDERATIONS:

The very nature of SOF requires the operators to be far away from even the most rudimentary of medical facilities and health providers. The SOF operator(s) must be totally self-contained, and if an injury or wound occurs, while in the field, they must have the medical expertise and the equipment/drugs/supplies to diagnose, treat, and manage the injured/wounded operator until he may be evacuated. It is imperative the SOF medical personnel have the capability to resuscitate injured/wounded personnel. Hemostatic agents i.e., a whole blood substitute, a soft tissue regeneration capability, and a non-invasive (as much as possible) machine providing triage and treatment as well as a hand-held X-ray machine or other technology will be the norm for the operator. Additionally, the SOF operator must have the ability to administer anesthetics in the field without special equipment as well as perform medical procedures without need for open drip or special machinery. The SOF medic needs to have a rapid diagnostics capability to detect pathogens, as well as the capability of telemedicine (i.e., hologram technology) to assist in life threatening situations. The SOF operators need to be able to be protected from infection, vectors, pests, insects, life threatening organisms, and selected chemical and bacterial agents. In short, the SOF operator must have the specialized training and the necessary equipment/supplies prior to departing his operating base and must be tied in to a long-term medical surveillance system.



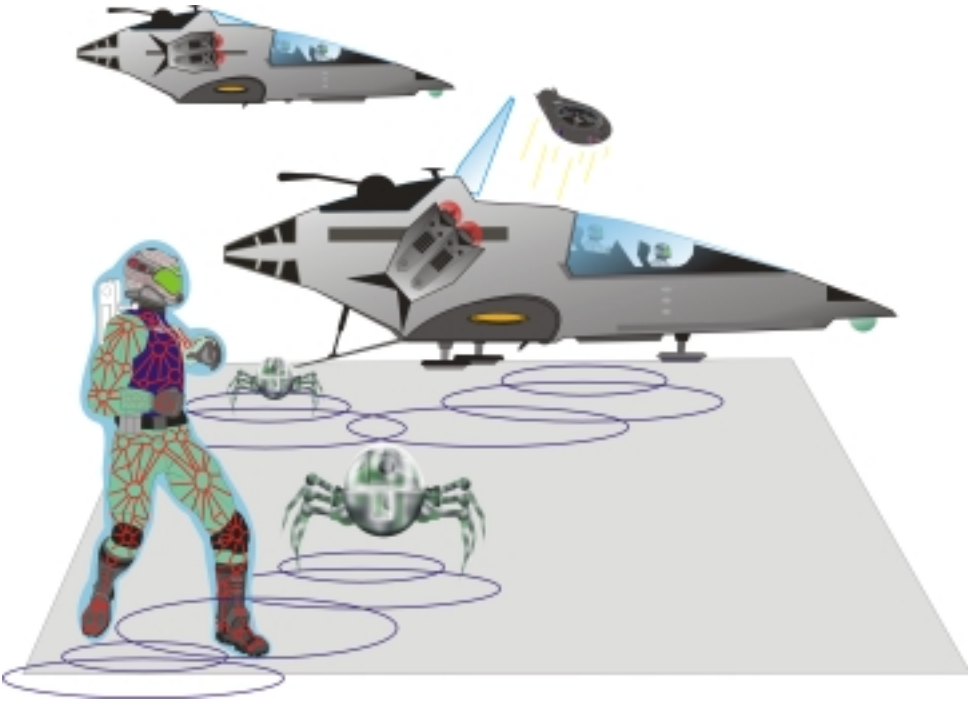
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 17

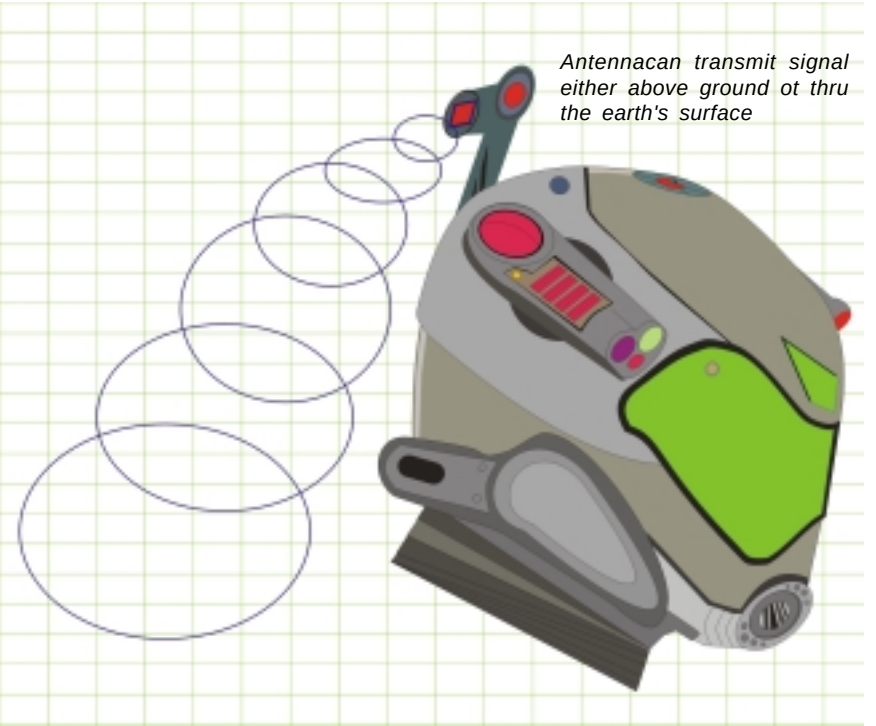
TITLE: Command, Control, and Communications (C3)

SCOPE: Command, Control, and Communications play a vital role in planning and executing SOF missions. Communication requirements/capabilities for SOF include a seamless information enterprise across the full spectrum of day-to-day operations as well as tactical operational missions. SOF must possess secure communications with the capability for high bandwidth imagery or target locations, UAV video and sensor feeds, location for friendly and enemy forces, status of support missions, and satellite sensor broadcast. Communications must provide information interfaces and services across all echelons of SOF in the sea, air, land, space and cyberspace. Communications must reduce the forward footprint of SOF by providing direct, on-demand, real-time linkup between the SOF operator in the field and rear echelons (to include national and strategic decision-makers). Tactical communications require small, physically and electromagnetic hardened radios that have the capability to transmit voice, data, and images with low probability of interception and low probability of detection and are capable of operating in all environments including underwater.

APPLICABLE TECHNOLOGY: The ongoing revolution in computing and communications will drive and make available to SOF dramatic improvements in machine and human interfaces, which will be required to realize the benefits of increased information flow and communications capabilities. These improvements will be enabled by technologies such as **high-resolution**, **miniature image sources** for personal **(head-mounted) displays** and **projection systems**; **wireless human tracking** and monitoring technology; continuous, **speaker-independent speech recognition**; and low-cost, portable rendering hardware. Much of this technology will be sourced from commercial R&D because of strong consumer markets. SOF-peculiar applications of these enabling technologies, such as **C2 operator workstations**, will require extensive adaptation and testing to become more effective than previous interfaces. This is because of orders of magnitude increases in the coupling and synergy between the

human-computer system and the task at hand. The majority of human interfaces in use today are based on windows, icons, mouse, pointer (WIMP) interface or its derivatives. The trends in human-centered systems are toward the use of **multi-modal interaction, 3D visualization**, **more immersive**, **virtual reality space**, **and hierarchical intelligent assistants. Human-Centered Systems (HCS)** technology refers to the broad spectrum of hardware, software, and human factors disciplines that enable humans to effectively interact with information systems, computers, sensors, machines, and other humans. This technology draws from a variety of software fields (e.g., **visualization**, **information presentation**, **human-computer interaction**, **computer graphics**, **human tracking**, **force displays**, **tracking sensors**, **graphics and GP computers**, **and networks**) and human factors disciplines (e.g., experimental psychology, cognitive science, physiology).





"TAILOR-TO TASK" COMMUNICATIONS

CAPABILITY OBJECTIVES:

USASOC: 2, 3, 9,12, 20, 22, 27, 29, 78, 99, 101, 122, 123, 124, 125, 126, 127, 128; **NSWC:** 3, 5, 6, 8, 9, 10, 31, 32, 33, 39, 40, 41, 62; **AFSOC:** 4, 7, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 45, 47, 48, 49, 50, 54, 55, 56, 57, 58, 59, 60, 61, 64, 65, 66, 68, 70, 72, 75, 76, 77, 80, 82, 86, 88, 89, 90, 91, 92, 96, 97, 98, 99, 101, 103, 110, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 127, 128, 131, 135, 137, 139, 141, 142, 143, 144, 145, 146, 148, 149, 151, 152, 154, 155, 156, 157, 158, 160, 162, 163, 164, 166, 167, 168, 169, 174, 175, 178, 179, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 193, 194, 195, 197, 199, 200, 201, 202, 203, 205, 206, 207, 209, 211, 212, 213, 215, 220, 222, 223, 226, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239; **FCWG:** 70, 191, 274, 297, 329, 357, 421

OPERATIONAL CONSIDERATIONS:

The communications requirements/capabilities for SOF are unique in the DOD. SOF requires a global information grid interconnecting capability processes and personnel for collecting, processing, storing, fusing and disseminating tailorable information on demand to the warfighter. There is also a requirement to reduce the forward footprint of SOF by providing direct, on-demand, real-time linkup between the SOF operator in the field and rear echelon headquarters and other agencies such as Ambassadors, Non-Governmental Organizations, the Services, the State Department, other government agencies and coalition partners *et al*. The tactical requirements of the SOF operator in the field on communications assets are also unique. SOF operators require electronically and physically hardened radios that are small and require low power, thus reducing the battery requirements. In addition, they should have low probability of interception (LPI) and low probability of detection (LPD) by enemy forces. They should be able to operate in all environments, including underwater and underground, and in all climates. They should also be lightweight, customizable, personalized, and require little or no training to use. Maritime SOF needs to be able to communicate real-time from underwater to above water without the use of an above-the-surface antenna. All communications assets must operate in both clear channels as well as in a covered/secure mode. They must further be able to transmit voice, data, and full motion video images in near real time/real time to/from operational SOF teams as well as to/from joint and combined force headquarters.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 18

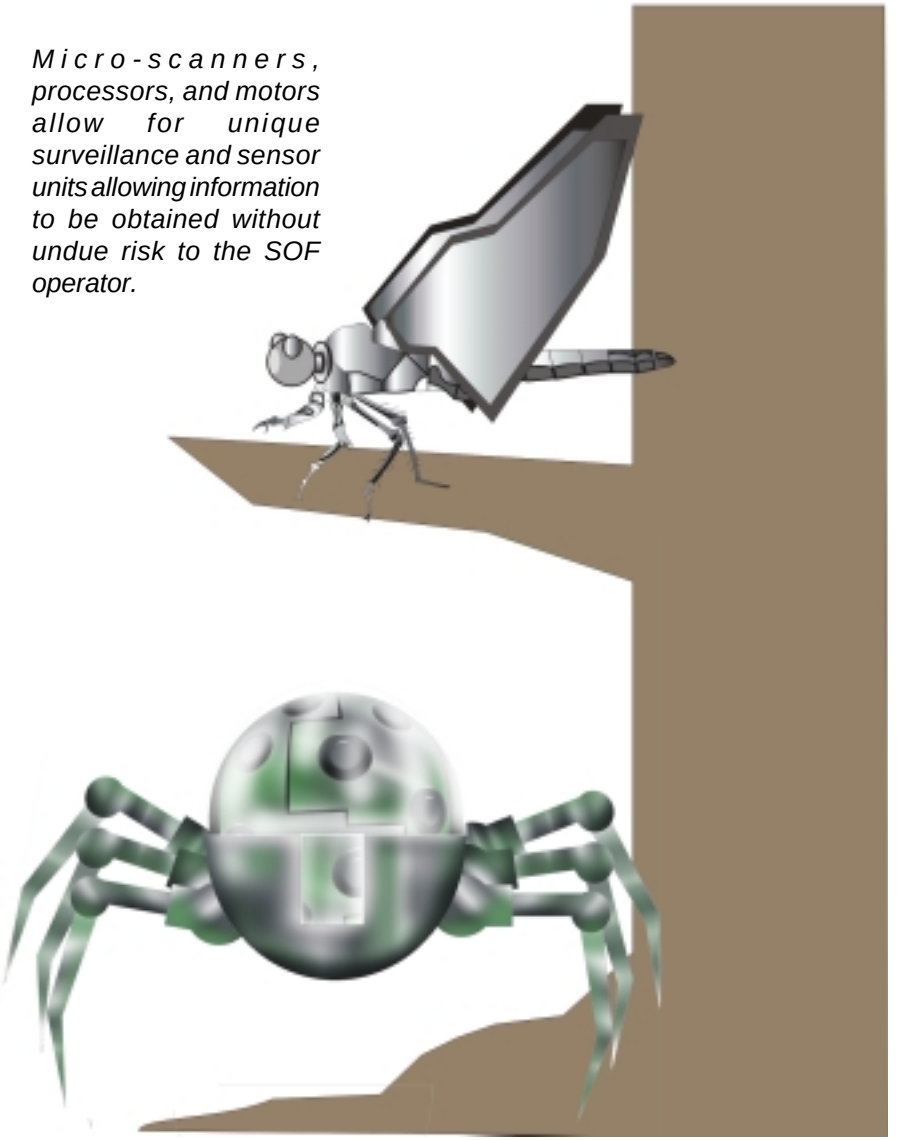
TITLE: Microelectromechanical Systems (MEMS)/ Microelectronics Systems

SCOPE: MEMS/microelectronics will be used extensively by SOF to perform reconnaissance and surveillance missions at substantial standoff ranges. MEMS will allow the SOF operator to remotely view structures/ layout of deeply buried underground complexes; mark/ tag and track mobile weapon systems; detect production of NBC agents; and enable micro air, land, and sea vehicles.

APPLICABLE TECHNOLOGY:

MEMS, while based on microelectronic manufacturing technology, merges information processing with sensing and actuation to realize new systems and subsystems and combinations. Typical applications include: **inertial measurement units** for munitions, military platforms, and personal navigation; **electromechanical signal processing**; **distributed control of aerodynamic and hydrodynamic systems**; **distributed sensors** for both condition-based

Micro-scanners, processors, and motors allow for unique surveillance and sensor units allowing information to be obtained without undue risk to the SOF operator.



maintenance and structural health and monitoring; **distributed unattended sensors** for asset tracking and **environmental/security surveillance**; **atomic scale and resolution data storage devices**; **miniature analytical instruments**; **noninvasive biomedical sensors**; and **optical fiber components**. **On-board munition environment sensing**, decisionmaking, arming, fuzing, and initiation in miniature, low-cost packages are feasible using this technology. MEMS will be critically important for any application where size, weight, and power consumption must decrease while functionality increases under extreme cost pressure. New device concepts include **integration of micro devices with communication**, **control**, **computation**, **and power components**, **miniature electromechanical signal processing elements** (tuning elements, antennae, filters, mixers), **miniature opto-electromechanical devices** (cross-bar switches, fiber-optic interconnects and aligners, deformable gratings, and tunable interferometers), **force/motion balanced accelerometers and pressure sensors**, atomic resolution data storage, **electromechanical signal processing**, process control (HVAC, fuel flow, mass flow sensors, and controllers), and **simultaneous**, **multiparameter sensing** with monolithic sensor clusters.

CAPABILITY OBJECTIVES:

USASOC: 8, 14, 15, 25, 26, 33, 42, 59, 61, 94, 111, 114; **NSWC:** 4, 5, 6, 7, 8, 9, 10, 17, 18, 25, 28, 30, 31, 32, 39, 40, 41, 45, 51, 53, 54, 62; **AFSOC:** 19, 21, 24, 25, 48, 57, 66, 104, 105, 106; **FCWG:** 6

OPERATIONAL CONSIDERATIONS:

MEMS will play an increasingly important role for SOF in the future. To have a MEMS or microelectronic system capable of performing reconnaissance, target detection, mine hunting, surveillance, and or analyses of facilities or NBC components will be the norm for the SOF warrior. MEMS/microelectronic systems will be important to remotely view deeply buried complexes and other structures, and to determine the presence or absence of hazardous materials. They will be used to tag personnel, material, facilities, and mobile weapons systems. They will be deployed to perform functions that would be impractical, impossible, or too dangerous for an operator. They need to be able to operate in all environments, including underwater and extreme climatic conditions. They will include sensors capable of determining whether humans are present at specified

locations and will be able to sense whether an individual is armed. These sensors will be able to identify known chemical and biological compounds of interest. In addition, they will have the capability to be operated either from air, ground, or maritime platforms or remotely to give added operational situational awareness and overall support to their operators.

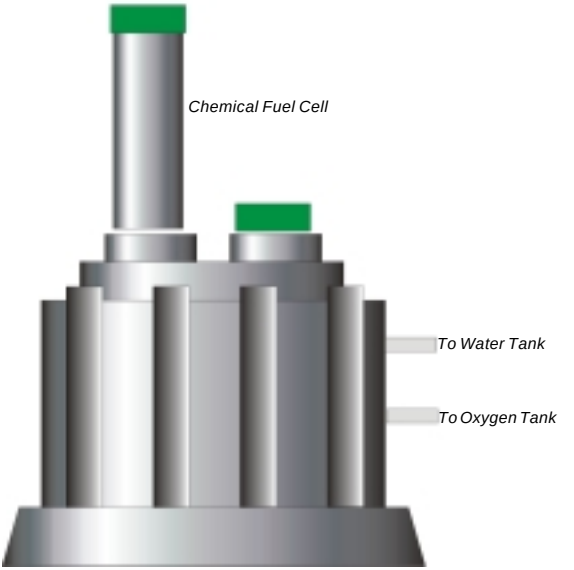
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 19

TITLE: Advanced Engines, Motors, Powertrains, and Propulsion Systems

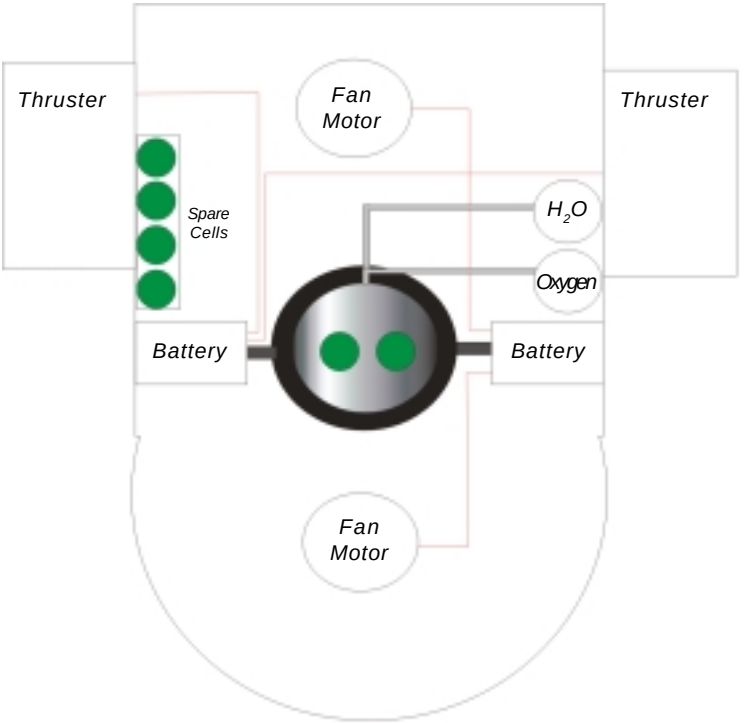
SCOPE: Advanced engines, motors, powertrains, and propulsion systems will afford the SOF operator the ability to infiltrate/exfiltrate and operate with highly maneuverable, high-speed, air/land/sea platforms over extended ranges and with significantly reduced signatures. These technologies will maximize performance and provide signature reduction for all mobility platforms. Power sources for submersibles must optimize operational capabilities such as range, speed, endurance, and maneuverability.

APPLICABLE TECHNOLOGY: **Air systems. Ceramic Matrix Composites (CMCs)** have been identified as potential candidates for high-temperature structural applications. Using fuel/air or air/air heat exchangers to provide lower temperature cooling air for the turbine and the compressor disks allows current cooled materials to operate at higher engine-cycle temperatures. **Fluidic thrust vectoring technology** allows for a fixed nozzle that will reduce weight and complexity of current variable area convergent/divergent nozzles. **Pulse detonation engines** present alternatives to current gas turbine and rocket engines, based on a continuous combustion process. **Ground systems.** Engine design goals that maximize an engine's power density and contribute to minimizing vehicle size and reducing weight are critical elements. Reducing the size and increasing the power output of a diesel engine (power density) pushes the limit of many areas of design and technology, e.g., materials, high temperature lubricants, eliminating parasitic power losses, air movement, and so on. These technologies are critical to reach the desired goal of smaller, more efficient "SOF specific" vehicles. Technology advancements required are: **automatic**

transmissions with integrated braking and regenerative steering systems for high-speed tracked vehicles and for **high-density**, **compact diesel engines. Maritime systems.** Four types of **Air Independent Power (AIP)** thermal engines are candidates to power submarines and other underwater vehicles: (1) the **closed-cycle Brayton;** (2) the **closed-cycle Rankine or steam turbine;** (3) the **closed-cycle Stirling piston engine**; and (4) the **semi-closed-cycle diesel engine.** AIP systems also include **electrochemical power sources**, i.e., fuel cells, nonrechargeable batteries, rechargeable batteries, and thermoelectric devices. **Waterjets are an alternative for countering propeller cavitation problems for high-speed craft and special-purpose craft.** With a speed range above 45 knots, waterjets, whose principal advantage is improvement of vehicle maneuverability, are typically applied to patrol boats, surface effect ships, hydrofoils, motor yachts, and fast ferries.



HYDROGEN POWER PLANT



CAPABILITY OBJECTIVES:

USASOC: 38, 136, 137; **NSWC:** 1, 15, 21, 42, 46, 52, 58, 59, 60, 61; **AFSOC:** 10, 15, 18, 19, 88, 94, 95, 147, 176, 191, 210, 212, 216, 224, 225

OPERATIONAL CONSIDERATIONS:

Engines, motors, powertrains, and advanced propulsion systems will give the SOF warrior a decided advantage over a potential adversary. The SOF warrior will require air, ground, aerospace, and maritime propulsion systems that are light, energy efficient, noiseless, essentially maintenance free, use multipurpose fuel(s) (land and small maritime engines), and produce little, if any, IR, visible, RF, or electromagnetic signature. Maritime vehicles will be designed to ensure compatibility with US Navy hazardous material handling requirements for surface and subsurface vessels. In addition, submersibles will ensure the power and propulsion designed and fitted aboard them optimize operational capabilities of range, speed, endurance, and maneuvering. The primary concerns for SOF engines/powertrains/advanced propulsion systems are range (long), speed (fast and faster) and signature (virtually invisible in all spectrums).

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 20

TITLE: Navigation and Positioning Systems

SCOPE: The individual and platform systems must allow the SOF operator to navigate and function in all environments and climatic conditions. These technologies will permit SOF crews to fly safely in rendezvous flight and close formation, without task saturation in zero-zero visibility. It will allow a high-speed target acquisition/navigation system for the SOF gunship platform and be interoperable with the worldwide air navigation system.

APPLICABLE TECHNOLOGY: Future **Differential GPS (DGPS)** systems will provide sub meter accuracy. The SOF application of geodetic and geophysical databases such as terrain, magnetic, and gravity matching techniques offer the possibility for more autonomous navigation capabilities. **Hybrid Inertial Navigation System (INS) systems** such as GPS combined with **Ring Laser Gyroscope (RLG)** or **Fiber-Optic Gyroscope (FOG)** INS will be expanded. Miniaturized GPS (GPS on a chip) will hasten hybrid INS/telecommunication applications at reduced cost. Over the next 5 to 15 years, INS could be revolutionized by **Microelectromechanical Systems (MEMS)** technology. MEMS technology could be further enhanced by the continued growth of optical computing/processing/correlating technologies, especially in **georegistration of hybridized data from remote sensors** (pseudo-imaging) using highly accurate timing data. Accurate and **miniaturized "smart" gravity and magnetic detection sensors** combined with GPS/INS and satellite communications will provide target recognition and real-time movement and direction of enemy forces. These same sensors combined with **biological**, **chemical**, **and or neutron emission sensors** could help identify and track movement of biological, chemical, and nuclear emissions on the battlefield. Further cost reductions would allow localized battle areas to be "seeded" (by mini-AUVs) with these detection devices. Further **micro-miniaturization of low-power clock technologies** will provide autonomous "fly-wheel" time devices in all navigation and communication equipment, minimizing the effect of GPS jamming. The use of GPS time synchronization to locate the position of 911 cellular users can be adapted by SOF to improve situational awareness in urban terrain. Integrated with

Onboard computers monitor positioning sensors programmed to operate on a SOF friendly low level frequency which is verified by low orbit positioning satellite. Onboard navigation computer keeps track of other vehicles to eliminate collision.

In case of encounter with unknown object or vehicle, computers analyze information regarding size, shape, and material composition. The computer then checks characteristics against known vehicles programmed into the database to determine friendly or enemy objects.

Combat Identification Tags (CID) and localized terrain maps, **mini-navigation/Low Probability of Interception (LPI) telecommunication sensors** may provide positive ID of friendly forces and thereby reduce the "fog of war" in urban terrain. Over the next 15 to 20 years, **Nanoelectromechanical Systems (NEMS)** technology could continue to decrease the size and cost of INS and further revolutionize navigation by providing an autonomous INS using multiple NEMS accelerometers (potentially eliminating the need for gyroscopes). For SOF, this could affordably allow a non-jammable INS to be installed on every air, land, and sea vehicle, smart weapon, artillery shell, and warfighter.

CAPABILITY OBJECTIVES: **USASOC:** 10, 25, 51, 52, 53, 55, 64, 72, 89, 90; **NSWC:** 3, 6, 9, 18, 41; **AFSOC:** 1, 2, 7, 13, 14,15, 18, 19, 21, 24, 25, 26, 28, 31, 32, 38, 39, 41, 44, 48, 50, 57, 60, 61, 64, 65, 66, 73, 76, 80, 82, 92, 99, 100, 103, 104, 105, 106, 109, 110, 111, 139, 146, 149, 154, 158, 162, 163, 164, 194, 197, 205, 206, 207, 208, 212, 213; **FCWG:** 416

OPERATIONAL CONSIDERATIONS:

SOF forces require accurate, easy-to-read, low-maintenance navigation systems for all their advanced mobile platforms in addition to those carried by those operators conducting missions on the ground. For example, these navigation aids in SOF aircraft will assist them in conducting close formation flying (in zero-zero visibility situations), as well as make it possible for SOF aircraft to rendezvous in less than perfect conditions (e.g., nighttime operations, inclement weather operations). On the ground, the individual SOF operator will require a very accurate navigation system that is both light and requires little in the way of power source requirements to be able to locate their position in buildings and deeply buried targets etc. Small boats and submersibles, like aircraft in their domain, will require the ability to move in a maritime environment long distances and not only know their location, but also the location of their support and other operational craft. Additionally, SOF maritime forces swimming in open water/ocean need the ability to navigate accurately without broaching the surface. Lastly, advanced navigation systems will allow high-speed target acquisition for SOF gunship aircraft.

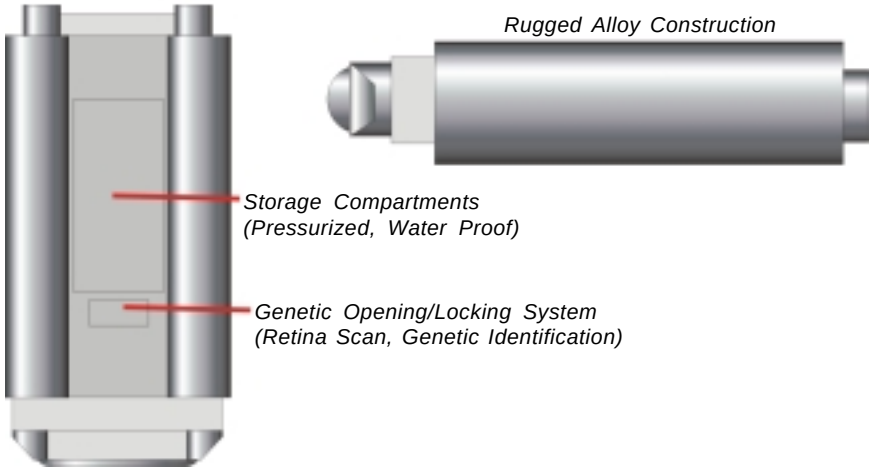
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 21

TITLE: Individual Survivability and Support

SCOPE:

Individual survivability and support encompasses a wide variety of capabilities focused on the SOF operator in extremes of climates and environments (including underwater). These technologies will allow him to have complete situational awareness and threat warning in near real time as well as leave little or no signature on the battlefield. He must be protected from mines, fragmentation, high ballistic impact, NBC agents, life-threatening organisms, microwaves, and electrochemical/electro-optical and laser energy. SOF may be required to provide or enhance survivability to indigenous, surrogate, or coalition forces engaged in support of US SOF or conventional missions. Protection may be individual or integrated into vehicles of all types to provide physical and psychological advantages.

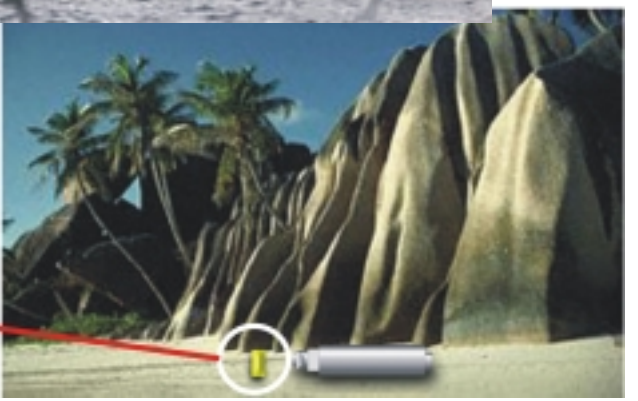
Twin Propulsion System
(Total Contained System)



APPLICABLE TECHNOLOGY:

Foreseeable advances in individual survivability technologies include development of next generation **advanced materials for multiple threat protection**; technology to provide fragmentation and small arms ballistic protection at 30 percent reduced weight; **materials to prevent detection by multispectral sensor devices**; **clothing systems that provide thermal and environmental protection** with minimum bulk and weight; and development and application of integrated soldier and small unit battlefield performance simulations that support analysis of technology enhancements. Supporting technologies include **bio-engineered materials** for protection and **analytic tools with resolution to capture battlefield effects of fatigue**, **load**, **environmental exposure**, **hydration**, **terrain**, and so forth. The technical challenges associated with these technology advancements include the development of **polymeric materials for ballistic protection**; **passive protection against advanced sensors** without degrading current visual and near infrared camouflage protection, while maintaining desired/required textile properties; **durable combat uniforms** that provide protection against multiple threats, cost-effective, and do not impose a heat stress penalty; **dielectric stacks for broadband laser protection**; an **ergonomically efficient load-bearing system** that is compatible with other system components, has a **quick-release capability**, is

comfortable, reduces fatigue and localized injury, and increases mobility and combat effectiveness; **boot designs** to reduce stress-related lower extremity injuries.



Homing Beacon (automatic beginning and ending sequence)

CAPABILITY OBJECTIVES:

USASOC: 5, 30, 31, 32, 34, 73, 132, 133, 134, 135; **NSWC:** 1, 4, 6, 13, 16, 17, 18, 25, 31, 34, 35, 36, 37, 40, 41, 47, 51, 53, 54, 56, 57, 63; **AFSOC:** 2, 3, 8, 26, 29, 31, 32, 36, 38, 42, 45, 46, 50, 52, 53, 54, 59, 60, 66, 77, 81, 102, 103, 110, 127, 129, 130, 133, 146, 150, 155, 163, 165, 172, 183, 197, 198, 204, 208, 212, 218; **FCWG:** 6, 10, 13, 36, 42, 43, 50, 54, 57, 158, 159, 160, 162, 194, 232, 262

OPERATIONAL CONSIDERATIONS:

The goal of the SOF community is to make the SOF ground warrior as near invisible on the battlefield as possible. This reduced signature includes reducing/eliminating his electromagnetic, RF, IR, seismic, aural, and olfactory signs. Furthermore, the overriding issue on SOF support equipment is weight! Whatever support elements/systems are devised in the future, the overriding limiting factor for the SOF warrior is the amount of weight he may carry. For instance, exposure suits for maritime and extreme cold environments, floatable body armor, new aircrew survival vests/protective ensembles (for protection against flak and other ballistic projectiles), and micro cooling/heating suits for SOF operators are all equipment types that SOF operators need. They, like all other personnel equipment of the operator, must all be engineered and designed with weight as the key performance parameter. Other SOF-unique systems and needed capabilities are oxygen systems providing unobstructed use for parachute equipment, as well as an advanced camouflage/concealment system for both ground equipment and personnel. Still other individual survivability and support capabilities/issues are: combat identification and other fratricide reduction capabilities; extreme environment hand-wear (gloves); tactile display suits for SOF pilots; battlefield situational awareness systems that allow real-time/near-real-time information for the operator; and maximizing the physiological performance of the SOF operator (with drugs, diet, stress reduction, sleep cycles, and weight/strength training). All of the aforementioned individual survivability issues should individually address whether they are active or passive systems. The SOF warrior needs to be able to determine with certainty if he or members of his team/crew have been exposed to laser, high power microwave, and nuclear radiation in addition to chemical/biological agents. All systems, sensors, and materials developed for indigenous, surrogate, or allied forces must be highly resistant to "backwards engineering" and attribution to US military

as they are at high risk of capture. Simplicity of use and minimal maintenance/sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Bolts of cloth with stealth and other protective qualities that simulate indigenous textiles would enable local personnel to develop advanced capabilities with little investment, as would "paint on" stealth or armor. Systems may require the ability to automatically or on-command self-destruct/inactivate when mis-used, without causing damage or casualties to the user.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 22

TITLE: Directed Energy Weapons (DEW)

SCOPE: DEW will allow the SOF operator to kill, neutralize, or suppress enemy or civilian personnel as well as incapacitate vehicles, ships, or aircraft. SOF must have the ability to force personnel to vacate an area and temporarily incapacitate personnel within a bunker, building, or ship. Ultimately, the SOF warrior will need lightweight, tunable, man-portable lethal/non-lethal weapons.

APPLICABLE TECHNOLOGY: A most likely use of DEW technology would improve mission execution in major regional conflicts to include hitting target/accomplishing SOF-peculiar mission objectives with minimal noncombatant/collateral damage, concealment/covertness, evasion/escape, and disabling/degrading enemy logistics and infrastructure. To accomplish these goals DEW would be required to disable C4I systems, personnel, vehicles, and radar and targeting systems. Potential DEW technologies include **direct-coupled and free air radiated Electromagnetic Pulse (EMP) weapons**, **high-power microwave weapons**, **high-power radio frequency weapons**, and **electro-optic augmentation countermeasures** (that could include nonpersonnel targeted lasers). Maritime SOF operations requiring mine clearing, sensor disablement, and antipersonnel are likely to deploy **pulsed power acoustic weapon systems** in addition to the DEW mentioned above. Acoustic energy is not considered a pure directed energy technology, but in air or water performs similarly.

Low-energy, **eye-safe at the aperture LASER dazzlers** are potentially capable of denying areas or structures to personnel unprotected from the visible wavelength in use. Hostage rescue, crowd control, or pursuit deterrent operations are applications that could benefit from these technologies. Fusion technology is being researched as a possible means for future energy/propulsion systems.

CAPABILITY OBJECTIVES:

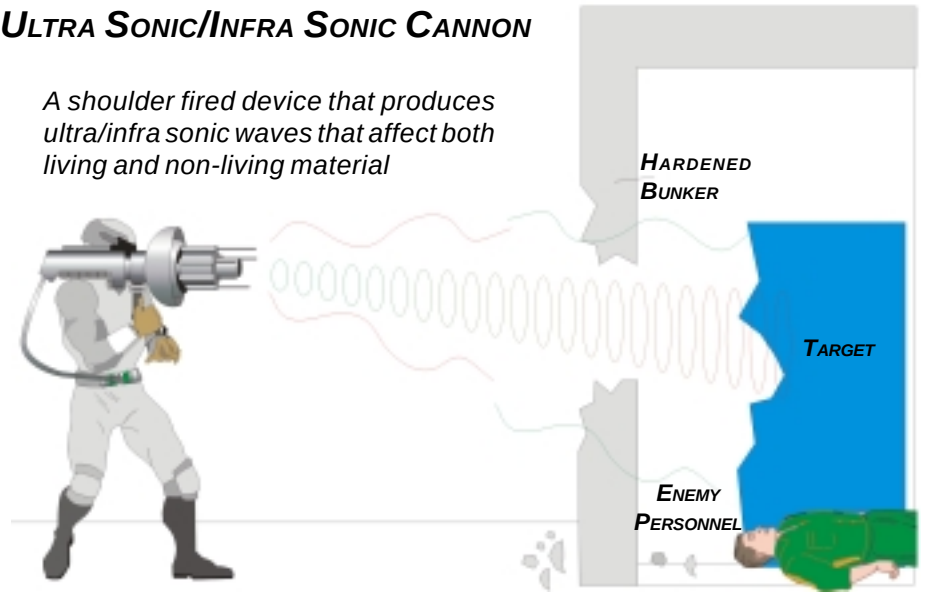
USASOC: 46, 54, 66, 112, 113, 114, 116, 117, 121; **NSWC:** 13, 20, 22, 23, 27, 29, 55; **AFSOC:** 26, 57, 58, 60, 61, 62, 63, 66, 68, 68, 71, 76, 80, 108, 129, 146, 159, 171, 173, 192, 197; **FCWG:** 213, 257

OPERATIONAL CONSIDERATIONS:

SOF use of directed energy will be primarily for offensive combat. SOF will use directed energy in a man-portable, lightweight, tunable lethal/non-lethal weapon as well as have an airborne lethal/non-lethal weapon capable of attacking/killing/neutralizing/suppressing targets on the ground. SOF forces will need the capability to temporarily incapacitate personnel, in addition to cause them to vacate confined areas (buildings, DUGs, aircraft, bunkers, etc.). Directed energy will also be used to restrict the use of high value terrain or facilities for indefinite periods of time as well as incapacitate ships without breaching or sinking them.

ULTRA SONIC/INFRA SONIC CANNON

A shoulder fired device that produces ultra/infra sonic waves that affect both living and non-living material



TOC

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 23

TITLE: Training Systems Technology

SCOPE: Training systems technology will allow the SOF operator to enhance and perfect his skills and knowledge more efficiently and with less resource expenditure. The systems will provide realistic training in such areas as live-fire training, simulators for parachuting and diving, medical operations, planning training and rehearsals, as well as tactical security situations. SOF needs the training system technology capability to cover the entire spectrum of mission preparation from planning to training to rehearsal to execution. Training system technologies need to be tailorable and on-demand through the use of databases and data fusion tools to replicate the full range of condition and situations that relate to a specific threat. US SOF will require the ability to rapidly train indigenous, surrogate, or allied forces to perform complex tasks in support of SOF or conventional forces.

APPLICABLE TECHNOLOGY: Future training should be organized in a manner that exploits **information-processing and cognitive-process technologies** to maximize the learning experience. **Virtual reality systems** will provide key aids to realism in training, without the ability to use the actual geographical site. Through the use of up-to-date, **real-time photo/video imagery**, operators are capable of participating in designed training for the specific geographical "piece of ground." These system designs can incorporate the various types of data to illustrate the generic makeup of the proposed operation's area, thereby preparing as best as possible for all contingencies. These types of systems can provide invaluable training application and may enable operator's maximum training through minimum costs. Virtual reality can provide significant enhancements of realism, and through the use of **artificial intelligence** applications linked to the training system, will enable the operator to advance from student to higher levels of training preparedness. The use of **computer simulation and virtual reality** can especially enhance training through the capabilities of the instructor view when a failure has been determined. Herein the instructor can stop the portion of training without unduly preventing all the training by beginning again. **Case-**

VIRTUAL REALITY HELMET SYSTEM

Feeds the SOF warrior stimuli (sights, sounds, odors) from computer generated programs specially created for missions. also can be used for general mission training.

based intelligent tutoring systems will provide computer-based training systems for SOF operators in complex and dynamic formats. Intended for individuals who have already completed formal training, this type of training will include a **simulator** that allows a student to experience and practice the cases under the guidance of a **computer-based tutor**. The architecture will use an **operator function model** to provide intelligence and instructional control.

CAPABILITY OBJECTIVES:

USASOC: 1, 22, 33, 48, 72, 86, 120; **NSWC:** 4, 6, 9, 11, 12, 18, 19, 41; **AFSOC:** 5, 9, 10, 11, 12, 15, 17, 24, 26, 27, 29, 31,32, 33, 37, 38, 41, 43, 45, 46, 47, 48, 50, 52, 53, 57, 58, 59, 60, 61, 62, 63, 67, 68, 78, 79, 80, 82, 83, 87, 90, 92, 100, 102, 103, 105, 106, 110, 111, 126, 127, 129, 130, 131, 138, 141, 142, 143, 146, 148, 152, 153, 155, 180, 183, 194, 196, 197, 198, 204, 213, 218, 228; **FCWG:** 55, 56, 111, 164, 165, 175, 253, 263, 302

INTERACTIVE TRAINING ROOMS

Made of polymer or ceramic (plezoelectric) that flexes when electrical current is introduced. This room can be used to simulate terrain, buildings, walls. 3D panoramic photos add realism to scenario.

Electrode suit used to simulate outside stimuli. Mimics the function of Combat Battle Uniform with VR weapons, Power, etc.

Rooms may be tied together to allow training at different training sites.

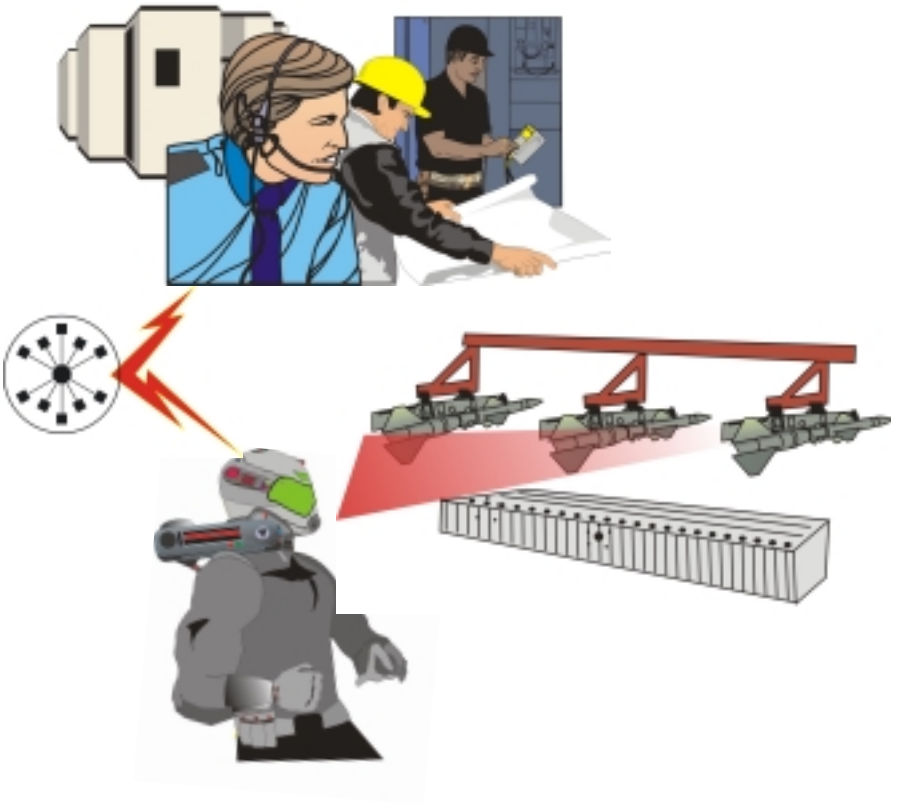
OPERATIONAL CONSIDERATIONS:

Training and training systems technology within the SOF arena are areas marking substantive difference from the regular Air Force, Army, or Navy operating forces. SOF trains to vastly different missions, tasks, conditions, and standards. The training and training systems, therefore, require tailored/realistic SOF-unique technology. For example, SOF needs deployable training device technology to ensure all peoples around the world understand them (from a linguistic standpoint), and additionally the SOF warrior must also be highly trained in the culture in which he will operate. Both have unique SOF technology capabilities inherent in them. Further, because of the nature of SOF forces to operate independently, far behind enemy lines, it is absolutely necessary SOF medical personnel have been trained in the latest medical advances/techniques. This training is unlike any in the regular forces, as it is so specialized and focused on the SOF operator, that SOF medics need to be able to train replicating actual situations. This will force new training and training systems especially if the medical "reach back" capability looming on the horizon is added. Furthermore, to be successful, the SOF operator must rehearse his operational mission thoroughly. To have the state-of-the-art 3D multisensory virtual environment technologies to facilitate mobile rehearsal realism is absolutely key for future mission success. This rehearsal realism can facilitate virtually all SOF training including such diverse tactics as training for High Altitude, High Opening parachuting to locking out of a submerged submarine. Systems used to train indigenous, surrogate, or allied forces must not rely on high-tech interfaces to be effective. Systems requiring large facilities, significant power requirements, or delicate instrumentation are unsuitable for training of indigenous in austere locations. Simplicity of use and minimal maintenance/ sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Systems must allow for programming of unconventional weaponry, scenarios, and cultural factors to ensure acceptability with the trainees. Training devices must include capability to integrate several languages into both administrative instruction and training scenarios. Nothing can guarantee success, but proper/realistic training can provide the greatest risk mitigation in mission accomplishment.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 24

TITLE: Education Systems Technology

SCOPE: Educational systems will provide a potential knowledge base of information for SOF operators, thereby enhancing their warfighting capabilities. Educational systems are uniquely integrated with training systems. As such they will provide for upgraded applications of particularly focused information, which is relative to specific classes of ongoing training or student application. The education systems should be reliable and easily manageable for both on and off-site locations. The systems should support distance learning using state-of-the-art computer technology.



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APPLICABLE TECHNOLOGY:

The advantages provided by the fast, accurate, and reliable global communications systems of the future will be employed commercially to make **distance learning** a routine occurrence. Financial pressures on colleges and universities, plus the increasing scarcity of technically trained teachers, will contribute substantially to enabling distance learning to achieve its long-sought potential. As these methods are developed and refined such that the lecture format is augmented or replaced by a **tutorial**, **interactive**, **computer-aided instructional format**, the educational experience will become more flexible and better able to provide the level of education needed. Trends in education, including extensive development of **computer-aided**, **self-paced instruction and interactive distance learning**, will not only provide new and improved educational tools relevant to naval force tasks, but also will provide a valuable resource for use on an outsourcing basis. Access to formal education in science and technology via **interactive distance learning from colleges and universities** will ease the problem of preparing and maintaining competent officers. It must place greater emphasis on **computer-based**, **self-paced**, **education** using **modeling and simulation techniques**, **embedded training**, and **intelligent tutors**. Education modules must be tailored to the individual or groups by making use of **selection**, **classification**, and **characterization methods** to better match the people to the processes.

CAPABILITY OBJECTIVES:

NSWC: 6, 19; **AFSOC:** 146; **FCWG:** 23, 83, 103, 131, 137, 146

OPERATIONAL CONSIDERATIONS:

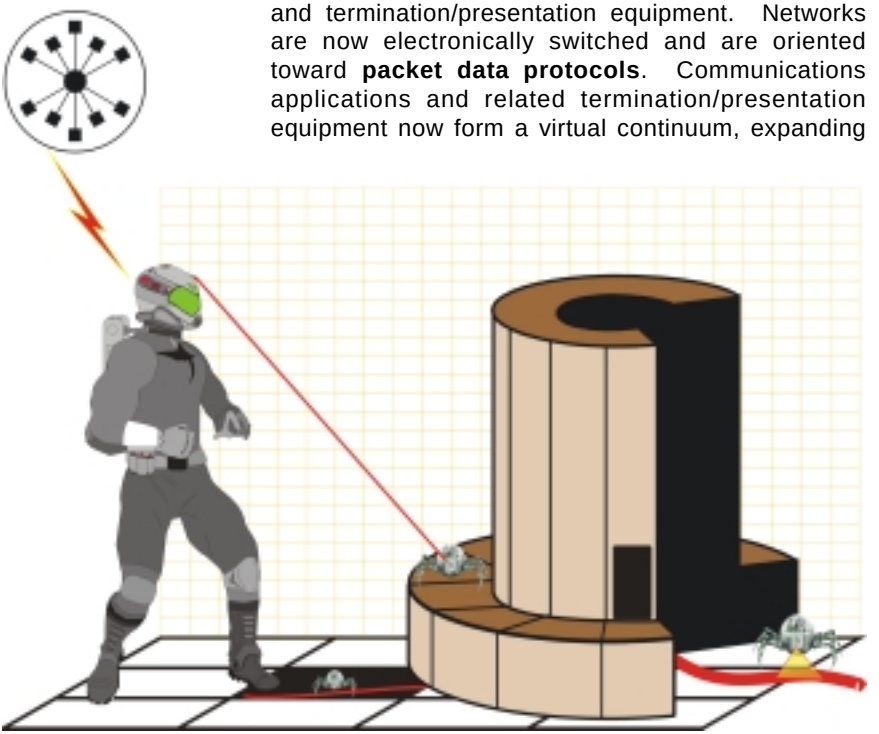
Educational systems technology will enable SOF operators the capabilities of relying on their learned skills and knowledge, while enhancing their particular skills within the SOF arena. As the web-based educational technology systems are intertwined within the Automated Information Systems (AIS) environment, the SOF operator will be real time connected to vast resources. This will provide the SOF operator with accurate and up-to-date information relative to any situation, thereby improving greatly on the success of any operation. Because of the uniqueness of the SOF mission the individuals in SOF require cultural, political, language and other specialized education. Emerging educational advances i.e., sleep memory enhancements must continue to be part of the SOF ethos.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 25

TITLE: Information Operations (Cyber Operations)

SCOPE: Information operations is broken down into two areas: cyber operations and influence operations. A cyber operation includes computer network defense, computer network attack, and electronic warfare. SOF must be able to protect all information systems against attack and intrusion. It must be able to intercept tactical and operational communications signals and render ineffective enemy information systems. SOF must have a seamless information enterprise system connecting with all joint forces and agencies across the full spectrum of day-to-day operations. The real SOF contribution in this whole area, however, may be access to denied areas and closed systems. SOF will need the technology boost to assist in this area.

APPLICABLE TECHNOLOGY: Technology in communications, the backbone of Information Operations, falls into four principle areas: transmission, networks, applications development, and termination/presentation equipment. Networks are now electronically switched and are oriented toward **packet data protocols**. Communications applications and related termination/presentation equipment now form a virtual continuum, expanding



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from traditional messaging to data, facsimile, imagery, and live video. Rapid progress in encoding methods for **data compression** continues, and **asymmetrical approaches** are being made in many applications, wherein brief queries to databases, for example, elicit voluminous responses of graphic or other data. **Asynchronous Transfer Mode (ATM)** (packet switching) and supporting protocols enable much more efficient use of available bandwidth, i.e., "bandwidth on demand." Developing areas of technology applications with key implications for SOF requirements include **SatCom Personal Communications Systems (PCS)**, e.g., International Maritime Satellite (**INMARSAT-P)**, while a private venture, shows promise of future direction of this particular area. Integrated Service Digital Network (ISDN) related equipment, **asymmetric channels and intranet/multilevel access** are also candidates.

CAPABILITY OBJECTIVES:

USASOC: 23, 28, 41, 98, 122, 128; **NSWC:** 8, 12, 28, 40; **AFSOC:** 4, 12, 17, 18, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 34, 35, 38, 42, 47, 48, 50, 55, 56, 63, 64, 65, 66, 70, 72, 76, 97, 98, 99, 112, 113, 115, 116, 117, 118, 119, 121, 122, 123, 124, 125, 131, 140, 141, 142, 143, 144, 145, 146, 148, 149, 151, 154, 156, 157, 158, 169, 174, 178, 181, 184, 188, 193, 195, 199, 200, 202, 203, 205, 206, 207, 209, 211, 212, 215, 222, 226, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239; **FCWG:** 299

OPERATIONAL CONSIDERATIONS:

Information superiority is a key enabler to achieve the goal of SOF dominance across the full spectrum of military operations. The SOF information system must have access to all current intelligence databases and agencies. SOF needs worldwide deployable capability to exploit imagery, in near real time, from all sources. It must be able to protect all information systems against attack and intrusion. The SOF information management system should have real-time assessment capability. It must be capable of detecting, thwarting, and then reconstituting databases in its information systems that have been corrupted by the enemy. SOF must maximize low probability of detection/exploitation/ interception of communications. It must be able to intercept and collect tactical and operational communications signals in all environments including underwater. SOF requires systems or devices that can autonomously and anonymously access, influence, monitor, control, manipulate, disrupt, spoof or utilize

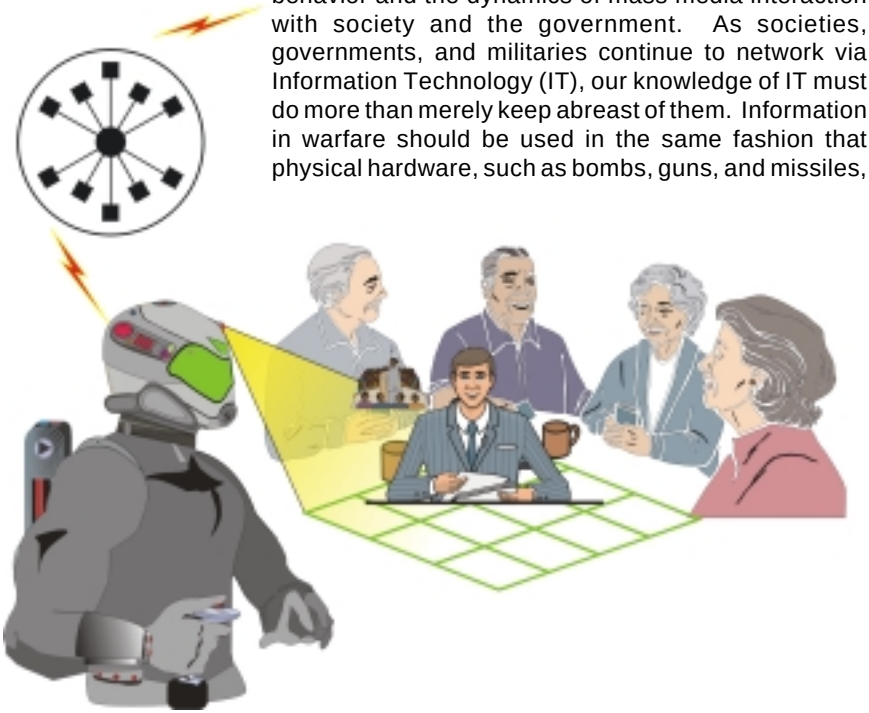
the enemy's cyber infrastructure. SOF must have the ability to conduct electronic warfare against all known communications systems. Ultimately, SOF desires to have a neural network linking the brains of the SOF operator to each other as well as to other databases.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 26

TITLE: Information Operations (Influence Operations)

SCOPE: Information operations is broken down into two areas: cyber operations and influence operations. Influence operations includes PSYOP, counter propaganda, deception and counter deception. SOF needs the capability to network PSYOP systems and employ a system similar to commercial networks of deployed small teams reaching back to a support infrastructure of expertise with the ability to disseminate information in real time over long distances and all types of media.

APPLICABLE TECHNOLOGY: PSYOP must be in touch with advances in the social sciences. The social sciences can provide a deeper understanding of the factors that influence human behavior and the dynamics of mass media interaction with society and the government. As societies, governments, and militaries continue to network via Information Technology (IT), our knowledge of IT must do more than merely keep abreast of them. Information in warfare should be used in the same fashion that physical hardware, such as bombs, guns, and missiles,



are used to achieve a desired effect. Thus, Information Warfare (IW) should be categorized as either information fires or information defense. Likewise, PSYOP should consist of PSYOP fires and PSYOP defense. In Joint Vision 2010 terms, information, and PSYOP fires become elements of precision engagement. Likewise, information and PSYOP defense would be elements of full-dimensional protection. To achieve a desired effect, a psychological weapon may be a better choice than a physical one. Targeting boards must understand their physical and information weapon options, to include the requisite expertise to choose the right weapon for the right target. Simply put, targeting boards must transition to effects boards. The power of networking should allow virtual collectives of government agency and the private sector expertise to collaborate securely from the Continental United States (CONUS) in support of a PSYOP effort halfway around the world. However, synthesizing commercial broadcasting, marketing, and advertising capability with social science experts and government and military expertise will not be enough to achieve an information-age PSYOP capability. The PSYOP assets assigned to corps, division, or brigade levels provide a tactical dissemination capability across the commander's front and have limited PSYOP product development assets. These limited assets are designed to respond to suggested products from the maneuver commander. Upon receiving a tactical commander's request for a product, the tactical PSYOP unit's developmental cells develop a product within the commander's intent. They then forward the suggested product to the senior PSYOP headquarters in the theater for further development and approval. Upon approval the product is produced and forwarded to the user level for dissemination.

CAPABILITY OBJECTIVES:

USASOC: 19, 56, 90, 91, 128, 138; **NSWC:** 8, 12, 62; **AFSOC:** 4, 17, 18, 19, 23, 24, 25, 28, 34, 47, 48, 49, 73, 73, 74, 99, 101, 115, 116, 117, 118, 119, 121, 123, 125, 131, 146, 151, 156, 157, 158, 168, 169, 174, 182, 185, 195, 199, 225, 235; **FCWG:** 40, 58, 59, 302, 472

OPERATIONAL CONSIDERATIONS:

Information superiority is a key enabler to achieve the goal of SOF dominance across the full spectrum of military operations. PSYOP teams and aircraft require real-time connection to central, CONUS-based production facilities to facilitate rapid distribution of

professional quality television and print media, and the ability to broadcast radio and television in a standoff mode in real time or near real time. Forward teams need real-time collaboration with subject matter experts via collaborative planning tools. It must be able to accurately deliver PSYOP leaflets anywhere in the world without compromising delivery platforms and personnel as well as use a multimedia application such as the Internet to deliver its message. SOF must have a 3D holograph imaging system with the capability of projection on the ground or in the air in near real time. SOF must also be able to identify individuals through matching speech and voice patterns and then duplicate those speech and voice patterns by words or phrases into a current ongoing speech in real time. Lastly, SOF needs the capability to assess the results of influence operations (i.e., information Bomb Damage Assessment (BDA)).

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 27

TITLE: Intelligence Systems

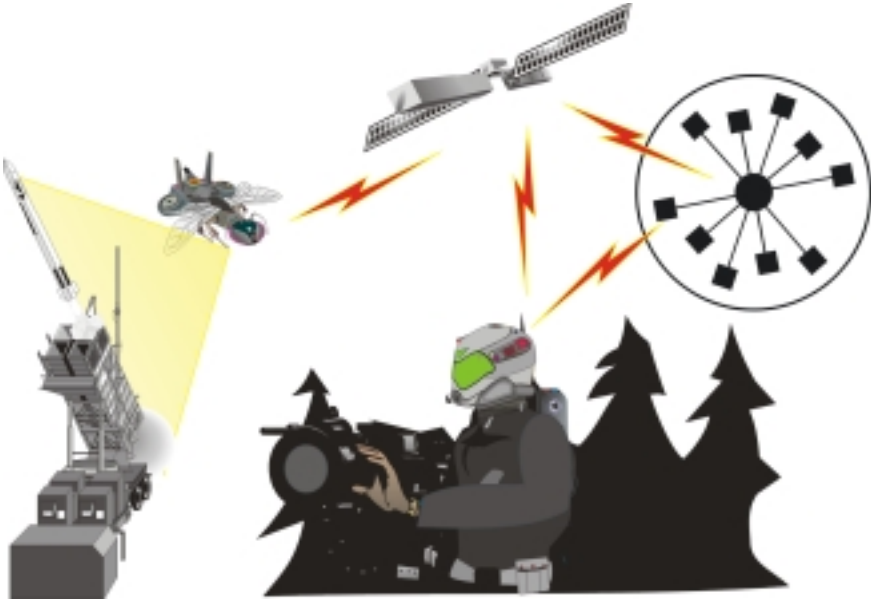
SCOPE: Intelligence systems will allow the SOF operator to access all current intelligence data bases/agencies as well as store, transfer, use, and disseminate large amounts of data and imagery from worldwide sources. SOF must have situational awareness of the battlefield in near real time. The operator must have the capability to conduct electronic warfare and intercept tactical and operational communications against all known systems. In addition, SOF needs manned and unmanned sensors to collect and provide information in near real time. SOF is not only a consumer of intelligence and therefore needs timely reporting, it is also a significant producer and collector of intelligence and needs the capability to process raw data into the intelligence pipeline. Because of this fact, information/ intelligence acquisition, interpretation and display will become key to insuring the weight of the information/ intelligence does not paralyze the operator.

APPLICABLE TECHNOLOGY: **Hunter Sensor Suite** technologies will provide lightweight, deployable, and survivable hunter vehicle platforms with an advanced, low-observable, long-range hunter sensor system with aided target recognition and enhanced target handover. **Autonomous Unmanned Ground Vehicle (UGV)**

technologies will incorporate **landmark identification** technologies and will integrate **GPS** technology, imaging sensors, and advanced route/mission planning technology. **Low Probability of Intercept (LPI) Electronic Support (ES)** technologies will enable the capability to intercept and geolocate current and emerging threat noncommunications emitters, which use **LPI** technology. This technology will use **Very High Speed Integrated Circuit (VHSIC)** technology to perform onboard identification of non-communication emitters. **Impulse/wideband ES** will provide advanced techniques to detect, characterize, and geolocate impulse radars in the presence of conventional radars and communication signals. Signals Intelligence/ Direction Finding (**SIGINT/DF)** technology will provide noncooperative intercept and geolocation of modern communication signals. **Analog/digital beamformer** technology provides the ability to spatially resolve targets using beamforming and will increase the standoff ranges in which communications collection can occur. **Multifunction staring sensor suite technology** integrates multiple advanced sensor components including staring infrared arrays, multifunction laser, and acoustic arrays. **Rapid Battlefield Visualization (RBV) will provide** capabilities to rapidly collect source data and generate high-resolution digital terrain databases to support crisis response and force projection operations within the timelines required by the joint force commander. **UAV-**mounted imaging sensors and ground-based image exploitation workstations will be capable of high-resolution, wide-area coverage for battlefield reconnaissance and surveillance. **SIGINT ES packages** will be used on surrogate UAV platforms. **Synthetic Aperture Radar (SAR) target recognition and location** will provide real-time Aided/Automatic Target Recognition (ATR) capabilities and location of time critical targets in day/night and most weather conditions using wide area coverage rates. **Multiple source correlated intelligence fusion** will demonstrate a fully integrated tactical intelligence data fusion.

CAPABILITY OBJECTIVES:

USASOC: 3, 4, 23, 41, 98, 101, 121, 128, 123; **NSWC:** 9, 10, 32, 39, 40; **AFSOC:** 4, 17, 18, 19, 22, 23, 24, 25, 26, 28, 29, 33, 34, 35, 38, 49, 59, 60, 61, 64, 65, 66, 70, 76, 82, 97, 98, 99, 113, 115, 116, 117, 118, 119, 144, 145, 146, 148, 151, 157, 158, 162, 163, 164, 181, 189, 190, 192, 194, 200, 207, 220, 222, 223; **FCWG:** 57, 70, 191, 365, 390, 396



OPERATIONAL CONSIDERATIONS:

Intelligence systems need to have SOF operators possess the capability to pass imagery of target locations, UAV video and sensor feeds, location of enemy/friendly forces, status of support missions and satellite sensor broadcasts in real time. SOF operators also need to have sensor information converted to usable intelligence and disseminated worldwide in near real time. SOF operators need to be able to access all current intelligence databases/agencies from both home base as well as in the field. Intelligence systems will assist the operators and commanders by having full tactical situational awareness/real-time picture of enemy activities in the operations area. Inherent in that capability is the requirement for data fusion to prevent information overload and a filter to ensure accuracy of the intelligence being received. Further, intelligence systems will allow operatives to access, store, transfer, use, and disseminate large amounts of data from worldwide sources. State-of-the-art tactical signal intelligence collection assets will be clandestine, lightweight, and man-portable. They will aid intelligence collection systems in all environments.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 28

TITLE: Modeling and Simulation

SCOPE: Modeling and simulation technologies will greatly assist the SOF operator in using 3D multi-sensory environment to facilitate mobile rehearsal realism. These technologies will allow SOF medics to train on surgical techniques using computer models and the parachutist to improve his navigation skills over extended ranges and in near-mission conditions. The SOF operators must have a fully integrated, deployable, planning rehearsal system with real time update capability. In addition, SOF must be able to predict NBC dispersion patterns for unknown terrain (in all climatic conditions), as well as model mission conditions and success predictions. One of the unique SOF capabilities is to conduct various missions within urban areas. Modeling and simulation can help the individual SOF operator to visualize urban terrain and thus increase his skill level. US SOF will require the ability to integrate indigenous, surrogate, or allied forces into complex training scenarios and rehearsals in support of SOF or conventional forces.

INTERACTIVE TRAINING ROOMS

Made of polymer or ceramic (plezoelectric) that flexes when electrical current is introduced. This room can be used to simulate terrain, buildings, walls. 3D panoramic photos add realism to scenario.

Electrode suit used to simulate outside stimuli. Mimics the function of Combat Battle Uniform with VR weapons, Power, etc.

Rooms may be tied together to allow training at different training sites.

APPLICABLE TECHNOLOGY:

VIRTUAL REALITY HELMET SYSTEM

Feeds the SOF warrior stimuli (sights, sounds, odors) from computer generated programs specially created for missions. also can be used for general mission training.

Simulation Interconnection technology will provide the architectural design, protocols and standards, multilevel security, survivability, interoperability among simulations at different levels of resolution, and common services (application gateways, databases, time and workload management, servers, and translators) to conduct collaborative simulations over the information network. The modeling of **mission planning**, **rehearsal**, **and execution control management processes** will provide the infrastructure to support rapid automated mission planning, **simulation-embedded mission rehearsal**, and real-time **simulation-aided execution management** aids. **Computer Generated Forces (CGF)** modeling will provide representation of human (soldier) behaviors for the realistic simulation of system performance. **Computation-aided operational planning algorithms** will translate military command and control instructions into computer language, integrate these with battlespace environment, battlespace situational awareness information, and mission specific doctrines. In the future this technology will support implementation of **materiel embedded training**, where individual units and their aggregates are fully immersed in synthetic environments, with horizontal and vertical synchronization throughout the operational forces partaking in the rehearsal using in-place equipment. **Artificial intelligence technologies** will speed up and improve decision, command and control, and information flow processes based on situation and resource knowledge. This includes technologies for **automated revision of mission and route plans** for the fighting units as well as their support, area-controlled, **hierarchical information management** over combat communications networks, and **application-tailored information display and network interface**. **Simulation representation technologies** will enable the generation and the realistic, high fidelity synthetic representation of the prevailing physical environment, natural and man-made (e.g., terrain, hydrography, atmosphere, vegetation, buildings), the materiel and humans operating in it, and their interactions with each other. **Simulation interface technologies** will enable quick and responsive interface between the human and synthetic environments and realistic dynamic representation of systems in synthetic environments and of synthetic forces to the human.

CAPABILITY OBJECTIVES:

USASOC: 58, 60, 72, 86, 120; **NSWC:** 6, 11,12; **AFSOC:** 5, 8, 14,15, 17, 31, 32, 33, 36, 47, 48, 67, 75, 78, 79, 83, 90, 92, 102, 105, 106, 110, 126, 127, 130, 131, 137, 138, 141, 142, 143, 148, 152, 180, 194, 196, 197, 219, 227

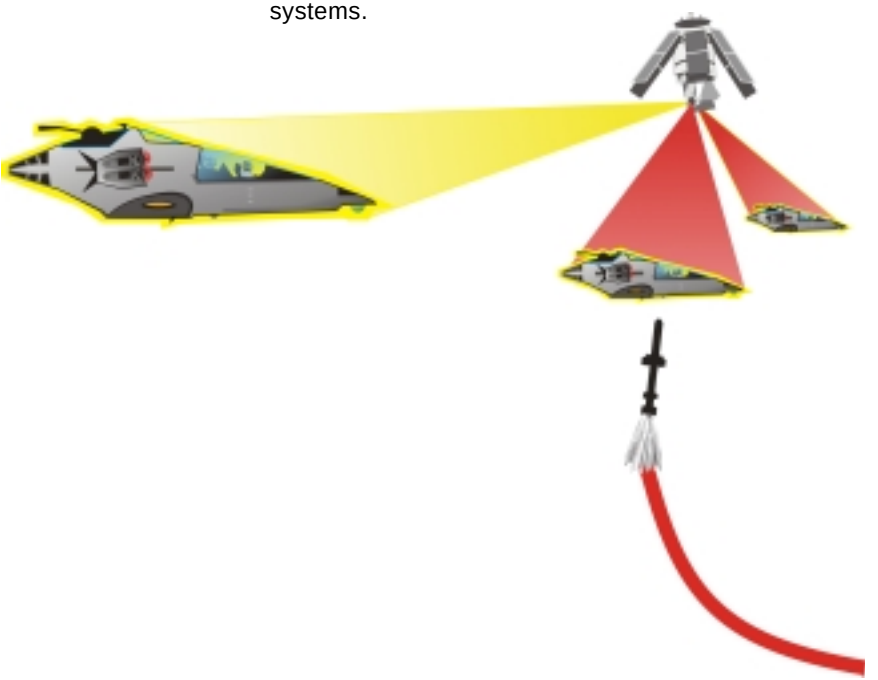
OPERATIONAL CONSIDERATIONS:

Modeling and simulations will play an increasingly important role for SOF in the future. Pilots will use a fully integrated, deployable mission planning and rehearsal system to plan and then execute missions. They will fly a mission in a simulator and then download that information into their flight data computers to aid them in avoiding enemy Anti-Aircraft Artillery (AAA) as well as other flight hazards. This planning and rehearsal system will have near-real-time update capability. Simulators will be able to assist SOF operators in learning how to navigate while executing High Altitude, High Opening parachuting over extended ranges in less than perfect weather conditions. In addition, SOF medics will use 3D multi-sensory, virtual environment technologies replicating actual medical situations. SOF operators will need automated decision making tools assisting them in difficult mission situations. SOF will need to be able to predict NBC dispersion patterns for chemical and biological weapons while at the same time will need simulators and models to perform initial analysis on those same weapons. Systems used to train indigenous, surrogate, or allied forces must not rely on high-tech interfaces to be effective. Systems requiring large facilities, significant power requirements, or delicate instrumentation are unsuitable for training of indigenous in austere locations. Simplicity of use and minimal maintenance/ sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Systems must allow for programming of unconventional weaponry, scenarios, and cultural factors to ensure acceptability with the trainees. Systems should include ability to program large-scale guerilla or conventional operations in support of Foreign Internal Defense (FID), Unconventional Warfare (UW) and coalition support missions. Simulations must include capability to integrate several languages into both administrative instruction and operational scenarios.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 29

TITLE: Signature Management

SCOPE: Because of the clandestine nature of SOF operations and its inherent danger of behind-the-lines operations, signature management of the SOF operator is of the utmost importance. Signature management technologies must eliminate or significantly reduce electromagnetic, visual, laser, IR, RF, seismic, aural and olfactory signature of the SOF operator and his equipment to include air, land, and sea mobility systems.



APPLICABLE TECHNOLOGY: The following technologies, though not all-inclusive, are critical to achieving Low-observable capability: **Radar Absorbing Material (RAM)** and **Radar Absorbing Structures (RAS); multilayer camouflage systems;** reduction of weapon platform signature or component system because of either **active or passive techniques** that result in shaping, cooling, or degrading the detection in any spectrum; materials that use **polymers loaded with carbon fibers**, **honeycombs**, **polyurethane**, **graphite fibers**, **microwave absorbers**, **ferrites**, **sputtered metals on cloth**, **IR transparent binders**, **ceramic**, **reticulated foam**,

diamond coatings, **electrochromics**, **thermochromics**, **thin films**, and **millimeter wave aerosols; multispectral surface treatments** applied to weapon system platforms to improve IR/visual characteristics; processes which use **micro-encapsulation** or **microspheres** that reduce thermal, radar, or visual detection; treatments that reduce the acoustic signature by using **active noise cancellation**, **modulation of turbofan engines** or rotor blades or advanced passive techniques; computer codes that use classified measured data to analyze, predict, or design signature reduction solutions; **LO antennas**, **radomes**, and **windows; IR signature reduction materials** and techniques including but not limited to paints, **controllable emissivity**, and/or **reflectivity characteristics** that affect electro-optical characteristics; visual, including color and dynamic variations, and acoustic signature reduction; **laser signature reduction techniques**.

CAPABILITY OBJECTIVES:

USASOC: 5, 6, 21, 32, 36, 37, 69, 77; **NSWC:** 1, 8, 9; **AFSOC:** 15, 17, 24, 25, 26, 31, 32, 38, 45, 48, 59, 60, 61, 66, 76, 80, 82, 96, 99, 131, 132, 146, 149, 158, 165, 181, 197, 204, 208, 223; **FCWG:** 6, 36, 46, 267

OPERATIONAL CONSIDERATIONS:

The SOF payoff for signature reduction is enormous. For SOF aircraft to avoid detection and physical destruction while accomplishing the mission is the primary goal for all pilots and commanders. To avoid

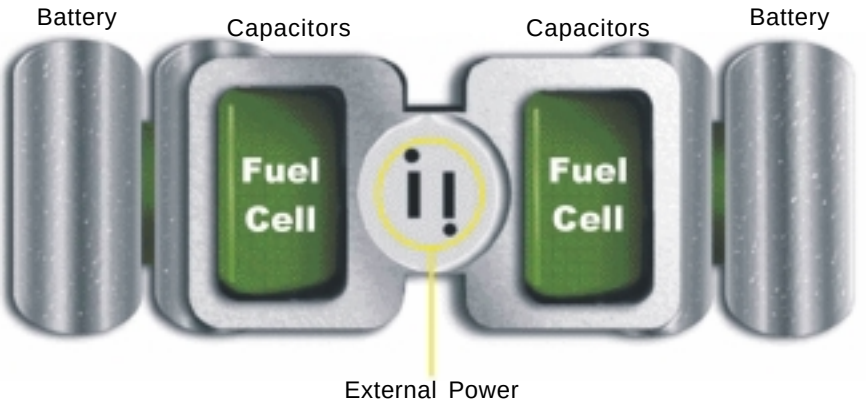
detection, SOF aircraft must reduce, if not eliminate, all electromagnetic, IR, RF, and aural signature. The same lesson applies for ground and sea forces. They must be able to access denied areas and not be detected. The goal is to operate on the battlefield/ maritime environment without ANY signature. This would give them an operational advantage over any adversary. In addition, SOF would like to have weapons that may be fired from even confined spaces with little or no aural signature. SOF operating forces also require Low Probability of Interception (LPI)/Low Probability of Detection (LPD) communications equipment to go along with their stealthy mobility platforms and physical presence. These communication assets must operate above ground, underground, and underwater.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 30

TITLE: Power Systems

SCOPE: Power systems technologies will give the SOF operator a significant advantage in overall weight reduction of a combat load, as well as an overall reduction in the numbers and types of these systems. This power source should be capable of continuous operation with minimal thermal, electromagnetic, acoustic, and visual signature. All SOF equipment should possess a universal, interchangeable power source. Power sources for robotics and unmanned systems should be maintenance free and controllable by the SOF operator.

PERSONAL POWER PLANT



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APPLICABLE TECHNOLOGY:

Energy conversion and power generation encompass the transformation of biological, chemical, electromagnetic, nuclear, mechanical, and thermal energy or reactions into electrical power. The technologies included are: **lithium thermal batteries (primary), Proton Exchange Membrane Fuel Cells (PEMFCs)**, **Solid Oxide Fuel Cells (SOFCs) microturbines**, **Photovoltaics (PVs)**, **thermionic converters**, **Explosive Magnetohydrodynamic Generators (EMHDGs)**, **Magnetic Flux Compression Generators (MFCGs)**, **and Alkali Metal Thermal to Electric Converters (AMTECs)**. **Energy storage devices** are intended for pulsed applications requiring short-term storage (microsecond-to-second) through long-term storage (several years). Energy can be stored chemically, mechanically, or electrically. For mechanical storage, the energy is stored in the rotary motion of machinery, such as a flywheel. For electrical storage, the energy is stored in the electric field of the dielectric medium, such as a capacitor, or in the magnetic field of the dielectric medium, such as an inductor. For chemical storage, the energy is stored in the reactants (as in batteries). Energy storage technologies include **flywheels**, **lithium ion battery (rechargeable)**, **lithium polymer battery (rechargeable)**, **nickel metal hydride battery (rechargeable)**, **silver zinc battery (rechargeable)**, **electrostatic capacitors**, **electrochemical capacitors**, **high-energy and power density pulse alternators and compulsators. Power conditioning** is the process involved in modifying the source output to meet load characteristics. SOF applications range from charging a battery or forming pulses for a weapon subsystem to electric motor drives. Advances in technology for **conditioning**, **regulation and distribution of power** will be required to support advanced sensors, avionics, Vehicle Electronics (VETRONICS), and Command, Control, and Communications (C3). Power conditioning enabling technologies include **low**, **medium and high-repetition-rate capacitors**, **soft switch inverters**, **High-Temperature Superconducting (HTS) wires**, **pulse transformers**, **Wide Bandgap (WB) semiconductors**, **diamond semiconductor switches**, **MOS-Controlled Thyristor (MCT)**, **MOS turn-off thyristor**, **Integrated Pulse-Forming Networks (IPFNs).**

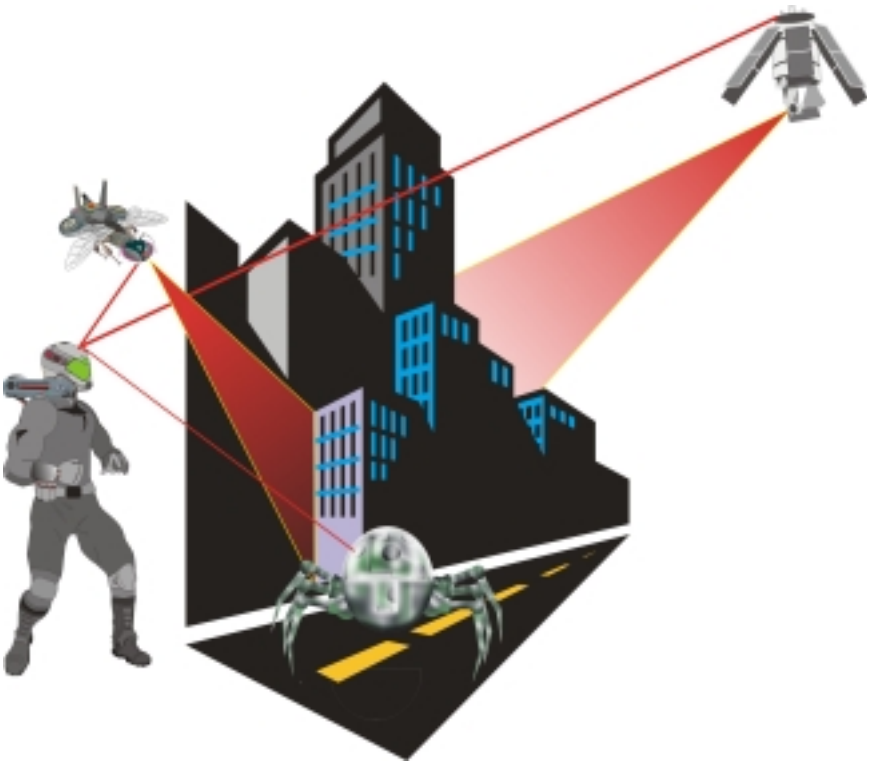
CAPABILITY OBJECTIVES: **USASOC**: 44, 100; **NSWC**: 5, 42, 51, 61; **AFSOC**: 17, 88, 94, 95, 146; **FCWG**: 8

OPERATIONAL CONSIDERATIONS: Power systems of the future must have four qualities if they are to meet SOF operating requirements: (1) they must be lightweight; (2) they must be maintenance free; (3) they must be versatile; and (4) they must be inexpensive. They must be versatile enough to meet the power generation requirements for all SOF equipment and thus significantly reduce the bulk and weight problem facing today's SOF warrior. Further, the power systems of the future must be capable of continuous operation with minimal thermal, electromagnetic, acoustic, or visual signature. In addition, they must be able to operate underwater/ underground as effectively and efficiently as they do on the ground or in the air. Future SOF warriors will need the capability to have alternate type power sources such as perhaps the human body (waste, heat , motion etc), solar and lunar energy and possibly even stellar ambient light.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 31

TITLE: Surveillance Systems

SCOPE: Surveillance systems encompass a wide variety of capabilities ranging from maximizing the innate senses; remotely viewing the structures of DUGs; detecting all known NBC agents and devices; seeing through walls; detecting mines and boobytraps; night color vision under all light conditions; man-portable scanners; seeing through obscurants, fog, smoke, clouds and other obscured media; detecting underwater mines; robotic and remote platforms performing reconnaissance and surveillance; passive, adverse weather air traffic control; seeing at extended ranges; and detection awareness/avoidance and identification of friend and foe. These capabilities will allow the SOF operator to operate in all environments and climatic conditions with near-real-time situational awareness. Some systems may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. SOF may also employ systems parasitically or non-cooperatively by clandestine attachment to third party or enemy personnel and equipment.



APPLICABLE TECHNOLOGY:

Space-based sensors for surveillance require new technology to rapidly and accurately detect, identify, characterize, and track targets. **Electro-optical**, **spectral**, **and synthetic aperture radar** are just three types of sensors that are required. Electro-optical and spectral sensors must be lightweight and have high signal-to-noise ratio characteristics requiring **advanced optics**, **dispersion elements**, **focal planes**, **and processing segments**. Synthetic-aperture radar sensors, using **high-power antennas,** will use **light transmit/receive modules** and **highly efficient amplifiers**. Spacecraft may also need to process data onboard. This will require **robust**, **reconfigurable**, **radiation-hardened processors**, **real-time capabilities**, **advancements in high-speed processors**, **models for using data**, **cross cueing techniques**, **and fusion technologies**. The **global defense information network** will fuse and manage information from all sources. New **air and ground surveillance system**s consist of a **High Mobility Multipurpose Wheeled Vehicle (HMMWV)**-mounted base station and three air-mobile platforms capable of transporting remote sensing packages to observation points within a 10 km radius. **Mobile undersea warfare technologies** will use a **Mobile Sensor Platform (MSP**), and a lightweight, small boat deployable, underwater acoustic sensor string. The remote **MSP** sensors

consist of a **Thermal Imaging Sensor (TIS)** and a **Visual Imaging Sensor (VIS)** (collocated on a computer-controlled pan and tilt mechanism), and a **Furuno X-Band surface search radar.**

CAPABILITY OBJECTIVES:

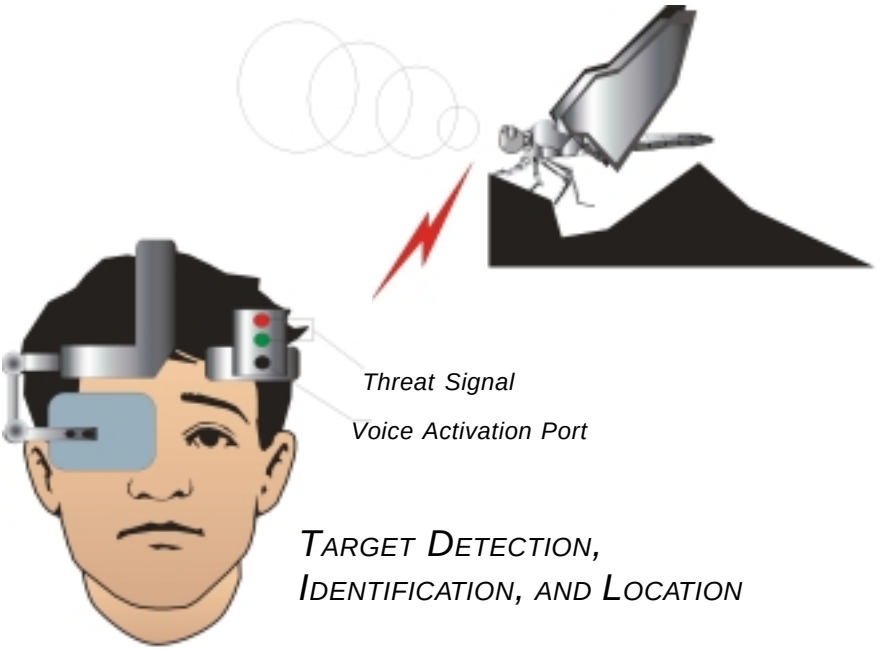
USASOC: 7, 8, 11, 14, 15, 25, 26, 48, 59, 61, 68, 71, 72, 76, 89, 94, 102, 111,114, 118,119; **NSWC:** 1, 6, 9, 30, 32, 39, 40, 53, 54; **AFSOC:** 6, 19, 24, 25, 26, 29, 31, 32, 35, 38, 50, 57, 64, 65, 76, 82, 97, 105, 106, 109, 120, 129, 146, 156, 157, 158, 162, 163, 164, 167, 186, 192, 194, 197, 207, 212, 228

OPERATIONAL CONSIDERATIONS:

The surveillance systems of tomorrow will allow all SOF warriors, in the air, on the ground, and on and under the water to stay farther away from those places and things that can harm them or their mobility platforms. For example, pilots of SOF aircraft will be able to see/detect enemy anti-air weapons at a greater range and thus give them more time to react. The ground SOF operator will be able to not only see through obscurants that enemy forces might use on the battlefield, but also see what is on the other side of walls, barriers, or natural objects. While surveillance systems will proliferate, they must remain small and lightweight. Surveillance systems will increase the battlefield situational awareness of the SOF warrior. Surveillance systems will work in all climates and environments and will not cause undue logistical burdens on the SOF operator. For example, the SOF air platform of the future will have the ability to effectively detect obstacles (i.e., high-tension electrical wires) while not significantly adding weight to the aircraft, while the ground operator will have the ability to use a scanner to search vehicles and facilities for the presence of enemy personnel or explosives. This scanner would be small and lightweight and would not cause the operator to significantly increase his combat load with batteries to support the sensor. SOF also needs to focus on counter-surveillance and surveillance-detection technologies. Some systems may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. Simplicity of use and minimal maintenance/sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Systems may have to be packaged for clandestine emplacement, or allow for non-cooperative or parasitic employment on unsuspecting personnel or vehicles. Sensors may require the ability to automatically or on-command self-destruct/inactivate when tampered with or misused, without causing damage or casualties to the user.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 32

TITLE: Target Detection, Target Identification, and Target Location

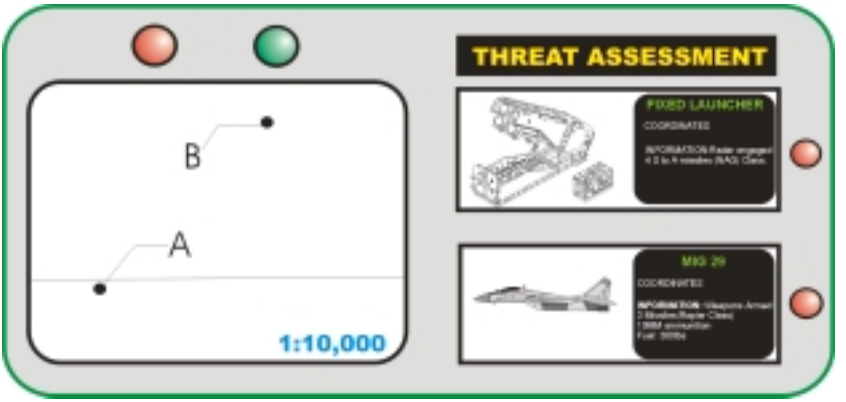


TARGET DETECTION, IDENTIFICATION, AND LOCATION

SCOPE: Target detection, identification, and location technologies will greatly assist SOF in effectively engaging targets as far as the SOF operator can see. The operator must be able to identify, tag, and track mobile weapon systems and attack, kill, or neutralize targets at maximum effective range of his weapon. He must have the capability of offset laser target designation. He must also have the ability to detect the entire range of naval targets with hand-held underwater sonar. The SOF operator must have a portable, lightweight mine hunting/mine detection for both ground and underwater mines. SOF air and boat crews will need detection, identification, and location capabilities against sophisticated air-to-air, ground-to-air, and surface-to-surface missile systems. Maritime SOF must possess the (passive) capability to acquire, identify, designate, and if necessary, attack underwater targets. After the SOF operator has engaged his target, he must have the capability to immediately and accurately assess effects (battle damage).

APPLICABLE TECHNOLOGY:

The success or failure of future target detection, identification, and location technologies systems will depend on the sensors employed and the priority modeling used to process the sensor information. Future technology trends in sensors include increasing **sensitivity**; **higher resolution**; **lower noise**; large **increases in data rates and processing capability**; increased use of **multiple distributive sensor systems** to combat weather and countermeasures to provide multiple viewing perspectives; increased use of **multiple wavelength and multimode sensing** to see through foliage and camouflage to detect low-observable targets; and increased employment of **LIDAR and imaging millimeter waves** to provide two- and three-dimensional images of targets. Future target detection, identification, and location algorithms will use **adaptive systems that are insensitive to component failure** and changes in target appearance, and **uncertainty reasoning in the representation of ambiguous sensor reports** in handling modeling limitations and the increased use of **context in processing of models and sensor data**. The increasing sophistication of targets and countermeasures cannot be overlooked. Failure to deal with new countermeasures and stealth techniques may nullify gains resulting from these trends. In addition, **neuro-holography** for automatic target detection and recognition should be addressed.



CAPABILITY OBJECTIVES:

USASOC: 8, 24, 33, 35, 42, 48, 54, 55, 97; **NSWC:** 1, 6, 9, 23, 27, 28, 30, 32, 39, 40, 45; **AFSOC:** 2, 6, 14, 15, 18, 19, 21,22, 23, 24, 25, 26, 28, 29, 31, 32, 38, 50, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 68, 69, 76, 80, 82, 97, 103, 104, 105, 106, 109, 120, 129, 146, 156, 157, 158, 162, 163, 164, 167, 172, 181, 183, 192, 194, 197, 208; **FCWG:** 179, 200

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OPERATIONAL CONSIDERATIONS:

One of the key tenets of SOF's clandestine activities is "shooting." Shooting inherently denotes there must be a target. Before a target can be shot, however, it must be detected, then located, and finally identified before a decision can be made to attack, kill, suppress, neutralize, or disregard it. Ideally the SOF operator will be making this engagement decision at the maximum effective range of his weapon system. Once the SOF operator has engaged the target, he will need the ability to determine what the condition of the target is. Technology must help in this process. SOF operators must have the ability to detect, locate, and identify a target long before it has the capability to do the same. Optical devices able to see at night at extreme ranges or sensors capable of detecting targets over the horizon will give the SOF operator a battlefield situational awareness and a decided advantage over the adversary. The SOF operator must have the capability to detect, locate, identify, and engage targets while moving in/on mobility platforms. The SOF operator also must be able to identify friend from foe to reduce fratricide. In addition, the SOF operator must be able to use robotic platforms to perform these tasks.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 33

TITLE: Radar and Counter-radar/Wide-Band Electronic Materials Technology

SCOPE: Radar and counter-radar/wide-band electronic materials technologies will offer the SOF operator a wide variety of capabilities ranging from detecting buried objects underwater or in the soil; remotely viewing the structure layout of DUGs and presence of WMD hazardous material; identifying personnel in a room and determining if they are armed, detecting and avoiding antihelicopter mines; employing hand-held maritime radar scanners; detecting mid-range (10+ miles) incoming surface vessels and aircraft, and employing countermeasures to deceive the vessel/aircraft of the true identify and location of the SOF craft; detecting launch/identifying enemy missile/AAA fire and detection awareness/avoidance while in flight.

APPLICABLE TECHNOLOGY:

Applicable technologies include **electronically steered and LPI radar; IR and advanced Infrared Search and Track (IRST); multispectral imaging; embedded microsensors and "smart" skins and structures; laser and laser-based imaging and sensing (LIDAR)**. Powerful computing algorithms in applications that blur the demarcation between classic radar and conventional imaging will enhance these technologies. **Sophisticated multi-spectral returns,** when processed, yield dramatic, dynamic, real-time mapping and charting capabilities such as the rapid development and implementation of **Synthetic Aperture Radar (SAR & ISAR)** in direct and side-looking applications. Other sensor technologies would be joined in these applications with specialized information technologies (**secure data access; stealth and counterstealth**; **chemical**, **biological**, **and nuclear weapons detection**; **and automatic target recognition**) to contribute to SOF-peculiar missions, part of the information-in-warfare systems. **Ultra-wideband**, **spread spectrum**, **and micropower radar configurations** will contribute to the data required to visualize the urban battlefield of tomorrow. Personnel detection and tracking, Identification Friend or Foe (IFF), covert communications, counter-radar and communications are all potential beneficiaries of rapid advances in these related technologies. **High-performance computing** will enable real-time virtual reality support, abetted by real-time data, for visualizing large, situational awareness databases, for mission planning and real-time tactical control.

CAPABILITY OBJECTIVES: **USASOC:** 14, 15, 48, 76, 94, 114, 118; **NSWC:** 1, 6, 7, 18, 39; **AFSOC:** 15, 18,19, 24, 29, 41, 44, 49, 50, 64, 65, 66, 76, 92, 99, 104, 105, 106, 107, 120, 144, 145, 146, 148, 157, 158, 162, 163, 166, 208,

OPERATIONAL CONSIDERATIONS: SOF aircraft are not the only platforms on which radar and counter-radar/wide-band electronic materials technology will be used. For example, SOF aircraft will use radar and counter-radar to avoid enemy detection and physical destruction while flying by detecting the launch/identification of enemy missile/AAA sites long before they can affect the aircraft. In addition, SOF aircraft will use radar to detect and avoid adverse weather and to conduct formation/rendezvous flight. Finally, SOF aircrews will use radar to detect and avoid anti-helicopter mines. The use of radar is not limited to aircraft and aircrew, but will be used in the maritime environment by operators detecting the physical presence of enemy ships/aircraft and vehicles as well as employing electronic countermeasures to deceive the enemy vessel/aircraft of the true identity/location/size/speed/heading of the SOF surface craft. Furthermore, the ground operator will use radar to see buried objects such as mines and boobytraps, as well as remotely view the structure/layout of DUGs and determining the presence of hazardous material. Ground SOF operators will also use radar to identify personnel in a room or facility and determine if they are armed or the room is boobytrapped.

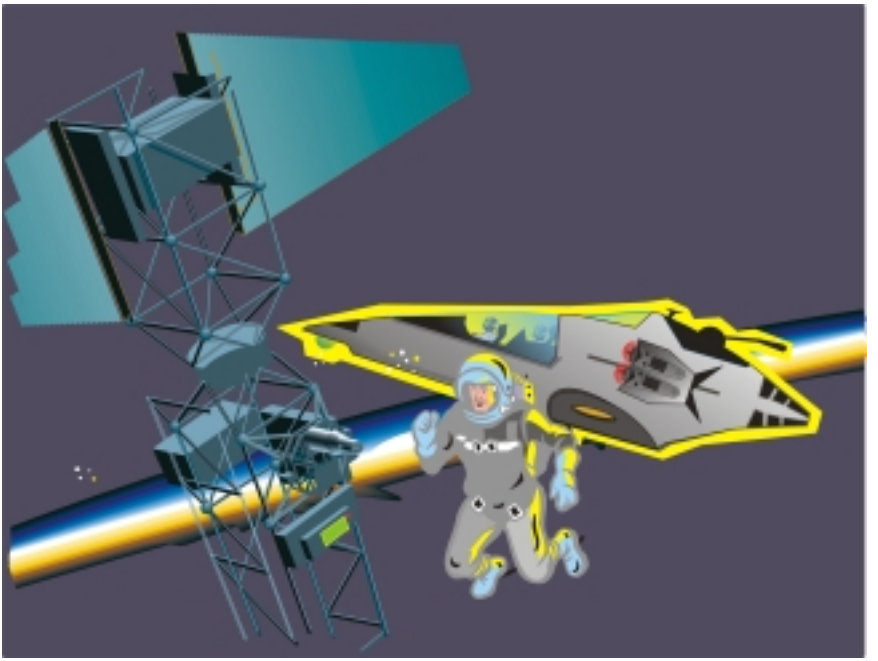
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 34

TITLE: Space Systems

SCOPE: SOF operators must be able to fully interface and operate within the space surveillance network. SOF must have the ability to leverage and fully exploit national and international commercial assets for surveillance, target neutralization and direct attack weapon systems. Although SOF will not own large UV assets, these assets may include SO-peculiar payloads.

APPLICABLE TECHNOLOGY: **Discrete device and Integrated Circuit (IC)** technologies are essential for deploying highly accurate intelligence and surveillance satellites. Critical technologies in this area are focused on

radiation hardening of the architecture and electronic components that fly in space and include **digital signal processors**, **high-speed data buses**, **field programmable devices**, **nonvolatile memory**, **packaging**, **dielectrically isolated materials, and fault-tolerant software**. **Optronics** technologies set the limits of possible target detection, identification, and resolution. Optical components are also the critical elements in projected space-based, high-energy laser systems. **Low-power**, **relatively large optical elements** are required for space power, relay, and communication systems. **Power and thermal management.** Future space applications requirements lead to a preference for passive systems that operate maintenance free, provide heat rejection by radiation, require low mass and volume, and are capable of reliable autonomous operation. **Advanced cells**, **including thin-film**, **poly-crystalline (or amorphous) silicon**, **and Multiband-Gap (MBG) cells** can lower cost, increase efficiency, and provide higher radiation resistance. **Propulsion** technologies for space are grouped in three basic categories: chemical, low-thrust electrical, and nuclear thermal. **Electric propulsion** can provide efficient station keeping and maneuvering capabilities. **Low-cost solids and low-pressure**, **high-tolerance liquid propellant** systems or hybrids are the leading candidates to meet first



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stage propulsion needs. **Nuclear thermal propulsion** appears to be very attractive for high-energy upper stage propulsion and for co-generated electrical output systems. **Electro-optic sensors** allow surveillance activity to occur at any point on or near the earth. In cases where scattered sunlight or thermal radiation is not adequate to form images of sufficient detail and clarity, laser illumination can be used. **Synthetic Aperture Radar (SAR)** is well suited for space applications. Another critical astronautic technology is a **space IR detector arrays system**, sometimes referred to as **focal plane arrays (FPAs)**, including one-, two-, three-dimensional arrays enabling imaging analogous to the vidicons in the visible spectrum, which provide the ability to "see" at night, and penetrate cloud cover.

CAPABILITY OBJECTIVES:

USASOC: 45, 110, 121; **NSWC:** 6, 8, 9, 28, 30, 32, 39, 40, 53, 54; **AFSOC:** 4, 6, 14, 17, 19, 22, 28, 34, 35, 49, 64, 65, 82, 97, 99, 139, 141, 143, 146, 151, 157, 158, 162, 167, 187, 192, 194, 202, 203, 205, 206, 207, 213, 216; **FCWG:** 421

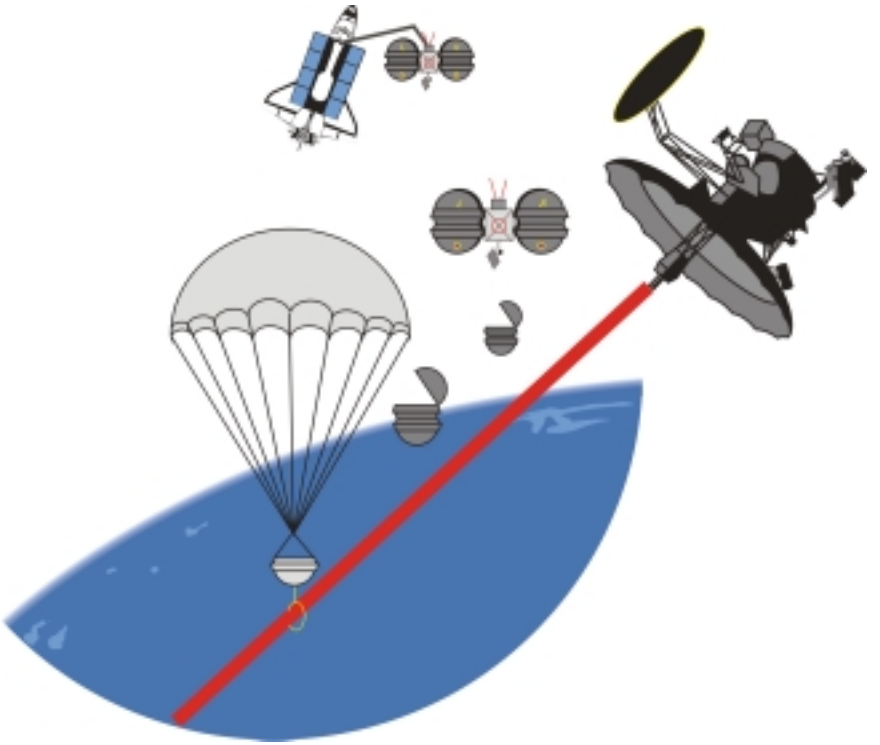
OPERATIONAL CONSIDERATIONS:

Space systems in the future will allow SOF operators to transport SOF anywhere in the world within minutes, as well as exploit/leverage the use of US space-based assets on other countries' surveillance satellites so as to mask SOF movement/deployment on earth. Furthermore, when necessary, SOF desires the ability to disrupt enemy space systems as well as pinpoint real-time positioning and vectoring of SOF operational forces for total battlespace awareness. Space will also afford SOF operators the ability to have Low Probability of Interception (LPI)/Low Probability of Detection (LPD) two-way worldwide connectivity. The use of space-based assets will also facilitate the passing of imagery, mission planning information, and terrain mapping to forward deployed operators.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 35

TITLE: Logistics Technologies

SCOPE: SOF must have agile and responsive logistics to support full spectrum operations and reduce the logistics "footprint" of SOF units. For example, these technologies will provide the SOF operator with waterproofed, shock and vibration resistant advanced equipment packaging that is air transportable and air droppable on land and in the water. It will also provide SOF the capability to handle, transport, and dispose of hazardous NBC materials. Ultimately, SOF will deploy anywhere in the world with sustainment packages requiring little, if any, home base support. The bottom line is focused, tailored, and responsive logistics is an important enabler for SOF operating forces.



APPLICABLE TECHNOLOGY: **Semi-rigid Deployable Wing (SDW)** technology will be used to accomplish precision, high offset delivery of supplies and equipment. **Total Distribution System (TDS) technologies** will provide the integration of

automated logistics planning tools, **computer simulation and modeling techniques**, **advanced microelectronics**, **satellite tracking**, and **communications technology** to significantly enhance total asset visibility by displaying the requirements for and the location of assets at the strategic, operational, and tactical levels. The **Total Distribution System (TDS)** provides strategic, operational, and tactical commanders with automated logistics planning and visualization capabilities for force deployment, sustainment, and operational execution using **artificial intelligence technology and Management Information System (MIS) databases. Advanced formulation technologies and new materials** will be employed to provide fluid/lubricant products that exhibit improved performance, multifunctionality, and global operability. These products will provide SOF with enhanced capabilities in the pre-positioning of materiel and supplies, to support mobilization and deployment of forces, and sustainment of forces once deployed and during offensive operations. The improved fluids and lubricants being demonstrated will use **advanced additive technologies** and new base materials to meet existing/future equipment needs and comply with environmental initiatives. **Petroleum quality analysis technology** and automated devices/systems will be employed to provide **rapid, on-the-spot assessment of bulk and packaged petroleum products** from CONUS and/or host nation support. **Mobility Enhancing Ration Components (MERCs) technology** will provide shelf stable, highly acceptable, eat-on-the-move/eat-out-of-hand components for operational rations. Ration components will be suitable for individual or group ration systems that support highly mobile and deployed troops. **MERCs** will be suitable for arctic, jungle, desert, mountain, and urban environments. **Electric power generation** technology will provide light, highly mobile power sources that support implementation of the "one fuel forward" policy.

CAPABILITY OBJECTIVES:

USASOC: 18, 43, 64, 75; **NSWC:** 2, 3, 14, 15, 41, 61; **AFSOC:** 3, 7, 9, 10, 11, 14, 15, 20, 27, 31, 32, 37, 39, 43, 55, 81, 86, 88, 93, 96, 98, 131, 132, 134, 135, 136, 146, 153, 155, 167, 176, 192, 214, 229; **FCWG:** 4, 25, 37, 53, 60, 71

OPERATIONAL CONSIDERATIONS:

Responsive, tailored logistics makes it possible for the SOF operator to accomplish his assigned mission. The operator requires a responsive/rapid logistics "tail"

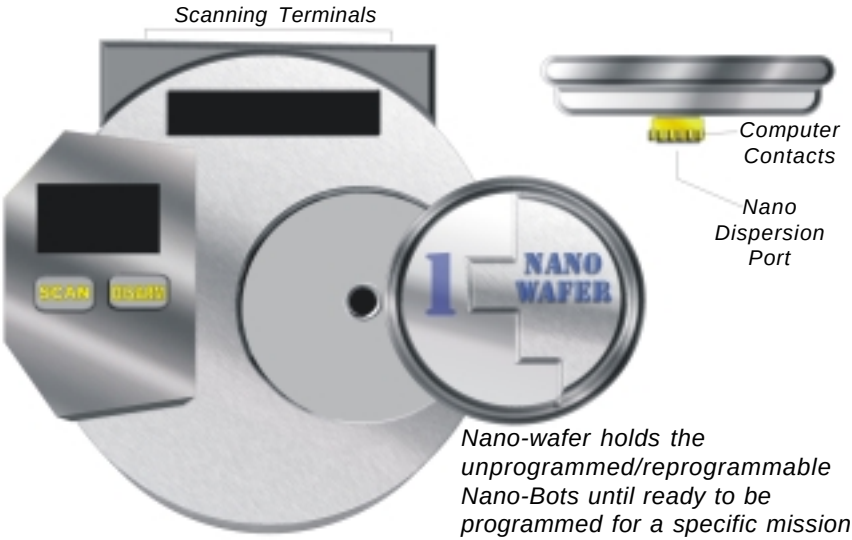
that can, for example, deliver air droppable bundles without compromising his clandestine location. These air droppable bundles must have the capability to efficiently rearm, refuel and resupply the SOF operator (on land and on the water) with a minimum of collateral packaging. Most of the packaging must be self-destructing. In addition, the operator requires a logistics system that can waterproof all equipment, or at the bare minimum, produce a waterproof bag that does not leak, even at operational depth (66 feet). Logistics is not, however, just waterproof bags or air droppable bundles. It is producing equipment able to sustain large shock and vibration as well as eliminating corrosion on SOF aircraft/vehicles. Responsive logistics produces the capability to safely transport hazardous NBC materials. It is also instrumental in improving in-flight refueling capabilities for SOF aircraft. Further, responsive and tailored logistics helps produce in-flight diagnostic equipment that can not only find the electronic problem but also fix it. Logistics technologies will help produce flexible, modular supply packaging for SOF teams that are not only easy to unload but are also easy to hide/destroy. A responsive logistics system will produce cradles for all air-transportable/droppable NSW craft that have the capability of worldwide deployment. SOF must also possess an automated logistics planning system with modeling and simulation capability as well as the ability to rapidly procure commercial off-the-shelf products. Further, this SOF system must be "stand alone" but integrated into larger Service/DOD logistics infrastructure.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 36

TITLE: Explosives Ordnance Disposal

SCOPE: SOF needs the capability for detecting unexploded ordnance and other specialized explosive devices in a crowded, urban environment. It will need the capability to see through the outside of unexploded ordnance to detail the components of the device. SOF will necessarily have the requirement to use robots and specialized sensors for the detection of bomb components.

Nano Explosive Disposal (NED)



Nano-wafer holds the unprogrammed/reprogrammable Nano-Bots until ready to be programmed for a specific mission

Hand-held scanner (NED) analyzes the explosive device composition. A computer determines the proper disarm method, then programs Nano-Bots to disarm or change molecular structure to render explosive inert

APPLICABLE TECHNOLOGY:

Magnetometry involves using magnetometers and gradiometers designed to locate buried ordnance by detecting irregularities in the earth's magnetic field caused by ferrous (iron-based) materials in the ordnance. Airborne magnetometers show little or no capability to detect Unexploded Ordnance (UXO). **Ground Penetrating Radar (GPR).** The main elements of a GPR system are the transmitter unit, the receiving unit or antenna, the control unit, and the display and recorder unit. The transmitter produces short pulses of electromagnetic energy that are directed toward the ground. As the energy pulses travel into the ground, buried objects reflect the signals back to the receiving unit, where they are recorded and processed into an image. **Electromagnetic induction.** Electromagnetic (EM) induction can be used to detect both ferrous and nonferrous metallic UXO. EM induction systems transmit electric current into the soil to detect metallic objects. The systems measure either the secondary magnetic field induced in metal objects or the difference between the electrical conductivity of the soil and the electrical conductivity of buried objects such as UXO. **Pulsed Electromagnetic Induction (PEMI)** holds promise for accurate location and characterization of

subsurface UXO. **Infrared sensors.** Infrared (IR) sensor technologies can be used to identify objects by measuring their thermal energy signatures. UXO on or near the soil surface may have a different heat capacity or heat transfer properties than the surrounding soil; theoretically, this temperature difference can be detected and used to identify UXO. **Multiple sensors.** Combining two or more sensor technologies into a **multisensor approach** has been demonstrated to improve UXO detection and characterization. Other technologies currently being developed include **nuclear technology**, **acoustic sensors**, and **biological sensors**. **Remote-controlled excavation technologies.** Remote-controlled UXO excavation systems will be used in the future in situations where safe removal of UXO is required and include **telerobotic and autonomous systems**. Remote-controlled systems include a navigation and positioning component (GPS) that can be integrated with an inertial navigation system to increase the capability of the navigation system.

CAPABILITY OBJECTIVES: **AFSOC:** 84, 85, 133;

OPERATIONAL CONSIDERATIONS: As the threat of terrorism rises in the world, SOF will require the capabilities of locating, defusing, and disposing of specialized explosives. Since urban areas are the most likely targets of terrorists, SOF needs to be prepared to execute the aforementioned tasks in crowded city environments. They will require sophisticated "sniffers" to locate the explosives and then the latest in state-of-the-art technology "kits" (tools, sensors etc.) to render the devices inert. Finally, they will require transportation for the devices to not unduly endanger the indigenous population.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 37

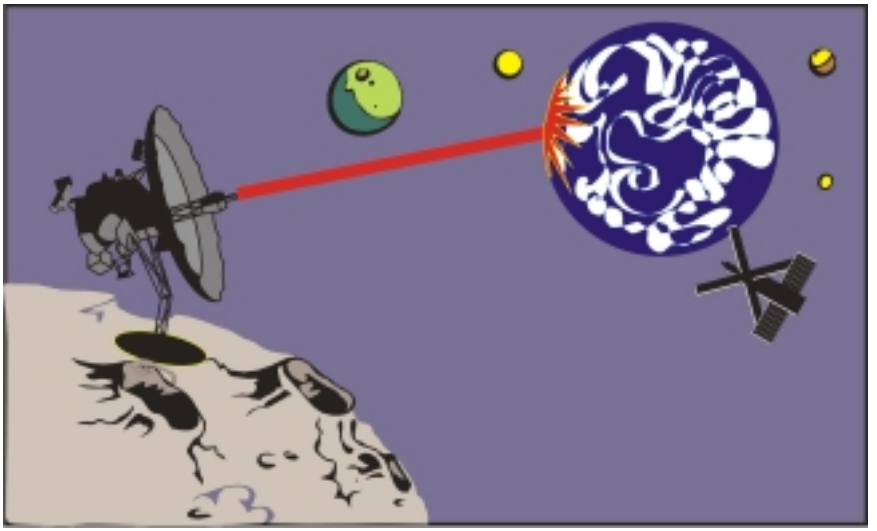
TITLE: Meteorology

SCOPE: SOF must be able to operate in all environmental conditions. Meteorological, oceanographic, and robust communications technologies will give SOF the capability to accurately assess current atmospheric

and space environmental conditions and provide value-added predictions to ensure mission success. This real time, accurate capability will assist SOF air, land, and sea operators in detecting and avoiding adverse natural environmental conditions and allow exploitation of the environment to achieve operational advantage. Examples include accurate formation and rendezvous flight operations, combat rescue and recovery, high altitude parachute operations, and infiltration/exfiltration boat operations.

APPLICABLE TECHNOLOGY:

Meteorology technologies include **ground**, **sea**, **and space-based environmental sensor arrays** located with appropriate density (quantity) to provide the environmental specialist a complete characterization of the environment—land, sea, and space. Sensors systems must be emplaced, air dropped, or launched with relatively simple effort and should have the capability of being undetected and the ability to transmit data worldwide in near real time using **space-based communications platforms**. The communications technology must be sufficiently dedicated for exclusive two-way, **secure receipt and transmission of mission-impacting environmental data**. **Advanced modeling techniques** providing point forecast capabilities worldwide will be key to exploiting both favorable and unfavorable environmental conditions. SOF must be capable of **short-term and localized weather modifications** for suppression or intensification of mesoscale (<200KM) or microscale



(immediate local area) weather features to gain the necessary tactical advantage. LIDAR systems are capable of characterizing and tracking local weather patterns by measuring laser backscatter from the observable weather. These systems may be operated for the ground, air and space. **Bioluminescent** technology can result in improved predictive capability.

CAPABILITY OBJECTIVES:

USASOC: 53, 72, 89, 90; **AFSOC:** 6, 38, 39, 41, 59, 66,73, 74, 89, 146, 175, 179, 187, 231, 232, 233, 234, 235, 236, 237, 238, 239,

OPERATIONAL CONSIDERATIONS:

Environmental sensing and forecasting plays a critical role in the overall SOF mission accomplishment. SOF flies very sophisticated aircraft in day and night and good and adverse environmental conditions. SOF also relies on space-based platforms to conduct real-time command and control. Space-based and exoatmospheric assets that support SOF operations must have assured survivability in potentially hostile (yet transient) natural space environment. Therefore, it is essential for SOF to have the latest weather and environmental information possible. Obtaining accurate, timely, and operationally relevant environmental information from within friendly areas of responsibility as well as from data-sparse, data-denied areas will prove critical to mission planning and operational mission execution. Long term, SOF needs the capability of "making" its own weather to mask its movement and creating tactical/operational difficulties for potential adversaries.

SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 38

TITLE:

Mobility Vehicle Instrumentation

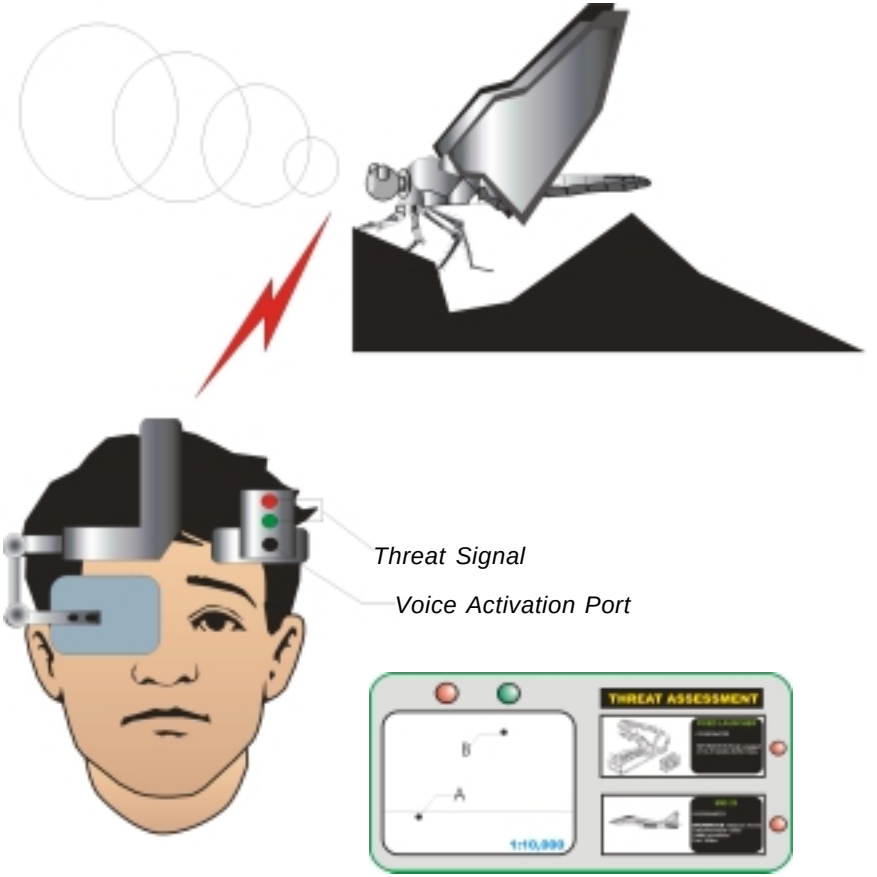
SCOPE:

Mobility Vehicle Instrumentation will afford SOF operators a wide variety of capabilities from identifying coalition friend from foe in all weather conditions; obstacle/collision detection/awareness/avoidance; high-speed target acquisition system/navigation system for future SOF aircraft, maritime craft and land vehicles; obtaining battlefield situational awareness in real time while mobile; detecting and avoiding anti-helicopter mines; possessing an underwater positioning system that doesn't require an above-the-

surface antenna; detecting and attacking targets from SOF mobility vehicles to resupplying teams and units with air deliverable bundles without detection. Systems may be required to be integrated into civilian vehicles of all types for clandestine or low-visibility operations.

APPLICABLE TECHNOLOGY:

Avionics technologies critical to developing future air vehicles include **automated closed loop coupling, fly-by-light/ power-by-wire (FBL/PBW)**, **helicopter active control**, **multivariable re-configurable control**, and performance-seeking aircraft control. In the future, a pilot will control an aircraft's situation via many real or virtual controls in a cockpit. In addition to standard hand and foot controls, controls will be activated by head movement, eye movement, voice sensing, and brain activity **(fly-by-thought)**. Advances in **smaller**, **more powerful computers** will enable more nearly full exploitation of the potential of rotorcraft performance. **Integrating flight controls with weapons control** is of great interest to permit improved pointing accuracy and lower-cost unguided rockets as precision munitions. Future flight regimes for manned air vehicles and UAVs will require enhanced control systems. **Adaptive/expert systems** will enable maximum mission effectiveness and potentially reduce maintenance costs. Objectives for new technology in fixed-wing aircraft include flight-control technologies leading to **aircraft-control systems that automatically adjust to and survive combat damage**, have **on-board systems to identify flight control component failures** and reduce repair time, provide **supersonic tailless fighter control** to improve range and payload, have **FBL/PBW control** technology to improve reliability, have **LO air data systems** to improve survivability, and operate in poor visibility with an **autonomous landing system** to increase operational readiness**. Land and maritime vehicles** (surface and subsurface) in future engagements must autonomously sense, be sensed, and **adaptively share data in full duplex modes** with friend and discriminate the enemy seamlessly. Advanced mobility instrumentation must provide the SOF operator capability to operate his vehicle(s) without fatigue, task saturation and afford his vehicle information management systems with real-time assessment capability, as well as passive, **autonomous worldwide navigation**. Mobility instrumentation must be **self-netting, fault tolerant, and adaptable** to dynamic battlefield conditions.



CAPABILITY OBJECTIVES: **USASOC:** 33, 48, 52, 53, 55, 64, 75, 76; **NSWC:** 1, 3, 8, 27, 39, 40; **AFSOC:** 1, 13, 15, 29, 32, 41, 43, 44, 48, 50, 58, 66, 68, 76, 77, 92, 97, 99, 100, 103, 110, 111, 123, 141, 142, 143, 144, 145, 146, 148, 151, 154, 156, 157, 158, 162, 163, 164, 181, 189, 201, 212, 213

OPERATIONAL CONSIDERATIONS: Advanced mobility instrumentation for SOF vehicles will play a vital role in the future conduct of successful SOF operations. Advanced instrumentation will allow the SOF operators to operate their vehicles without fatigue and task saturation. They will have the capability to operate SOF vehicles in close formation and rendezvous flight in all weather conditions. In addition, they will allow aircrew to safely and accurately land SOF aircraft in zero/zero weather condition on/in areas that are unimproved all the while using passive autonomous systems. Advanced mobility instrumentation of the future will allow SOF operators

to have automated decision making equipment aboard allowing them to execute tasks that otherwise would have to be aborted for operational or weather considerations. Further, mobility vehicle instrumentation will allow SOF operators to maximize all weapons systems aboard their vehicles in all weather conditions. Advanced mobility instrumentation will afford SOF information management systems with real-time assessment capability, as well as a passive worldwide navigation system. Some systems may require the ability to "wired in" to unsophisticated civilian mobility platforms, to enable SOF to achieve mobility advantage within a low-visibility mission profile. Some systems may be employed by indigenous, surrogate, or allied forces through the direction or training of U.S. SOF. Simplicity of use and minimal maintenance/sustainment of such systems are paramount, as these non-U.S. personnel may be illiterate and/or technologically uneducated. Systems may require the ability to automatically or on-command self-destruct/inactivate when tampered with or mis-used, without causing damage or casualties to the user.

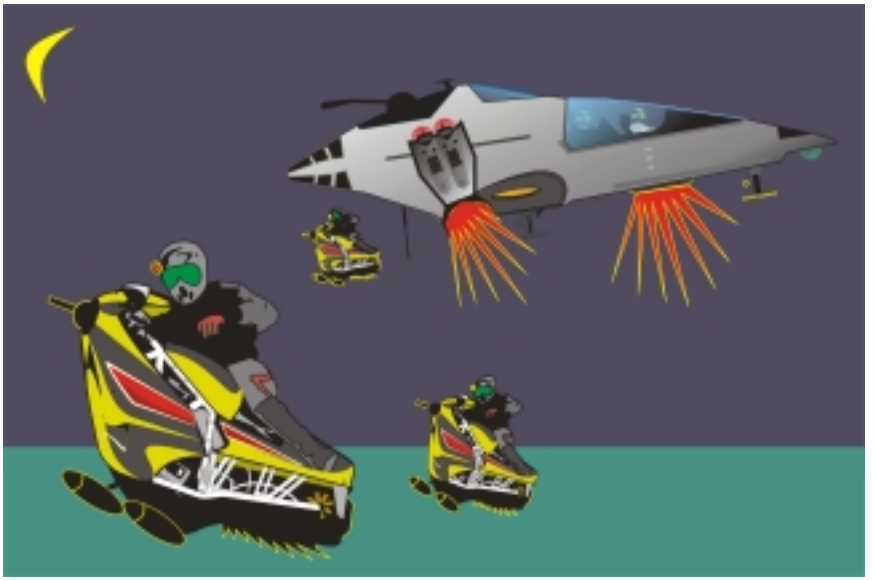
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 39

TITLE: Advanced Mobility

SCOPE: SOF must have the capability to deploy worldwide, without detection within hours of notification. This deployment includes surface and subsurface craft. The SOF operator must have ground vehicles that are highly maneuverable, long-range, low observable, and fit into SOF aircraft. These vehicles will be used for reconnaissance and surveillance as well as target detection/hunting missions and should be able to operate in the water, on the land, and in the air. SOF will also need low-observable boats for infiltration/ exfiltration at long, operational ranges, as well as a highly maneuverable, stealthy, high-speed insertion craft.

APPLICABLE TECHNOLOGY: The **Reconnaissance**, **Surveillance**, **and Targeting Vehicle (RST-V)** will incorporate advanced power/ propulsion, mobility, and survivability technologies for ground use. The technologies that this vehicle will incorporate include **hybrid electric drive**, **integration**

of advanced survivability/signature management technologies, **advanced mobility**, **integrated communications and sensor packages**. The **RST-V** is expected to demonstrate increased payload capability and twice the fuel economy of a current HMMWV in a V-22 internally transportable package. In addition, the **RST-V** will yield increased cross country speed, improved acceleration, **burst recharge ability** for man-portable batteries, silent watch and movement capability when operating on battery power only, and increased electrical power for communications and sensor packages. Advances in technologies related to **submersible vehicles** have precipitated the use of **UUVs** for a greater variety of missions. Both submarines and surface combatants will operate UUVs, and variants may well be launched from fixed-wing and rotary aircraft. **Autonomous**, **independent UUV** operations, without a host platform, are also likely for certain missions. UUVs will provide economical force multiplication, increased battle-space awareness, reduction in exposure to hostile action, and extend operational capability. Future UUV applications will include the following: **Off-board sensing**, platforms for acoustic and nonacoustic detection and localization and tracking of targets; **intelligence collection**, covert platforms for gathering tactical and strategic intelligence, including minefield surveillance, harbor and waterway traffic surveillance, surveys of uncharted bodies of water, plus the ability to carry a limited range



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of weapons for attacking detected targets; and **mission support**, autonomous, covert, and stealthy electronic warfare and information warfare platforms for decoy operations in coastal areas.

CAPABILITY OBJECTIVES:

USASOC: 21, 37, 38, 45; **NSWC:** 1, 2, 3, 14, 15, 17, 18, 27, 39, 41, 46, 52, 58, 59, 60, 61; **AFSOC:** 1, 15, 16, 18, 26, 32, 38, 39, 41, 43, 44, 48, 50, 55, 58, 64, 65, 66, 68, 92, 95, 110, 139, 146, 148, 161, 165, 168, 176, 181, 191, 192, 194, 197, 208, 210, 212, 216, 218, 221, 224, 225; **FCWG:** 1, 5, 19, 35, 46, 48, 49, 52, 159

OPERATIONAL CONSIDERATIONS:

Advanced mobility vehicles will play an important role in the future. SOF forces need lightweight, stealthy, durable vehicles that are highly maneuverable and mobile and can operate in more than one environment (air, ground, and water). They need to have a long-range capability without the encumbrance of additional fuel slowing them down. Additionally, all advanced mobility vehicles must place emphasis on providing the SOF operator(s) with a smooth, non-fatiguing ride to deliver him to the objective area fresh and totally prepared to accomplish his assigned mission. The advanced mobility vehicles need to be able to respond quickly to any contingency so they must not only be air transportable but air droppable as well. The goal for all SOF mobility vehicles is to make them invisible, or at the least low-observable, on the battlefield. SOF forces will further require low-observable aircraft that can conduct the full range of PSYOP missions as well as one or two-man flying machines that can effectively penetrate enemy defenses.

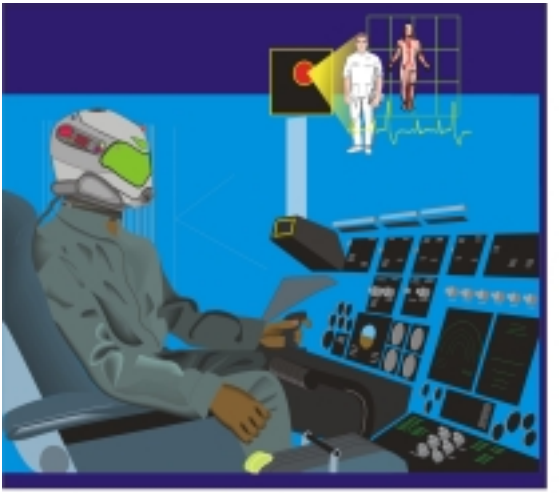
SPECIAL OPERATIONS TECHNOLOGY OBJECTIVE: 40

TITLE:

Behavioral, Cognitive Technology

SCOPE:

The SOF operator, due to his inherently unique mission requirements, must possess to a degree not normally found in the average soldier, sailor or airman, cognitive skills, perceptual processes, non-cognitive skills and abilities, and leadership. The SOF operator is a scholar warrior, who through intense training, education, political astuteness and experience, is able to make the right decision(s) under extremely stressful



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circumstances. Therefore, stress management and psychological "hardening," for example, become increasingly more important to the SOF community. The entire scope of behavior and cognitive/non-cognitive thought is an important aspect to the uniqueness of SOF because it can help in training in virtual and constructed realities, determining fitness for duty as well as determining when mental/physical-training goals have been achieved.

APPLICABLE TECHNOLOGY:

Applicable technology for this SOTO include distributed simulation and constructed reality; iconographic compatibility with human user; remote vital signs; (neuro)physiological measures of human performance; stress reduction; sleep deprivation; neural network communications; skill acquisition, process, storage and use of information; psycho-social measurement; metrics of operational physical performance; casualty care; circadian rhythm manipulation; stimulate drugs or ergogenics for special operators; systemic sleep and rest on demand; remote life sign detection; neuropsychological profiling; effects of photic exposure, stimulants, diet on sleep; Pharmacogenomics; Single Nucleotide Polymorphism (SNP); Dorsolateral Prefrontal Cortex (DLPFC) and cognitive tasks.

CAPABILITY OBJECTIVES:

USASOC: 148; **NSWC:** 19; **AFSOC:** 102; **FCWG:** 299

OPERATIONAL CONSIDERATIONS:

After the decision by high level Commanders/National Command Authorities to use SOF as an instrument of national power, the actual tactical employment is down at the small unit (detachment, squadron, platoon) level. These SOF warriors must prepare themselves physically as well as mentally. Not only must they possess the proper equipment, they must also possess the proper "attitude." This "attitude" of almost physical invincibility and mission accomplishment "focus" comes from both their training and from the proper mental preparation. They have practiced the execution of the entire mission "mentally" long before they step on the mobility platform that will take them to the Area of Operations. This mental preparation includes the small unit commanders monitoring the (neuro) physiological, psychomotor and cognitive status of his men. He will monitor their sleep and if physical aspects of the mission interfere with systemic sleep, he will

direct that they use specially formulated drugs to get the rest they need. The small unit commander, given enough warning, will also begin to adjust the circadian rhythms and homeostatic determinates of his unit to be as adjusted to the time difference between home station or forward operating base and the Area of Operations. Further, the small unit leader will begin, through psychological training, the reduction of personal stress (to include irrational anxiety). This may be accomplished in any number of ways to include meditation and selected, safe drug therapy. Special operators, once engaged in the mission, will be able to be physically and mentally monitored by the unit commander. Blood pressure, heart function, sweat production, hydration, sleep deprivation/alertness, cognitive thinking ability, mental fatigue, spatial disorientation and temperature, for examples, will all be monitored and immediately available (for assessing cognitive thinking ability in real time) to the unit leader for use in tactical decision making. This data would be "digested" via an algorithm and presented in an informative way to not "data overload" the commander. Additionally, if, during the course of the mission, a SOF operator is wounded or physically/mentally incapacitated, that information will immediately be available to the unit medical personnel via data link. That link will even be able to remotely detect and transmit if the operator has sustained a fatal wound. All of this behavioral, cognitive information will lead to an increased battlefield situational awareness on the part of the SOF operator.

USASOC Capabilities

USASOC operational forces need the following capabilities:

USASOC1.	Talk/communicate with indigenous personnel around the world in all languages and dialects to include military jargon and slang.
USASOC2.	Communicate voice, imagery, and data around the world.
USASOC3.	Sensors that collect information and communicate it worldwide.
USASOC4.	Ensure the operator and commander can receive sensor information that is then converted to useable intelligence and disseminated in near real time.
USASOC5.	Eliminate electro-magnetic, IR, RF, seismic, aural, and olfactory signature by Special Operations Forces.
USASOC6.	Access denied areas and not be detected.
USASOC7.	Maximize the innate senses (smell, sight, touch, taste, and hear) of fielded Special Operations Forces.
USASOC8.	A robotic platform to perform portions of reconnaissance and surveillance when it's impractical, impossible, or too dangerous to use a human.
USASOC9.	Ensure seamless communications with SOF operators at all levels.
USASOC10.	Navigate underground with a self-contained system.
USASOC11.	See through obscurants.
USASOC12.	Communicate between surface, air, and underground elements.
USASOC13.	Destroy deeply buried and hardened targets from the air, surface, and subsurface.
USASOC14.	Remotely view the structure/layout of DUGs and determine the presence or absence of hazardous materials.
USASOC15.	See buried objects in the soil (mines, sensors, booby traps, etc.).

USASOC16.	Render safe and then rearm any non-US installed explosive devices.
USASOC17.	Detect, collect and analyze, at any range, hazardous materials (NBC, etc.).
USASOC18.	Handle and dispose hazardous materials without harm to the SOF operator or others.
USASOC19.	Worldwide PSYOP communications.
USASOC20.	Communicate video between deployed teams and headquarters in real-time.
USASOC21.	A low, observable aircraft that can conduct the full range of PSYOP missions.
USASOC22.	Conduct VTC worldwide.
USASOC23.	Conduct offensive Information Warfare against all modes of communications.
USASOC24.	A miniature communications system with full communications capability including third party tracking and emergency locator beacon.
USASOC25.	Map the ocean floor with a vehicle (manned/ unmanned) capable of operating in up to and including Sea State 3.
USASOC26.	Detect all known chemical and biological compounds.
USASOC27.	Communicate worldwide with all services and non-government agencies.
USASOC28.	Quickly and easily render ineffective/useless all communications equipment.
USASOC29.	Communicate with host-nation communications systems.
USASOC30.	Ensure the SOF operator has the personal equipment to operate in all environments, extremes of climate, terrain, and NBC conditions.
USASOC31.	Ensure the SOF operator has complete situational awareness and threat warning capability in Near Real Time.
USASOC32.	Operate on the battlefield with no signature.

USASOC33.	Identify friend from foe in all operating conditions.
USASOC34.	Protect the vital organs of the human body from fragmentation and high ballistic impact.
USASOC35.	Effectively engage targets as far as the SOF operator can see/detect.
USASOC36.	Render invisible SOF aircraft and ground vehicles.
USASOC37.	A long-range, low-observable SOF aircraft.
USASOC38.	A long-range SOF ground vehicle.
USASOC39.	Accurately attack/kill/neutralize targets with a man-portable weapon during all operating conditions at maximum visual range with little or no aural or visual signature.
USASOC40.	Control terminal guidance smart munitions from apogee to target.
USASOC41.	Conduct electronic warfare against all known communications systems.
USASOC42.	Tag (personnel, material, and facilities) target(s).
USASOC43.	A flexible, modular logistics package for SOF teams.

USASOC44.	Provide SOF operating forces with a universal power source.
USASOC45.	Transport/deploy SOF anywhere in the world using space assets.
USASOC46.	A “tunable” lethal/non-lethal personal weapon for SOF.
USASOC47.	Communicate to the controlling SOF headquarters while aboard USAF aircraft.
USASOC48.	Detect and attack targets from SOF rotary wing aircraft using precision munitions.
USASOC49.	A hand-held x-ray machine capable of both dental and body examination.
USASOC50.	Capability Deleted.
USASOC51.	A man portable, precision aircraft landing system.
USASOC52.	Operate SOF aircraft without (pilot) task saturation.
USASOC53.	Operate SOF aircraft in close formation in all weather situations (zero/zero visibility).
USASOC54.	Attack/kill/neutralize/suppress targets from the air using an airborne tactical laser/high power microwave system.
USASOC55.	Mark and tag/track mobile weapons systems from land and air.
USASOC56.	Identify individuals through matching speech/voice patterns.
USASOC57.	Render all known NBC agents harmless.
USASOC58.	Predict NBC dispersion patterns for known terrain and in all weather conditions.
USASOC59.	Detect production of chemical/biological/nuclear agents/properties without internal access to production facilities.
USASOC60.	Perform initial analysis on chemical and biological agents.

USASOC61.	Detect/conduct initial analysis on nuclear devices at a distance.
USASOC62.	A reusable NBC suit.
USASOC63.	Detect the presence of chemical/biological agents with unattended, air delivered sensors.
USASOC64.	Resupply teams/units with air deliverable bundles without compromise.
USASOC65.	Conduct all missions (i.e., NBC conditions) without need to don special clothing.
USASOC66.	Conduct air/ground missions, in all environments, involving all types of laser weapons.
USASOC67.	Administer anesthetics, in the field, without special equipment.
USASOC68.	Night color vision under all light conditions.
USASOC69.	Defeat armor and bunkers with a shoulder-fired weapon from a confined space with little or no aural signature.
USASOC70.	Tell the remaining barrel life of individual and crew-served weapons.
USASOC71.	Day/night sniper scope.
USASOC72.	Navigate, while executing high altitude, high opening parachuting over extended ranges, in less than perfect weather conditions using navigation aids and references.
USASOC73.	An oxygen system providing unobstructed use of parachute equipment and an unrestricted field of view for high altitude parachute operations.
USASOC74.	A universal demolition kit accomplishing a variety of missions.
USASOC75.	Improve in-flight refueling capability for rotary wing aircraft.
USASOC76.	Provide detection/protection against anti-helicopter mines.

USASOC77.	Reduce the visual and IR signature of SOF aircraft.
USASOC78.	Transmit thermal images.
USASOC79.	Precision guided mortar rounds.
USASOC80.	Range determination capability for all SOF crew-served weapons.
USASOC81.	Perform disease diagnoses, in the field, with portable equipment.
USASOC82.	A small non-invasive machine, providing rapid triage and treatment.
USASOC83.	Provide effective, routine, non-combat injury and combat casualty care to the deployed SOF operator.
USASOC84.	Remove/retrieve exposed wounded SOF operator(s), in the field, without endangering recovery personnel.
USASOC85.	Use pharmaceuticals, in the field, requiring little or no special handling/equipment.
USASOC86.	Train SOF medics replicating actual medical situations.
USASOC87.	Effectively destroy a bridge support, concrete structures, and command bunkers.
USASOC88.	Engage area and point targets with a terminally guided smart round with a shoulder-fired weapon.
USASOC89.	A UAV that accurately distributes leaflets.
USASOC90.	A PSYOP aircraft that delivers leaflets.
USASOC91.	Broadcast radio and television in real-time.
USASOC92.	Render harmless a WMD by remote control.
USASOC93.	Initiate burn, destruction, or detonation of a WMD.
USASOC94.	See inside the skin of a WMD to determine its makeup.
USASOC95.	Capture a WMD/NBC component(s) from another country/terrorist group and transport it/them safely out of the country.
USASOC96.	Detect, locate, and counter intrusion detection systems/ sensors.

USASOC97.	Identify, precisely locate, track, and provide information on time critical/high value targets.
USASOC98.	Intercept tactical and operational communications signals and provide them to fielded SOF forces.
USASOC99.	Remote tactical/operational radios using UHF, SATCOM, and SHF links.
USASOC100.	A power source capable of continuous operation with minimal thermal, electromagnetic, acoustic and visual signature.
USASOC101.	A man-portable antenna designed to acquire low power signals of interest.
USASOC102.	A lightweight, non-cumbersome, wide-field night vision system.
USASOC103.	A topical skin chemical protector cream.
USASOC104.	Defend SOF operators against Clostridum Botulinum toxin.
USASOC105.	A non-water based chemical decontamination system.
USASOC106.	Defend SOF operators against “novel agents.”
USASOC107.	Immunize SOF operators against known CB agents.

USASOC108.	Treat the SOF operator therapeutically for pre exposure to radiation, toxins, viral, and bacterial agents.
USASOC109.	Protect the SOF operator from the next generation of anthrax.
USASOC110.	Mask SOF movement/deployment against other countries surveillance satellites.
USASOC111.	See what is on the other side of walls and other natural and manmade barriers.
USASOC112.	Temporarily incapacitate personnel.
USASOC113.	Cause personnel to vacate a confined area (i.e., building, bunker, DUG, etc.).
USASOC114.	Identify personnel in a room or facility and determine if they are armed or if the room is booby-trapped.
USASOC115.	Incapacitate or force a withdrawal of hostiles from an underground bunker.
USASOC116.	Force evacuation of a hi-jacked aircraft.
USASOC117.	Restrict the use of high value terrain or facilities for an indefinite period of time.
USASOC118.	Determine the interior make up of a facility i.e., walls, floors, and equipment.
USASOC119.	Use a man-portable scanner to search vehicles and facilities.
USASOC120.	Interface, using 3-D multi-sensory virtual environment technologies, to facilitate mobile rehearsal realism.
USASOC121.	Disrupt enemy space systems.
USASOC122.	A seamless SOF information enterprise across the full spectrum of day-to-day operations as well as tactical/ operational missions.
USASOC123.	High bandwidth path to pass imagery of target locations, UAV video and sensor feeds, location of enemy/friendly forces, status of support missions and satellite sensor broadcasts.

USASOC124.	Information interfaces and services across all echelons of SOF, including team level communications and mobile systems platforms.
USASOC125.	Through the Global Information Grid, interconnect capabilities, processes, and personnel for collecting, processing, storing, and disseminating information on demand to the warfighter.
USASOC126.	Reduce the forward footprint of SOF by providing direct, on demand, real time link-up between the special operator in the field and rear echelons.
USASOC127.	Near-real-time connectivity between deployed SOF and other agencies such as Ambassadors, NGOs, Services, State Department, etc., to ensure special operators are kept abreast of changing world issues impacting missions.
USASOC128.	Train, organize, and equip SOF forces to support Information Operations, and if required, engage in IO in support of national objectives.
USASOC129.	Protect the SOF operator from laser energy.
USASOC130.	Mask the movement of the SOF operator on the battlefield.
USASOC131.	Attach demolitions on all surfaces to include underwater and in all climatic conditions.
USASOC132.	To have the SOF operator capable of operating, without operational or physical impairment, in any and all environments to include the maritime environment.
USASOC133.	“Extreme environment” hand wear.
USASOC134.	Provide micro-cooling/heating suits for SOF operators.
USASOC135.	Provide tactile display suits for SOF operators.
USASOC136.	Provide small, quiet, long range UAV/UGV/MAV.
USASOC137.	To have a land and small maritime engine having multi-fuel capability.
USASOC138.	Provide a 3-D holograph imaging system.
USASOC139.	Provide a whole blood substitute for the SOF operator.

USASOC140.	Provide a soft tissue regeneration capability for the SOF operator.
USASOC141.	Mark and tag vehicles, equipment, and facilities with bio-chemical markers for identification and tracking.
USASOC142.	A weapon that is not detectable by x-ray or other airport sensors.
USASOC143.	Stop or repel individuals, vehicles, and crowds.
USASOC144.	A mobile robotic vehicle capable of counter sniper/ countermine operations.
USASOC145.	Mines and booby traps that are self-deteriorating.
USASOC146.	Detect the DNA of an individual from a breath sample.
USASOC147.	A man-portable tunneling device capable of breaching underground targets.
USASOC148.	SOF operators who are psychologically, physiologically and mentally prepared to conduct the full range of SOF operations while maintaining the ability to make the correct/right decision(s) under extremely stressful situations.

NSW CAPABILITIES

The following are capabilities for NSW operators:

NSW1.	Manage IR, visible, optical, laser, RF, acoustic, and electromagnetic signatures of NSWG craft/personnel/ propulsion systems to remain below detection thresholds (including techniques for camouflage, concealment, and spoofing).
NSW2.	Deploy SOF personnel, equipment, surface/subsurface craft, and land vehicles worldwide via advanced organic and dedicated methods.
NSW3.	Interoperate NSW equipment and mobility platforms with service support aircraft/surface/subsurface vessels. Fully compatible because SOF support is designed into service vessels.
NSW4.	Detect CBR agents; protect the NSW operator from these agents (lotions, pills, etc.); continue unencumbered operation in contaminated environments; and decontaminate personnel, equipment and all craft/vehicles.
NSW5.	Operate any and all NSW equipment with a universal or interchangeable self-recharging/regenerating power source.
NSW6.	Detect friendly and enemy virtual and or physical presence, determine movement and threat posture using organic, man-portable (or self-deploying) sensor(s) (i.e., sensors or systems capable of surveillance/reconnaissance; imaging; target detection/identification; transmitting/receiving audio, video, and digital data to/from surface, subsurface, air and land based communications nodes) at extended ranges. Deconflict with friendly sensors, evade, disrupt, or deceive unfriendly sensors.
NSW7.	Operate in any environment with EMP and ECM hardened sensors capable of penetrating any obscurant (all maritime environments and weather conditions, including periods of darkness, fog, mist/ salt spray, clouds, underwater, and through smoke or other deliberate obscurants) and working in low/no light conditions.

NSW8. Communicate real time LPI/LPD via digital data, audio, audio/video, and high-resolution imagery between SOF operators conducting surface/subsurface/land/ airborne operations, and planners/decision makers located at joint/allied afloat/land based or airborne headquarters or forward operating bases.

NSW9. Deploy and monitor an undersea network of clandestine reconnaissance, surveillance, and tracking sensors and communications nodes capable of penetrating harbors, very shallow water areas, and riverine/inland waterway environments; detecting/ identifying/tracking air/surface/subsurface craft of interest; and alerting/queuing SOF and joint force intercept assets.

NSW10. Communicate underwater (LPI/LPD) with other subsurface platforms/personnel, forward operating bases, mission planners, operational commanders, and joint/allied air, land, and sea platforms.

NSW11. Optimally simulate live fire training in areas where actual weapons firing is impossible.

NSW12. Integrate PCs, virtual reality simulators, interactive displays, and holographic imagery for extremely realistic mission planning, training and rehearsal.

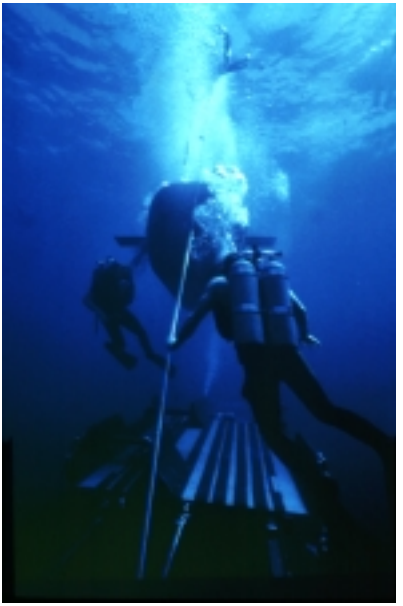
NSW13. Render all NSW equipment and weapons systems, including COTS/NDI equipment and components, completely waterproof to three atmospheres without impacting function or access.

NSW14. Rapidly load, transport, and deploy all NSW craft and equipment aboard joint/allied/civilian or chartered tactical and strategic airlift or sealift.

NSW15. Deploy equipment and platforms able to sustain and operate effectively during and after severe and repetitive shock, vibration, and “g” loading in all combat environments.

NSW16. Continue to reduce NSW operational equipment size and weight while retaining optimum effectiveness.

NSW17. Clandestinely detect, localize and avoid or selectively penetrate mines/obstacles (moored, bottom, and buried) in very shallow water/surf zones. Continue unencumbered operation in contaminated environments.



NSW18. Perform advanced, accurate, secure navigation for all manned and unmanned surface, subsurface, air and land vehicles and personnel (i.e., tactile display suits to warn of course deviations).

NSW19. Develop advanced methods of training and utilizing marine mammals to execute or assist with SOF missions.

NSW20. Employ a lightweight, tunable, selectable lethality, multi-purpose (surface to air, surface to surface) weapon for use on land, at sea, or underwater, capable of being used in a hand-held mode or mounted to manned and unmanned craft or aircraft, and with a high rate of continuous, accurate fire and minimal requirement for ammunition reload.

NSW21. Refuel any NSW craft engine with universal fuel, compatible with US Navy shipboard operations.

NSW22. Employ a man-portable, high-effects weapon capable of destroying entire structures (such as bridges, fortified and underground bunkers) from standoff distances.

NSW23. Penetrate hardened underground positions with field programmable weapons effects to disrupt, disable, or destroy personnel and material.

NSW24. Reliably activate and initiate explosives from remote locations, either afoot or from surface, subsurface, or air mobility platforms at long range.

NSW25. Detect contaminants or absence of oxygen in air; perform all missions/tasks unencumbered while operating in contaminated or oxygen depleted air (i.e., in underground complexes).

NSW26. Develop and employ moldable, insensitive, tamper/removal proof explosives and mines with underwater adhesives that work in/on any temperature/surface with controllable arming/de-arming and detonation times, and remote attachment/detachment capabilities.

NSW27. Develop and employ advanced fire control systems enabling SOF operators to detect, identify, select most effective countermeasures and engage targets at the maximum effective range of all weapons independent of sea state or platform or target movement.

NSW28. Identify, intrude on, exploit, interdict, or neutralize surface, subsurface, buried, land, aerial or space-based communications nodes, cables, pipelines, and other elements of support infrastructure.

NSW29. Neutralize/immobilize surface and subsurface craft without breaching hulls or sinking.

NSW30. Clandestinely mark/tag and track mobile surface and subsurface contacts, personnel or items of interest.

NSW31. Communicate undetected and unconstrained within ships, buildings and complexes.

NSW32. Develop and employ small, mobile, reconfigurable smart sensor arrays (multi-physics) capable of operating independently (deploy and forget) or being operated remotely from SOF Forward Operating Bases, mobility platforms, or in the field at large standoff ranges.

NSW33. Translate spoken and written English to and from any foreign language or dialect, with proper grammar, slang, accents, and voice inflections in real time.

NSW34. Maximize the physiological performance of SOF operators with advanced nutritional supplements and artificial enhancements (i.e., increased endurance, enhanced senses, cold tolerance, etc.).

NSW35. Protect SOF operators against injury, impairment, or mission degradation from ballistic projectiles, blades or shrapnel, chemicals, or fire while allowing unencumbered movement.

NSW36. Protect SOF operators against the use of directed energy weapons while allowing unencumbered vision and movement.

NSW37. Protect SOF operators (including injured and incapacitated personnel) from infection, parasites, insects, and life-threatening organisms.

NSW38. Perform medical procedures in the field without open drip or special, mission limiting equipment.

NSW39. Conduct clandestine hydrographic reconnaissance, surveillance and surveys in remote and hostile areas without triggering space, aerial, land based, surface or underwater offensive/defensive systems.

NSW40. Detect, divert, defeat, or assume control of initial and terminal guidance for hostile weapons systems.

NSW41. Locate, hide, protect, communicate with and retrieve/evacuate both healthy and injured combatant and non-combatant personnel and hostages in hostile areas on land and at sea, in all environments and weather conditions, without endangering recovery personnel.

NSW42. Power SOF surface and subsurface craft from sources that dramatically enhance range, speed, endurance, maneuverability, payload capacity, and stealth.

NSW43. Eliminate dust, fogging, condensation, and other obscurants from optical systems in any environment (including subsurface).

NSW44. Develop and employ controlled/selectable buoyancy body armor.

NSW45. Develop and employ underwater miniature robotic vehicles for reconnaissance, surveillance, hydrographic survey/mapping, mine neutralization, and underwater attack missions in any sea state.

NSW46. Develop and employ advanced surface, subsurface, air, and space mobility platforms for rapid transoceanic SOF insertion and extraction.

NSW47. Mark areas of known contamination (i.e., CBR) with a taggant providing a clandestine, own-force visible indication that area/personnel have been contaminated.

NSW48. Employ terminally guided smart rounds from hand-held and shoulder-fired weapons.

NSW49. Blow man-sized holes (1 meter square) in reinforced brick, concrete, or thick metal plate without causing noise, smoke, or danger to operators.

NSW50. Develop and employ a weapon that will penetrate brick, concrete, or metal plate to deliver a combustible warhead.

NSW51. Develop and employ personal equipment that provides enhanced mobility and personal protection and performance in rugged terrain and hazardous threat and climatic environments (i.e., exoskeleton).

NSW52. Clandestinely insert/extract as few as two operators via highly maneuverable, stealthy, high-speed craft.

NSW53. Determine size, shape and contents of compartments on a ship or rooms in a building from a standoff or remote location.

NSW54. Determine number, nationality, and threat potential of people on-board a ship or in a building from a standoff or remote location.

NSW55. Remotely incapacitate or disarm occupants of compartments of a ship or rooms of a building.

NSW56. Operate unencumbered at any extreme of any environment (including surface and subsurface environments) without the need to change clothes/ suits. Operators should be impervious to extremes of any environmental parameter including temperature, humidity, altitude, flora, fauna, etc.

NSW57. Perform extended diving operations below 66 feet without recompression.

NSW58. Conduct the full range of SOF missions from an organic, floating and or submersible mobile operating base.

NSW59. Clandestinely insert/extract 4-8 operators via high-speed, modular, scalable craft capable of land, surface, subsurface and air (flying) operations.

NSW60. Launch an amphibious air mobility craft from a submarine.

NSW61. Replenish craft fuel/power and re-supply operators with food/water, etc. (i.e., self-deploying pods, battery charging via satellite).

NSW62. Transmit Influence Operations (PSYOP) messages to a target audience from maritime combatant craft, communications buoys, or underwater communications nodes.

NSW63. Purify and desalinate unlimited amounts of water using lightweight low-volume man-portable equipment.

AFSOC CAPABILITIES

1. **0/0 Portable Landing (CAP169).**
Ability to provide precision guidance to aircraft allowing for landing in zero ceiling and zero visibility conditions. System must be man-portable. **ET038**

2. **21st Century Soldier (CAP170).**
Ability to provide security force members modern, state-of-the-art individual battlefield gear to survive against technologically advanced threats. Consists of enhanced target detection, night vision, IFF, GPS-aided location/navigation, and linked imagery capabilities. **ET036**

3. **30-Day Sustainability from Bare-Base Environment (CAP001).**
Ability to sustain operations for 30 days from a bare-base environment. **ET077**

4. **Access to Operational Data (CAP171).**
Ability to access all operational data transmitted in all required formats (i.e., air tasking orders (ATO), air coordination order (ACO)). **ET061**

5. **Adversary Courses of Action (COA) Development (CAP172).**
Ability to construct a consolidated list of all potential adversary COAs. At a minimum, this list includes all COAs that the adversary's doctrine considers appropriate to the current situation and accomplishment of likely objectives. **ET052**

6. **Aerospace Operations Area Survey (CAP173).**
Ability to survey an area of perspective or actual aerospace operations. **ET039**

7. **Air Refueling (Tanker) (CAP028).**
Ability for AFSOF aircraft to provide fuel in flight. **ET002 (Far-Term: ET003, ET004, ET024)**

8. **Airborne Physiological/Environmental Protection (CAP008).**
Capability to protect crews/cargo from physiological/environmental effects while airborne. Includes protection from the physiological and environmental effects associated with altitude to include decompression sickness, hypoxia, dehydration, temperature extremes, noise, vibrations, light management, etc. **ET019**

9. **Aircraft Component Inspection/Repair (CAP176).**
The ability of SOF personnel to assess, advise, and train host nation aviation forces on aircraft component inspection, teardown, repair, and inspection procedures and practices**. ET031**

10. **Aircraft Generation (CAP150).**
The ability to increase availability of aircraft provides a higher state of contingency response capability. This includes fueling, engine start-up, and cargo upload. **ET063**

11. Aircraft Generation/Regeneration (CAP177).

Ability of SOF personnel to assess, advise, and train host nation aviation forces on aircraft generation/regeneration and deployment procedures and practices. **ET031**

12. Aircraft Maintenance (CAP163).

The ability to maintain mission readiness of assigned weapons systems. Maintenance needs to have the ability to easily maintain SOF aerospace platforms and equipment utilizing the fewest man-hours, tools, spare parts, and personnel possible. **ET063**

13. Aircrew Workload (CAP011).

Ability of crew members to accomplish their jobs in a timely and accurate manner while avoiding task saturation or degradation of situational awareness. Emphasis should be placed on aiding aircrew conduct of operational missions. **ET002, ET003, ET004, ET008, ET019, ET024**

14. Airdrop (CAP178).

Ability to precisely deliver a payload in flight from a SOF aerospace platform to the surface regardless of altitude in all threat environments and in adverse weather conditions. Capability includes the precision delivery of airdrop supplies from offset release points. **ET003**

15. Alternate Insertion Extraction (AIE) (CAP179).

AFSOF vertical lift recovery platforms must possess the ability to rapidly insert or extract personnel/equipment using a variety of methods to include fast rope, rope ladder, STABO, SPIES, hoist, litter, or advanced technology insertion extraction methodologies. The delivery platform must minimize downwash, acoustics, IR, RF signature while in the terminal operations phase yet maximize insertion/extraction speed, efficiency, and safety. Platform may be manned or unmanned and must permit precise positioning regardless of visibility or weather conditions**. ET004, ET024**

16. **Amphibious Capability (CAP012).**
Ability of an AFSOF aerospace platform to operate from land, open water, rivers, and lakes. **ET003, ET004, ET024**

17. **Antijam Voice and Datalink Communications (CAP013).**
Ability to transmit and receive uninterrupted voice and datalink communications. **ET028**

18. **Artificially Intelligent, Autonomous Vehicles (CAP014).**
Ability of unmanned vehicles to function at long ranges with increased time on station to provide accurate positioning, targeting, and employment of information operations missions. **ET005, ET017, ET085, ET086**

19. **Assess Effectiveness of PSYOP/IW (CAP353).**
Ability to assess the military effectiveness of PSYOP and IW. This mission is often more difficult than traditional bomb damage or strike effectiveness assessments because the systems under attack do not show readily identifiable or direct physical changes. **ET026, ET084**

20. **Austere Locations Basing and Operations (CAP180).**
Ability to conduct missions in locations not conducive to military operations (i.e., urban areas, jungles, deserts, glaciers, space, and swamps). Challenges may include lack of sanitation, hot or cold temperatures, limited safe water supplies, contaminated food sources, substandard billeting, and presence of diseases, etc. **ET051**

21. **Auto Real Time Mission Assessment (CAP015).**
Ability to automatically follow, track, and provide information on mission progress/accomplishment on a near-real-time basis allowing instantaneous reaction to changes in the battlespace. **ET028**

22. **Auto Target Recognition (CAP181).**
Ability of the sensor system to recognize targets in the field of view through spatial comparison, electronic signature, acoustic signature or other means. **ET056**

23. **Automated Systems Intelligence Support (CAP182).**
Ability to provide digital threat in formats usable by mission planning and rehearsal systems. Provide digital files with standardized data so as to provide interoperability and commonality among data base architectures, mission planning and rehearsal systems, and onboard situational awareness systems and correlators for real time updates. Includes ability to provide intelligence support to SOF and appropriate host nation forces from pre- to post-deployment including the integration of intelligence information into mission planning and execution. Databases must be accurate, robust, and compatible with national, theater, joint, and service formats. **ET045, ET053**

24. Automatic Situational Awareness (CAP183).

Ability of the warfighter to automatically receive, fuse, process, and transmit situational awareness updates. Includes on-demand transmission of the latest information and electronic countermeasures (ECM) software changes to onboard systems. Also covers the ability to receive, fuse, process and transmit this information regardless of transport medium, environment, or information type; and process information from diverse multi-spectral sensors, information sources, and databases, to include delivery, distribution, and format presentation. **ET002, ET003, ET004, ET008, ET024**

25. Automatic Threat Update (CAP019).

Ability of tactical elements and command and control elements to automatically receive situation and threat updates in real time or near-real-time during the planning cycle and mission execution. **ET028**

26. Aviation Advisory Security Force Requirements (CAP184).

The ability of assigned security forces to train, assess, advise, and if tasked, assist in detecting, response, discrimination, and/or neutralization of forces that are hindering, targeting, or moving against AFSOF/host nation forces and resources in any environment**. ET011**

27. Base Supply System (CAP185).

Ability to conduct remote supply tracking and processing to include reports and transfers, and produce a variety of listings. Ability to monitor the accuracy and completeness of products and reports. **ET070**

28. Broadcast Over Multimedia/Bands (TV/Radio/Cable/Internet/Light Spectrum) (CAP020).

Ability to transmit a PSYOP product over a broad and flexible range of media throughout the electromagnetic spectrum available to the target audience. **ET017**

29. Camouflage/Concealment/Deception (C/C/D) (CAP070).

Ability to conceal the mission through appropriate deceptive measures. It can also encompass the capability to protect personnel/equipment from detection by active/passive optical, sonic, seismic, thermal, electromagnetic, and chemical sensors while in flight or in a static position. **ET043**

30. Cargo and Personnel Movement (CAP188).

The ability of SOF personnel to train, assess, and advise host nation aviation forces in cargo packing and preservation, pallet building/ loading/marshalling, passenger/equipment manifesting, hazardous cargo procedures, transportation information systems, and transporting injured personnel. **ET034, ET078**

31. Clandestine Dismounted Movement (CAP023).
Ability of ground teams to move through, into, or from a target area or territory occupied by either friendly or enemy troops or organizations without the aid of vehicular transportation. The movement is made, either by small groups or by individuals, at extended or irregular intervals. **ET024, ET038, ET058**

32. Clandestine Mounted Movement (CAP024).
Ability of ground teams to move through, into, or from a target area or territory occupied by either friendly or enemy troops or organizations with the aid of vehicular transportation. The movement is made, either by small groups or individuals, at extended or irregular intervals. **ET024, ET038, ET058**

33. Collaborative Mission Planning (CAP191).
Ability to interface through SOF, theater, and command networks for rapid and near-real-time exchange and management of pertinent mission data. It will also provide for the interactive sharing of mission and route information between SOF, Joint Task Force (JTF), and theater Special Operations Component (SOC) components to facilitate synchronization and command and control interoperability during pre-mission, mission, and post-mission operations. **ET062**

34. Commercial Office Applications (CAP192).
Ability to use USSOCOM SOF Information Enterprise (SIE) compliant office software application suite to support word processing, spreadsheet calculations, database construction, and presentation production for pre-mission, mission, and post-mission functions. **ET028**

35. Commercial Satellite Communication (CAP144).
Ability to access civil and foreign communications systems (INMARSAT, VSAT, PCS, etc.). **ET028**

36. Communicate in Required Languages (CAP025).
Ability of personnel to speak or write in the language of a host nation in an assigned theater of operations. **ET022**

37. Conceal Logistics Signature (CAP026).
The ability to optimize technology to operate with a reduced logistics footprint. Ability to conceal logistical footprint provided to AFSOF operations. **ET057**

38. Conduct Clandestine Infiltration Leaving Minimal Footprint (CAP029).
Ability to infiltrate SOF leaving a minimal footprint to ensure mission secrecy. **ET003, ET004, ET008, ET024**

39. Conduct Combat Casualty Care and Evacuation (CAP193).
Ability to organize, coordinate, and control the evacuation of severely injured patients, to include transload and mass casualty operations. **ET038**

40. Conduct Extrication Operations from Aircraft/Vehicles (CAP032).
Ability to remove people or equipment from a vehicle when damage to vehicle/equipment or danger of further injury to personnel prevents removal by normal exits and normal means. **ET024, ET058**

41. Conduct Missions in Austere Locations (CAP037).
Ability to conduct missions in locations not conducive to military operations, including urban areas, jungles, deserts, oceans, arctic, mountains, etc. Also includes ability to operate from austere areas including limited forward operating locations. Challenges may include lack of sanitation, hot or cold temperatures, limited safe water supplies, contaminated food sources, substandard billeting, and presence of diseases, etc**. ET073, ET077**

42. Conduct Operations in All Weather (CAP194).
Ability of the personnel and platforms to operate in all weather, including clouds, rain, snow, strong winds, turbulence, icing, heavy dust, blowing sand, etc. This includes the ability to perform the desired mission without the benefit of normal vision. **ET019**

43. Conduct Rapid Off-load/On-load (Personnel/Vehicles) (CAP038).
Ability to off-load/on-load SOF personnel and vehicles in the most expeditious manner possible under any environment. **ET073**

44. Conduct Self-Contained Takeoff, Approach, and Landing (CAP195).
Ability to takeoff, fly an approach, and land without use of external navigational aids or lighting and in adverse weather. **ET004**

45. Continuous Undetected Inter/Intra-team Communications (CAP125).
Ability of team members to communicate continuously via either voice or data without detection. **ET028**

46. Crash/Fire/Rescue (CFR) (CAP198).
Ability to provide CFR for aircraft and structures without interruption. **ET043**

47. Cultural Modeling and Simulation (CAP040).
Ability to use advanced high fidelity modeling and simulation techniques to accurately predict interactions with another culture. A cultural "what if" capability would assist in all facets of PSYOP and IO planning and assist SOF in developing and maintaining cultural awareness. **ET017, ET026, ET084**

48. Data Link Ground and Air Sensors (CAP199).
Ability to transfer and display ground sensor data on the aircraft and the ability to transfer and display air sensor data to the ground team. **ET056, ET076**

49. Data Manipulation (CAP355).
Ability to alter, capture, or load data without disruption of the target system data flow to support military or psychological operational goals. **ET085**

50. Deconflict and Coordinate SOF and Conventional Operations (CAP041).
Ability to deconflict and coordinate SOF and conventional operations to insure that SOF activities support the operational plan and to prevent fratricide. **ET033**

51. Deployed Community Health (CAP200).
The ability to deliver relevant dental health, fitness, mental health (to include stress management and suicide prevention), and tobacco cessation support to deployed AFSOF. **ET042**

52. Deployed Environmental Monitoring and Mitigation (CAP201).
The ability for medical personnel to detect, ascertain, and mitigate hazardous exposure with minimal human risk. **ET048**

53. Deployed Force Health Protection and Disease Management (CAP202).
The ability to prevent and limit disease effects on mission accomplishment, to include immunization with SOF-unique vaccines and population at risk (PAR)-based operationally relevant medical interventions. The ability to receive and use medical surveillance products to protect the PAR. **ET048**

54. Deployed Medical Communications (CAP203).
The ability to communicate medical and essential non-medical information from anywhere to anywhere. This involves a SOF-specific deployed medical communications backbone, real time voice and data transmission, signal acquisition, store-and-forward capability, on-site hardware/ software compatibility resolution capability, and ability to support covert operations. This includes novel adaptation, application, and fielding of known technologies. **ET075**

55. Deployed Medical Logistics (CAP204).
The ability to determine, anticipate, communicate, retrieve, and field required medical logistical support under all condition, any location. This includes novel adaptation, application, and fielding of established logistical solutions. **ET042, ET075**

56. Deployment Processing Automation (CAP205).
Ability to optimize and streamline deployments through automation of all personnel and equipment processing. Includes the ability to electronically access real-time Time Phase Flow Deployment Document (TPFDD) information and the status of deploying AFSOF from point of embarkation to the employment location. **ET057**

57. Designate Target in All Weather and All Light Conditions Undetected (CAP046).
Ability to designate or mark a target or objective for use/engagement by a weapons system/weapon in all weather/light/obscurant conditions without identifying the source of the designator/marker. **ET019, ET076**

58. Destroy Armored Vehicles (CAP047).
Ability to destroy armored vehicles. Accuracy should ensure that vehicles are hit with first round action and collateral damage is minimized in any environment, i.e., rural or urban setting. Speed of engagement should ensure accomplishment of mission objectives and protection of friendly forces. **ET019**

59. Destroy Chemical/Biological Targets (CAP206).
Ability to destroy above ground and lightly hardened chemical/biological storage facilities while minimizing or suppressing collateral damage due to venting or dispersing of agents into the environment. Accuracy and the use of agent defeat weapons (ADW) should ensure accomplishment of mission objectives and protection of friendly forces. **(ET019)**

60. Destroy Light Vehicles and Light Structures (CAP049).
Ability to destroy vehicles (trucks) and light structures (wood frame). Accuracy should ensure the target is hit with the first round and collateral damage is minimized. Speed of engagement should ensure accomplishment of mission objectives and protection of friendly forces. **ET019**

61. Destroy Medium Building (Cinderblock) (CAP050).
Ability to destroy medium buildings made from cinderblocks from beyond the ground-based threats' lethal range. Accuracy should ensure the target is hit with the first round and collateral damage is minimized. Speed of engagement should ensure accomplishment of mission objectives and protection of friendly forces. **ET019**

62. Destroy or Disable Targets Within Urban Areas (CAP088).
Ability to destroy/disable targets within an urban environment. Accuracy should ensure object is hit with first round/action and collateral damage is minimized. **ET019**

63. Destroy/Disable Information Operation (IO) Nodes (CAP051).
Ability to destroy/disable enemy equipment, facilities, and personnel through lethal or non-lethal means to corrupt or negate an adversary's capability to conduct. **ET005, ET086**

64. Detect and Track Moving Targets (CAP060).
Ability to detect and track multiple moving ground targets. Information can be generated onboard or supplied from off-board sensors. **ET019**

65. Detect, Sort, Locate, or Track Tactical Sensors (CAP061).
Ability to detect, sort, locate, and track friendly forces to assist the operator in engagement of an objective, target, or threat. **ET019**

66. Detection and Defense Against All Spectrum Threats (CAP207).
The ability of SOF personnel to assess, advise, and train host nation aviation forces to detect and defend against threats such as electrical-optical missile threats, airborne gun threats, radar missile threats, ground-based electro-optical (EO), antiaircraft artillery (AAA), and missile threats, infrared (IR), and missile threats, radar AAA, multiple moving ground targets, and acoustic/directed energy weapon (DEW) threats. This includes the ability to prevent detection/lock-on, to absorb damage, and defeat the directing threat before it engages. Also included are detecting passive and active sensors and tracking friendly and hostile airborne threats that exceed visual range. **ET033**

67. Device Fidelity (CAP208).
Ability to generate, in real time, perspective in multidimensional realistic scene displays with route and order-of-battle presentations to support full motion fly/drive/walk/swim/navigate through the mission operational battlespace considering time of day and other illumination characteristics. **ET062**

68. Disable Armored (Tank), Lightly Armored (APC), Light (Truck) Vehicles (CAP065).
Ability to disable hostile vehicles. Accuracy should ensure vehicle is hit with first round/action and collateral damage is minimized in any environment, i.e., rural or urban settings. Speed of engagement should ensure accomplishment of mission objectives and protection of friendly forces. **ET019**

69. Disable Personnel in Open or Within Wooden or Concrete Structures (CAP066).
Ability to non-lethally disable personnel in the open or within structures. Accuracy should ensure personnel are hit with first round/action and collateral damage is minimized in any environment, i.e., rural or urban settings. Speed of engagement should ensure accomplishment of mission objectives and protection of friendly forces. **ET019**

70. Disrupt Enemy Navigation Systems (CAP076).
Ability to deny the enemy use of his navigation systems through jamming or inserting false data. **ET005, ET085**

71. Disrupt Human Neural Pathways Through Non-Lethal Means (CAP067).
Ability to induce a desired human behavior to further military advantage. Encompasses non-lethal techniques for use in crowd control or incapacitation of an adversary. **ET019**

72. Distribute Malicious Code (CAP068).
Ability to distribute malicious code to attack, alter or disrupt adversary information systems. **ET085**

73. Distribute Physical Products (CAP360).
Rapid and precise dissemination of physical PSYOP products to target audience. **ET079**

74. Distribute Product Reception Systems (CAP359).
Distribute information systems (for example, radios) necessary for target audience to receive follow-on PSYOP products. **ET017**

75. Distributive Real Time Global SOF Collaboration (CAP209).
The capability to communicate and work collaboratively across the information transport systems to enable enhanced information operations activities. This includes technologies such as virtual collaboration tools, chat rooms, web portals, etc. **ET028**

76. Electromagnetic Interference Hardening (CAP069).
Ability of SOF aerospace platforms, sensors, and other equipment (ground or aerospace) to operate in electromagnetic interference (EMI) environments. These systems must continue to operate effectively when placed in proximity with other platform components or friendly systems, and during or following attacks by directed energy (i.e., high-powered microwaves, radio frequency radiation or lasers) or conventional weapons. **ET006**

77. En Route Mission Communications (CAP116).
Ability of passengers on SOF aerospace platforms to communicate both with the aircrew, clearly and without external emission during all mission profiles/events, and securely and clandestinely with stations external to the platform. **ET028**

78. En Route Planning (CAP071).
Ability to plan/re-plan/preview/rehearse missions while en route to the area of interest using systems compatible with ground-based mission planning/rehearsal systems. **ET001, ET002, ET003, ET004, ET008, ET019, ET024**

79. En Route Rehearsal (CAP072).
Ability to rehearse either preplanned missions or changes to missions while en route to the area of interest when operating either manned or unmanned systems. Must be compatible with ground-based mission planning/rehearsal systems. **ET001, ET019**

80. Engage Target at Standoff Ranges (CAP073).
Ability to engage a target identified by a ground party or other platform from a standoff range as required to meet mission requirements. **ET019**

81. Escape and Resistance (E&R) Kit Maintenance (CAP210).
Ability to assemble, issue, and track E&R kits to each mission participant prior to mission departure, and recover each kit following the mission. **ET044**

82. Establish Clandestine Assault Zones (AZ) Undetected (CAP075).
Ability to establish clandestine extraction, landing, or drop zones. While establishing the AZ, ground parties must be able to provide acquisition, guidance, or control information while assuring secrecy and concealment. **ET001, ET021**

83. Evasion Plan of Action (EPA) Preparation Support (CAP213).
Ability to assist in developing EPAs. This includes providing planners with applicable escape and resistance (E&R) data. **ET044**

84. Explosive Ordinance Disposal (EOD) Missions (CAP212).
Ability to detect, identify, gain access, recover, render safe, and dispose of all US and all foreign chemical, nuclear, biological, and explosive ordnance that poses a threat to personnel, property, or the environment. Clears operating areas of emplaced, dropped, or projected explosive ordnance, which hamper SOF combat operations. Gains access to and renders safe improvised or homemade explosive devices and weapons of mass destruction (WMD). **ET043**

85. Explosives Detection (CAP214).
Ability to inspect vehicles for explosives, regardless of size or type, entering, and exiting deployment locations. **ET046**

86. Field Expedient Expansion of Medical Benefit (CAP216).
The ability to tailor medical support in theater, to include redeployment, asset dispersion/reconstitution, expansion of in-theater medical services. The ability to efficiently and effectively use the electronic medical record in the deployed setting. The ability to monitor deployed AFSOF medical personnel activity and benchmark performance. **ET045**

87. Field Personnel Engineering Equipment Training (CAP218).
Ability to ensure fielded personnel can employ engineering support equipment to execute site operations. **ET051**

88. Force Beddown Equipment Deployment (CAP220).
Ability to quickly deploy and setup site operating equipment, vehicles, and facilities to support fielded personnel, based on mission, unit size, deployment date, and employment duration. Items include mobile arresting systems, Alternate Launch and Recovery Surface (ALRS), emergency lighting, power generators, water purification and distribution, runway construction and repair, and expeditionary base operating support facilities. **ET051**

89. Forecast Resource Protection Information (CAP222).
The ability to provide resource protection information at fixed and forward operating locations. This includes the ability to provide accurate forecasts of tornadoes, lightning, hurricanes, high winds, and temperature extremes. **ET081**

90. Foreign Aviation Operations Mission Planning and Rehearsal (CAP078).
Ability to conduct mission planning and to rehearse likely interactions with foreign aviation forces simulating the use of their equipment in their environment and language prior to deployment. **ET033, ET077**

91. Foreign Language Material (CAP226).
The ability of SOF personnel to translate, summarize, and interpret foreign language material using learned language skills and/or where appropriate using automated processing tools, with a high degree of accuracy and in real time. **ET022**

92. Formation/Rendezvous in Adverse Weather (CAP228).
Ability of aircraft to fly formation at all altitudes in adverse weather (including clouds, rain, snow, strong winds, turbulence, icing, heavy dust, blowing sand, etc.). This implies the ability to station, keep, and maintain situational awareness of other aircraft while en route or in a terminal area without the benefit of visual contact. **ET002, ET003, ET004, ET008, ET024**

93. Fuel and Cryogenics Products (CAP229).
Ability to maintain clean, dry, quality jet fuel, ground fuel, and cryogenics products. Ability to provide, on specification, fuel and cryogenics products to weapon systems, vehicles, and ground support equipment by receiving, storing, distributing, and accounting for all fuel. Ability to inspect and ensure maintenance of all fueling systems. Ability to provide forward area refueling point (FARP) capability to any forward covert or overt battlefield area. **ET070**

94. Fuel-Efficient Ground Systems (CAP080).
Ability of AFSOF systems to more effectively use fuel to increase range and/or reduce consumption of fuel sources (batteries, petroleum products, etc.). May include alternate and/or renewable fuel sources. **ET013, ET063**

95. Fuel-Efficient Platforms (CAP079).
Ability of AFSOF aerospace platforms to make efficient use of fuel. **ET013, ET063**

96. Full-Spectrum Deployed Medical Care (CAP230).
The ability to receive, detect, decontaminate, and assess NBC/TIM exposed personnel. The ability to diagnose, treat, and stabilize these patients with illness/injury which may range from minimal to life-threatening, under all conditions, in semi-permissive/permissive

environments, from remote bare base areas. The ability to competently diagnose and treat uncommon illness/injury in unusual settings. The ability for medical personnel to remotely monitor and intervene. The ability to reduce the footprint of medical administration on deployed medical operations, while enhancing the quality of that service. **ET029**

97. Fuse Information from Multi-sensors for Ground Teams and Aircrews (CAP081).
Ability to fuse information from multiple sensors operating in various spectral bands via a lightweight data management/interface tool to provide friendly forces (ground teams and aircrews) with high confidence and fidelity information to enhance operational decision making. **ET001, ET014, ET019, ET024, ET056, ET058**

98. Geospacial Information and Services (GI&S) (CAP231).
Ability to produce and disseminate geospacial information. This includes maps, charts, and geodesy (MC&G), imagery, and other products; and provides the basic framework for battlespace visualization. GI&S must be disseminated in the formats and media compatible with mission planning and rehearsal systems. GI&S products must provide worldwide coverage, be highly accurate, timely, current, and tailored to specific mission and platform requirements. **ET053**

99. Global Communications (CAP082).
Ability to communicate (voice and data) using unencrypted, encrypted, and clandestine methods to and from any place on the earth without regard for time of day, null zones, skip zones, or other environmental barriers to communications transport technology. This includes intra- and inter-aerospace platforms. The ability to implement the Global Information Grid architecture and modernize the ground, airborne, and space information transport infrastructure to meet warfighter requirements. **ET028**

100. Gust Sensitivity/Alleviation (CAP086).
Ability of SOF aerospace platforms to automatically compensate for unanticipated wind gusts or turbulence to increase safety and performance. **ET019**

101. Hologram Projection (CAP089).
Ability to project a visual image to an intended audience through long-range physical projection. **ET017**

102. Human Performance Enhancement (CAP077).
The ability to extend human performance to meet mission requirements. This includes disaster management team (DMT)/mission rehearsal/ threat mapping for significant human weapon system issues, to include night vision, laser eye/personal sensor protection, body armor (aircrew and ground operators), and other countermeasures against environmental and altitude/diving related problems, fatigue, circadian dysfunction, spatial disorientation, and decreased situational awareness.

The ability to conform, adapt, and accommodate operator platforms and equipment to gender, stature, and other conditions which limit human performance. **ET048**

103. Identification Friend or Foe (CAP090).
Ability to clandestinely or passively discriminate and identify friendly, neutral, and hostile forces (individually). The capability should be automatic, operate in all environments (including urban), and should not hinder ground forces operations. Capability must integrate into existing and future fire support/suppressive fire platforms, and may include the use of marking devices by friendly forces. **ET047, ET056**

104. Identify Objects under Ground (Bunkers/Tunnels) (CAP092).
Ability to detect underground bunkers and tunnels, which may be used by hostile forces. **ET019, ET056**

105. Identify One-Foot Objects in All Weather/Light/Obscurant Levels (CAP093).
Ability to detect and identify a one-foot object through weather, obscurants (smoke/haze), in all light conditions, under a tree canopies and under camouflage/concealment (includes radar, and IR scattering nets as well as visual camouflage netting) from beyond the expected ground-based threats' lethal range. Ability to distinguish armed versus unarmed personnel, target identification, and discrimination such as privately owned vehicles (POVs) versus military vehicles, windows, or other small features on buildings. Ability to see one-foot objects in an urban environment consisting of dense, five-story buildings or less, and high-rise buildings greater than six stories. **ET019, ET056**

106. Identify One-Foot Objects Within Dense High-Rise Urban Areas (CAP087).
Ability to identify objects as small as one foot within an urban environment. **ET019**

107. Improved Non-Destructive Inspection (NDI) Techniques (CAP239).
Ability to detect and confirm cracks and defects more efficiently in current and future materials on all AFSOF platforms during on and off equipment inspections. **ET063**

108. Incapacitate/Kill Personnel in the Open or in Revetments (CAP094).
Ability to incapacitate/kill personnel in the open or in revetments or behind small structures. Accuracy should ensure personnel are hit with first round/action and collateral damage is minimized in any environment, i.e., rural or urban settings. Speed of engagement should ensure accomplishment of mission objectives and protection of friendly forces. **ET019**

109. Individual Locator (CAP095).
Ability to identify and locate each individual at all times during all operations. **ET047**

110. In-Flight Recovery (CAP119).
Ability of an AFSOF aerospace platform to in-flight recover (at cruise, not hover speed) payload from a specific location on the ground or in the water (not AIE). **ET004, ET024**

111. In-Flight Refueling (Receiver) (CAP034).
Ability for AFSOF aircraft to receive fuel in flight. **ET002**

112. Information Life Cycle (CAP240).
The ability to manage information as a strategic resource throughout its life cycle (requirement, creation, storage, maintenance, dissemination, and disposition) to include information management (in a Global Information Grid environment) policy; data standards and management; and information requirements that are based on reengineered Air Force and AFSOC core business processes. This includes the ability to provide improved information management through the use of virtual network-enabled workflow management and transparent, automatic electronic records management. **ET028**

113. Information Operations (IO) Threat Analysis (CAP250).
Ability to provide accurate and timely intelligence in support of IO tasks, such as maintaining databases for nodal analysis and assessing foreign capabilities. **ET049**

114. Information Protection (CAP241).
The ability of SOF personnel to apply protection characteristics across the information spectrum to identify, analyze, protect, and control critical information. **ET072**

115. Information Tailored to Need (CAP243).
Ability for commanders and warfighters to receive relevant knowledge when and where they want it from source to user in near real time. Computing infrastructure will advance to be able to store, correlate, and intelligently fuse the mountains of data collected to provide commanders and warfighters with an actionable understanding of the operating environment. **ET063**

116. Intelligence Assessments (CAP244).
Ability to disseminate tailored, timely, and accurate intelligence information and provide analytical evaluations of the current situation, threat, force protection issues, and course of actions (COAs) to commanders, staff, mission planners, and deploying personnel. **ET045**

117. Intelligence Reports Submission (CAP246).
Ability to transmit intelligence information and data to higher headquarters and other units. Examples include mission reports (MISREP) and intelligence reports (INTREP). Need the ability to automate this process in the future. **ET054**

118. Intelligence Resources Review (CAP247).
Ability to immediately access and process updated intelligence products and databases to determine applicability of intelligence information to current mission tasking. **ET065**

119. Interactive Display of Operational Battlespace (CAP249).
Ability to compile operational battlespace information, data, graphic, imagery, and command products available for interactive display of terrain, topography, weather, enemy, friendly, and neutral forces. **ET061**

120. Intruder Detection (CAP152).
Ability to correct or minimize vulnerabilities to detect, sound and/or receive alarm, respond, discriminate and/or neutralize forces that are hindering, targeting, or moving against AFSOF and resources in any environment. **ET011, ET064**

121. Intrusion (CAP354).
Ability to access target information system support facilities or nodes for data manipulation or placement of physical/electronic attack devices supporting military or psychological operations goals. **ET005, ET017, ET023, ET085, ET086**

122. Intrusion Countermeasures (CAP101).
Ability to trace the source of an information attack and characterize it. **ET006, ET010, ET023**

123. Isolated Personnel Report (ISOPREP) Maintenance (CAP251).
Ability to prepare, maintain, and update individual escape and resistance (E&R) information for all personnel subject to flight or participation in a combat mission. **ET044**

124. Jam Enemy Weapons (ECM) (CAP356).
Defend against enemy weapon systems by jamming or inserting false data into information systems. **ET006**

125. Jam Information Systems (CAP103).
Ability to degrade adversary information systems, preventing uninterrupted information system communications in all mediums (air-to-air, air-to-ground, and ground-to-ground). **ET005, ET085**

126. Joint Security Modeling Capability (CAP252).
Ability to provide a computer-based analytical tool to assist personnel responsible for planning and conducting force protection operations. Consists of battlefield simulation training and field leadership training for commanders. **ET046**

127. Just in Time (JIT) Medical Initiatives (CAP253).
The ability to rapidly develop, test, evaluate, field, and temporarily sustain novel medical technologies for rapidly evolving operational requirements. **ET075**

128. Language Translation (CAP017).
Ability to translate real time from one language to another language, in audio, text, code or other medium in support of all mission areas. **ET026, ET085**

129. Lethal and Non-Lethal Protective Equipment (CAP254).
Ability to provide protection equipment and training for security forces from lethal and non-lethal weapons. **ET064**

130. Life Support Equipment and Training (CAP010).
Ability to train and equip AFSOF and passengers to support operations globally, to include personnel recovery procedures and equipment, parachutes, survival vests, anti-exposure suits, nuclear, biological, or chemical (NBC) equipment, night vision goggles (NVGs), and laser eye protection (LEP). **ET055**

131. Logistics Command and Control (LOG C2) (CAP255).
The ability to use deployable, secure, and portable information and decision support tools to provide the JSOACC with real time integrated support and command and control of logistics resources. The ability to establish lines of communication (secure and non-secure) with higher headquarters, home station, the deployed location, and any other functional areas to ensure a rapid and instantaneous flow of information. This includes the ability to establish initial control of deployed resources and the capability to perform reach-back. **ET057**

132. Low Observable Deployment Packages (CAP257).
Ability to deploy bare base packages engineered with low observable technology. The packages must be easily maintained and require significantly reduced airlift from existing bare base assets. **ET057**

133. Mail Inspection/Detection Capability (CAP258).
Ability to provide a sanitized/computerized detection staging area, which will detect explosives, weapons (e.g., metallic and nonmetallic) and NBC hazards prior to entering the base. **ET046**

134. Medical Care on SOF Mobility Aerospace Platforms (CAP263).
Provide Special Tactics operators a suitable environment to administer medical care to recovered personnel or casualties while onboard SOF Mobility aerospace platforms. This capability includes the ability to on-load non-ambulatory patients from all types of terrain. **ET024**

135. Medical Evacuation (CAP265).
The ability to receive, evaluate, monitor, sustain, and report on casualties while in transit on any platform (AFSOF or other), under all conditions, in semi-permissive/permissive environments, until transfer to definitive care or suitable medical evacuation. The ability to plan, request, coordinate, and execute medical evacuation from deployed setting. **ET029**

136. Medical Interoperability (CAP266).
The ability to import, create, or modify essential medical sources of oxygen, water, power, and blood. The ability to adapt and use other SOF and conventional medical assets. The ability to operate independently from deployed AFSOF base operating support (BOS). **ET029**

137. Medical Reachback Expertise (CAP267).
The ability to ascertain, shape, and retrieve patches to provide timely fill for knowledge or capability gaps in deployed medical teams. This includes remote instantaneous language translation, use of artificial intelligence to anticipate and shape needs, and operational telemedicine. **ET075**

138. Medical Skills Sustainment (CAP268).
The ability to inculcate and sustain required deployed medical skills in both fixed base and bare base environments. **ET075**

139. Minimal Risk Delivery of Psychological Operations Products (CAP106).
Ability to deliver a given psychological operations product to the intended audience without placing personnel in harm's way. **ET017**

140. Mission Debriefing (CAP269).
Ability to debrief AFSOF personnel to extract valuable, time-sensitive information following a mission. Debriefings must incorporate onboard data downloaded into compatible data transfer device. Need the ability to automate this process in the future. **ET054**

141. Mission Planning and Rehearsal (CAP108).
Ability to plan and rehearse missions. Planning and rehearsal should be fully automated, rapid, of high fidelity, and allow for future technological advances. It should display, from the crew/team's perspective, all planned profiles and events. Mission folder generation should be automated and support data transfer to all AFSOF aerospace platforms. **ET033**

142. Mission Planning Automated Tools (CAP270).
Ability to use automated mission planning tools to develop, disseminate, and print required mission preparation and execution materials. Mission planning includes route planning and generation, resource allocation, weapons munitions, demolition planning, development of decision/ execution matrixes, and system performance characteristics. **ET061**

143. Mission Planning Data Transfer (CAP271).
Ability to transfer all planned mission execution data to include charts, route navigational data, battlespace data, communications data, synchronization matrices, and weapons planning/engagement data to all AFSOF platforms. **ET061**

144. Mission Planning Threat Assessment (CAP273).
Ability to evaluate the location and assess the effects of enemy, friendly, or neutral threats considering threat characteristics, terrain, environmental, aircraft radar cross section, and target aircraft performance. **ET061**

145. Mission Preview (CAP274).
Ability to generate, in real time, multi-dimensional realistic scene displays with route and order-of-battle presentations to support fly/drive/walk/swim/navigate through the mission operational battlespace considering time of day and other illumination characteristics on portable, deployable mission planning hardware. **ET061**

146. Mission Prosecution in Austere Environment (CAP275).
Ability to conduct missions in locations not conducive to military operations, including urban areas, jungles, deserts, oceans, arctic, and mountain. Also includes the ability to operate from austere areas including limited forward operating locations. **ET014, ET024, ET047, ET058**

147. Mitigate Propulsion Footprint (CAP109).
Ability to mitigate propulsion footprint of AFSOF platforms, i.e., heat and jet exhaust effects. Allows personnel to operate in close proximity to engines and helps to prevent detection of platforms during or after operations on the ground. **ET063**

148. Mobility En Route Planning (CAP361).
Ability to plan/re-plan/preview/rehearse missions while en route to the area of interest using systems compatible with ground-based mission planning/rehearsal systems. **ET002, ET003, ET004, ET008, ET024**

149. Mobility Navigation (CAP277).
Ability to precisely navigate aerospace platforms to employ ground personnel and equipment at a required position in time and space. Navigation cueing and guidance must be able to use all-source, synthesized information, with or without external emissions/sources. **ET002, ET003, ET004, ET008, ET024, ET061**

150. Mobility Physiological/Environmental Protection (CAP276).
Capability to protect crews/cargo/passengers from physiological/ environmental effects. This includes protection from the effects associated with altitude and environment and aircraft induced stress. **ET002, ET003, ET004, ET008, ET024**

151. Move and Process Information (CAP105).
The ability to provide a secure, stable, available, load balancing, robust information transport mechanism. This provides the ability to transfer information globally and on-demand. Ability to handle and process large amounts of data (e.g., terabytes) in near real time. The ability to process and deliver the right information (voice, data, video, and imagery) at the right time, to the right place, and in a form that is useful to the user effectively and efficiently globally. This includes moving information regardless of transport medium, environment, or information type; and processing information from diverse information sources and data bases, to include delivery, distribution, and format presentation. Includes ability to easily interact with, broker, manipulate, and display data from multiple sources such as data mining and data warehousing. Ability to dynamically manage the transport layers of the infrastructure to ensure an available bandwidth access on a priority basis for forward deployed forces. **ET028**

152. Multisimulator Integration (CAP278).
Ability to link multiple USSOCOM/AFSOF simulators to provide a realistic multi-aircraft simulation of one or many combat operations. **ET062**

153. Munitions Management (CAP279).
The ability to provide accountable combat ready munitions and maintenance in a timely manner. **ET063**

154. Navigate Precisely (CAP110).
Ability to navigate precisely, i.e., to place aerospace platforms/ground personnel at a desired place and time. **ET019**

155. Nuclear, Biological, and Chemical (NBC) Environment Operations (CAP115).
Ability to operate in an NBC-contaminated environment. The platforms, equipment, and personnel must be protected, able to successfully complete their missions, and be decontaminated within the time available in the normal operational cycle. Additionally, need the ability to train all personnel in the use of NBC protective equipment. **ET043**

156. Near-Real-Time Access to Intelligence Information (CAP111).
Ability to access, in near real time, intelligence and geospatial information and services (GI&S). Must have robust, secure, reliable, connectivity with national, theater, and service intelligence organizations. **ET065**

157. Near-Real-Time Situational Awareness and Threat Warning (CAP112).
Ability to receive and provide timely and accurate warning of potential enemy threats and/or enemy posture and possible intentions. Includes real time information provided to the warfighter on demand, or continuously updated for rapid adaptation to changes in the battlespace. Information from various intelligence disciplines may be fused to form the threat picture and conveyed to tactical users via audio, video, or data links during mission execution**. ET053**

158. Negate Enemy Threat to Mission Accomplishment (CAP281).
Ability to avoid enemy detection, tracking, and engagement in any spectrum during all mission phases. Techniques and capabilities to assess enemy activity through multi-spectral sensing/fusing of global data, and the collation, correlation, processing/transmission/ reception and display of derived situational relevant information to the aircrew are required. Abilities and capabilities of the aircraft, crew, and systems will include insights into enemy C3 nodes including those monitoring passive detectors and will synthesize voice, radio frequency (RF), and *proforma* activities to allow avoidance/negation of positive detection, tracking, and effective engagement of enemy total capabilities. The ability to defeat lethal threats is included and comprises the ability to defeat all systems in detection, track, guidance phases of attack and allows for countermeasures in passive, deception, jamming, or physical counterattack (electronic/EO/DEW) schemes. **ET002, ET003, ET004, ET008, ET024**

159. Non-Lethal Weapons/Munitions for Security Forces (CAP282).
Ability to provide less than lethal and non-lethal options for force protection. **ET039**

160. Nuclear, Biological, and Chemical (NBC) Threat Characterized (CAP022).
Ability to detect, identify, and warn personnel of the presence/absence of nuclear material and biological, and/or chemical agents to include toxic industrial material (TIM). **ET017, ET043**

161. Obstacle Clearance Operations (CAP113).
Ability to remove obstacles to flight operations from an aircraft movement area. **ET021**

162. Passive Detection/Characterization (CAP117).
Ability to detect and characterize the adversary threat environment while remaining undetected, either automatically during mission execution or at long range with the goal of identifying adversary actions as they occur. **ET084**

163. Personnel Security (CAP287).
The ability of SOF and host nation personnel/platforms to determine if an active or passive sensor or threat has detected or targeted them. This includes the ability to distinguish between friendly, neutral, and hostile forces. **ET011**

164. Personnel/Equipment Locator Capability (CAP288).
Ability to identify, locate, and communicate without restriction with personnel/equipment during a recovery operation without compromising the mission. **ET024**

165. Place/Recover Sensors/Beacons/Navigation Aids (CAP289).
The ability to place, operate, and remove sensors, beacons, or navigation aids. **ET021, ET037, ET076**

166. Portable Ground Surveillance System (CAP291).
Ability to direct aircraft and vehicle movement on the ground without the ability to see the aerodrome due to weather or other obscuration. **ET038**

167. Post Strike Assessment (CAP292).
Assess the effectiveness of a strike to determine if the degree of desired destruction/suppression has been obtained or if further strikes are required to meet the operational objective. **ET037, ET076**

168. Produce Physical Product (CAP357).
Rapidly produce PSYOP product (leaflets, etc.) in forward areas for dissemination to a target audience. **ET026**

169. Protect and Defend Friendly Information Systems (CAP121).
Ability to protect and defend friendly information systems. Includes information protection, preserving the ability to receive, analyze, and disseminate information, and active and passive defensive measures to protect friendly systems from physical or cyber attack. **ET010**

170. Protective Capability for Dog Teams (CAP294).
Ability for working dog teams to operate and survive in all environments to include NBC. **ET060**

171. Provide Area Suppression (CAP124).
Ability to disable personnel or suppress weapons capable of employing direct fires against the SOF being protected. Accuracy should ensure targets are hit with first round/action and collateral damage is minimized in any environment, i.e., rural or urban settings. **ET019**

172. Provide Covert Illumination (CAP126).
Ability to provide covert illumination in support of night ground operations or augmentation of sensors. Includes wide area illumination and spot designation. **ET024, ET058**

173. Provide Defensive Suppressive Fires (CAP123).
Ability to employ weapons for the required on-station time without exceeding weapons limitations or availability of ammunition supplies. **ET004, ET019, ET0024**

174. Provide Information Assurance (CAP296).
Provide the capability to protect Air Force and SOCOM networks and information systems through an Air Force and SOCOM-wide "defense in depth" program that keeps our networks operationally ready, makes them impervious to information attack, and ensures the confidentiality and integrity of information. **ET070**

175. Provide Weather Observations to SOF (CAP134).
Ability to measure, prepare, and transmit weather data from all environments. Weather data will be collected for infiltration/exfiltration routes, target, hide site, escape and evasion, and low-level refueling areas. Examples of data include, but are not limited to, surface and altitude wind speed and direction, temperature, barometric pressure, visibility, cloud cover, ceiling, and humidity. Transmission of data should be secure and undetectable. **ET014**

176. Rapid Deployment (CAP136).
Ability to deploy AFSOF from home station to any location within 24 hours. **ET013, ET057**

177. Readiness Spares Packages (CAP297).
Ability to prepare, receive, store, issue, maintain, protect, and reallocate supplies for required weapon systems per MRSP/IRSP Authorization Document. Ability to deploy, employ, and re-deploy in support of AFSOF globally. **ET070**

178. Real-Time Edit/Produce (CAP137).
Ability to modify, adjust, or produce a message to accommodate the changing environment or target behavior in near-real-time. **ET026**

179. Real-Time Weather Data Availability (CAP298).
The ability to make current weather observation data available to the warfighter in real time. **ET080**

180. Realistic Initial and Recurring Training (CAP299).
Ability to conduct initial/recurring training in a realistic environment using simulation and other means. **ET027**

181. Receive Mission Changes Real-Time/Automatic System Updates (CAP139).
Ability to receive mission changes in near real time, to include route of flight, timing, target, threats, scenario, etc. Includes automatic reception and processing of information, and on-demand transmission of the latest information and electronic countermeasures (ECM) software changes to onboard systems. Route of flight information would include new coordinates, charts, waypoints, and significant route information. Timing information would also include execution checklist changes. Target information would include updated coordinates, ground unit information, target photos, target desired mean points of impact (DMPIs), target defenses, and collateral damage restrictions. **ET001, ET019, ET033**

182. Receive PSYOP Product in Timely Manner (Electronic/Physical) (CAP358).
Timely reception or delivery of PSYOP product to dissemination system for rapid distribution to target audience. **ET087**

183. Recovery Operations (CAP300).
The ability of SOF personnel to use host nation recovery capabilities to include tactical communication and survival, evasion, resistance, and escape (SERE). **ET073, ET074**

184. Remote Intrusion/Access (CAP141).
Ability to remotely gain undetected access into various adversary media or communications and information processes. **ET005, ET017, ET023, ET085**

185. Remote Monitoring and Control of Enemy Support Systems (CAP142).
Ability to remotely monitor and/or control adversary military and civilian information systems for military advantage. This includes information systems controling military and civilian infrastructure, such as power, communications, and physical distribution systems. **ET023, ET085**

186. Remote Perimeter Surveillance (CAP301).
Ability to perform perimeter reconnaissance and surveillance without exposing security forces to hostile fire. **ET036**

187. Remote Weather Sensing (CAP302).
The ability to obtain weather observations in an austere or tactical environment, with or without human presence. This includes remote sensing of the battlefield, weather sensors mounted on UAV platforms, and satellite soundings. **ET080**

188. Remotely Access Computer Networks (CAP143).
Plug and play instant global access to computer networks. **ET028**

189. Request for Information (RFI) Generation (CAP306).
Ability to generate, validate, and submit requests that are transmitted to collection management authorities at higher headquarters for satisfaction. Ability to track requests to ensure requestors receive timely and accurate intelligence prior to, and during, mission execution. **ET015**

190. Request for Information (RFI) Requirements Identification (CAP304).
Ability to review essential elements of information (EEIs) and assist mission planners in identifying intelligence information requirements and gaps that affect their specific mission. **ET015**

191. Restricted Area/Unimproved Surface Operations (CAP305).
Ability to takeoff, operate, and land AFSOF aerospace vehicles from restricted size areas. This includes surfaces that are soft, uneven, and possible contaminated with debris. **ET003, ET004, ET008, ET024**

192. Seamless Coverage (CAP308).
Ability to provide seamless coverage of an objective area for the duration of an operation. Ability to employ weapons for the required on-station time without exceeding weapons limitations or availability of ammunition supplies. **ET019**

193. Seamless, Integrated Logistics Information Systems (CAP309).
Ability to share data elements and functions within an integrated logistics information system responsive to AFSOF needs. **ET057**

194. Search for, Acquire, and Evaluate Objective Areas (CAP145).
Ability to search for and acquire an objective area using visual, electronic, or other means. After finding objective area, determine and evaluate the ability of that area to support mission goals. **ET001, ET014, ET037, ET056**

195. Secure Network (CAP146).
Ability to securely network friendly command, control, communications, computers, intelligence, surveillance, and reconnaissance capabilities to preclude and trace adversary information operations attack while protecting friendly information systems/networks and enhancing friendly command, control, communications, and computers. **ET010**

196. Security Forces (SF) Simulators (CAP310).
Ability to conduct realistic firearm training through use of simulation. SF personnel must maintain the ability to rehearse in a realistic environment. **ET039**

197. Self/Team Protection (CAP147).
Ability to exercise team and self-protection skills including fieldcraft and physical fitness as well as survival, evasion, resistance, and escape (SERE). Fieldcraft includes small arms weapons employment, precision

land navigation, deployment site preparation and security, communications equipment operation, and individual communications skills. **ET077**

198. Self-Protection Sensors (CAP311).
Ability for individuals to detect threats and defend themselves using multi-spectral/fused sensors from both personal and aerospace systems to highlight approaching hostile individuals, nuclear, biological, and chemical (NBC) dangers, and other explosive and ballistic threats. **ET047**

199. Self-Repairing/Self-Healing Transport Networks and Data Bases (CAP148).
Ability of a network/database to automatically self-repair, recognize attack, and initiate appropriate repair programs and instructions to reconstruct and preserve data integrity. **ET028**

200. Sensitive Compartmented Information (SCI) Management (CAP312).
Ability to support all matters concerning SCI security. Ability to oversee the execution of command policy with regard to information security. In addition, the ability to use and disseminate SCI material and design, develop, test, and integrate intelligence information systems to ensure overall security requirements are met. **ET050**

201. Sensor Simulation (CAP313).
Ability to simulate sensor views of aircraft, maritime, and ground sensors. This will allow operators to replicate a particular view or sensor/system reaction for an actual piece of mission equipment at a given point in the mission, for the actual conditions expected during mission execution. **ET061**

202. Site/Location Information (CAP315).
Ability to electronically access on-line, real time information on the capability of any beddown location globally. **ET057**

203. Situation Displays (CAP316).
Ability to monitor and assess events and projections of the operating environment to show relevant information to the commander and staff. Selectable views will encompass global-, theater-, force-, mission-, and engagement-levels of assigned missions, capabilities, and constraints. **ET063**

204. SOF-Specific Medical Capability (CAP151).
Ability to provide medical care in austere or denied territory under any environmental condition without detection of the patient or treatment provider. Austere environment is defined as lacking natural food, water, and environmental protection such as desert or ice pack. Harsh environment is defined as inhospitable areas, such as jungle, mountain or nuclear, biological or chemical contaminated areas. **ET024, ET029, ET058**.

205. Space Derived Data Dissemination (CAP318).
The ability to disseminate analyzed space products in a useful format. The capability of being incorporated into the mission planning systems and/or systems utilized during the execution phase of an operation with little or no human intervention. The ability to provide data directly to the aircraft/ground operator. **ET066**

206. Space Derived Data Processing, Display, and Analysis (CAP319).
The ability to process and display space derived information for mission planning analysis and execution. The ability to provide full space support to low visibility operations. **ET066**

207. Space Derived Data Retrieval (CAP320).
The ability to receive space data from any space source. This requires both the ability to receive raw and processed data directly from sensor satellites (broadcasts) as well as through terrestrial network architectures to space databases. Data may be received directly in aerospace platforms, ground operators, or command and control nodes. **ET066**

208. Special Tactics (ST) Ingress/Egress Undetected (CAP324).
Ability to avoid detection in any spectrum of observation during ingress and egress and in the target area. Includes ability to use air, land, and water infiltration/exfiltration techniques. This includes ST's ability to transition from an aerospace environment without aircraft ATC signature change or increased vulnerability. **ET047**

209. Special Tactics Conduct Mission Planning/Coordination in Denied Area (CAP085).
Ability for SOF ground personnel to plan and coordinate missions or mission changes while in hostile or denied territory. **ET047**

210. Speed Agility (CAP153).
Ability of SOF aircraft to achieve high cruise speeds while maintaining the capability to takeoff, operate, and land (includes hover and/or vertical landing modes) in a restricted size area. Cruise speed must allow global range and be compatible with CAF aircraft. **ET003, ET004, ET008, ET024, ET034**

211. Standardized Information Systems and Processes (CAP325).
Ability for all SOF C2 centers, from squadrons up to JSOTF, to seamlessly pass information using standard systems (i.e., Theater Battle Management and Control System (TBMCS) or data formats (i.e., United States Message Text Format (USMTF)) while performing similar functions of monitoring, assessing, scheduling, planning, and executing will dramatically enhance SOF operational efficiency. **ET063**

212. Survivability and Combat Damage Management (CAP326).
Ability for aerospace platforms and onboard personnel to absorb, negate, or withstand combat damage resulting from successful engagement by all enemy weapons. Ruggedness, onboard diagnostics, self-repair,

hardness, and redundancy should allow the aerospace platform and onboard personnel to complete the mission. **ET002, ET003, ET004, ET008, ET024**

213. Synchronized Air and Ground Grid Reference System (CAP328).
Ability of ground and air systems to communicate point locations on a standard grid system having an error of less than one meter between air operator and ground operator derived coordinates. **ET001, ET056, ET076**

214. Tactical Airland Cargo Operations (CAP329).
Ability to load or unload personnel, cargo, or vehicles in an expeditions manner without the aid of material handling equipment. Loading operations may be conducted with engines running or shut down. Rapidity of on-load or off-load is driven by the individual mission tasking and may require operations to be conducted in a matter of seconds. **ET004**

215. Tactical Data Burst Communication (CAP330).
Ability to direct aircraft for both air traffic control and weapons employment via secure, anti-jam, and data burst. **ET038**

216. Tactical Surprise (CAP331).
Ability to launch from any location and achieve tactical surprise anywhere in the world (possible solutions include speed, deception, and masking). **ET002, ET003, ET004, ET008, ET024**

217. Target Designator Visual Verification (CAP332).
Ability to use some visual aid to see the target designator from an aircraft or ground force. **ET019, ET056, ET076**

218. Team Workload (CAP156).
Ability of the team (ST) to accomplish their jobs in a timely and accurate manner while avoiding task saturation or degradation of situational awareness. Emphasis should be placed on aiding team preparation and conduct of operational missions. **ET014, ET021, ET024, ET058**

219. Threat and Penetration Analysis (CAP333).
Ability to determine the capabilities and vulnerabilities of an adversary and the most effective way to exploit their weaknesses. Threat and penetration analysis provides the basis for detailed mission planning and defense suppression. **ET052**

220. Threat Disposition (CAP334).
Ability to provide commanders, staff, and mission planners with timely and accurate threat data that identifies the strength, command structure, and disposition of personnel, units, and equipment of any military force. This threat data must be provided to the levels of detail required by AFSOF. **ET052**

221. Transfer Patients to Evacuation Vehicle (CAP336).
Ability to transfer a severely injured patient and ST personnel from all environments to airborne, water or ground transportation quickly and without additional injury. **ET024, ET058**

222. Transmit Threat Updates Real-Time (CAP157).
Ability to transmit threat updates in real time as they occur. This information should be capable of being transmitted automatically with or without user query. **ET028**

223. Undetectable Sensor Operations (CAP158).
Ability to perform undetectable sensor operations. Any sensors used should be undetectable to the enemy. This includes any active transmission or passive emissions. **ETO12, ET037**

224. Unrefueled Intratheater Mission Execution (CAP161).
Ability to execute missions anywhere within a theater of operations without refueling. A vehicle can achieve increased range by various methods, including more internal fuel, more external fuel, more efficient cruise capability, or better access to the objective. **ET019**

225. Unrestricted Range (CAP337).
Ability for AFSOF aerospace platforms to possess unrestricted range. This capability can be achieved by both high speed and endurance. **NOTE:** Endurance is partially addressed by air refueling. **ET002, ET003, ET004, ET008, ET024**

226. Video Morphing Real-Time (CAP164).
Ability to intercept, change, and rebroadcast visual information. **ET026**

227. Virtual Reality Modeling and Simulation (CAP166).
Ability to use advanced high fidelity modeling and simulation techniques to accurately portray the target environment and predict target response behavior or reaction to planned operations. **ET062**

228. Virtual Spoofing (CAP165).
Ability to provide false inputs to reconnaissance and surveillance systems to aid friendly military operations and security, and to counter adversary intelligence, surveillance, and reconnaissance capabilities. **ET085**

229. War Reserve Materiel (WRM) Visibility (CAP340).
The ability to electronically access real time information on the type, quantity, location, status, and availability of all assets at designated war WRM storage locations. **ET057**

230. Weapons Systems and Imagery Data Processing (CAP341).
Ability to conduct an initial review of post-mission threat downloads from aircraft avionics or other weapons systems and disseminate in proper formats for further analysis. Ability to review recorded imagery data to assess mission effectiveness. **ET054**

231. Weather Condition Predictions (CAP343).
The ability to accurately predict the future condition of the atmosphere and solar weather phenomena, on any scale, and for any timeframe. The ability to provide human and computer-based forecasts from the global to microscale. **ET081**

232. Weather Data Climatology (CAP344).
The ability to use climatological weather data to give the warfighter an accurate description of the battlespace environment in the absence of current weather data, or for time scales beyond forecasting capabilities. **ET079**

233. Weather Data Gaps (CAP345).
The ability to fill data gaps with reasonable weather phenomena in data sparse areas. Weather models must be capable of taking climatology, model smoothing, and available data to form a start point for forecast model runs. **ET079**

234. Weather Data Input to Mission Planning (CAP346).
The ability to incorporate the forecast atmospheric phenomena into weapons and mission planning platforms. Weather forecast information should be directly input into the mission-planning phase, with a minimum of human interface. **ET083**

235. Weather Data Matched to Platforms or Systems (CAP347).
The ability to match required weather data and forecasts to a specific SOF weapon system or platform. For example, specific flight level winds for tactical drops or leaflet drops. **ET083**

236. Weather Information Access (CAP002).
The ability to provide weather forecasts to planners and operators in a timely manner. Forecasts are the crux of the weather business, and, while not as perishable as observation data, need to get to the command and control personnel in a timely manner if decisions are to be affected by weather information. **ET073, ET082**

237. Weather Observations (CAP348).
The ability to take weather observations. This capability covers airfield locations, both fixed and forward, and the observing equipment required to take the observations. This capability includes surface phenomenon, upper air observations, visibility, and any other weather parameters required to meet the mission of SOF takeoffs, landings, and jump criteria. **ET080**

238. Weather Observations Combined (CAP349).
The ability to overlay weather observations, battlefield depictions, and topographical data into a unified, accurate depiction of atmospheric conditions worldwide. **ET079**

239. Weather Related Space Phenomena Forecasting (CAP350).
The ability to provide space related weather phenomena information in a timely manner. The ability to forecast space weather phenomena and the effects on operations such as high frequency (HF) propagation is required. **ET081**

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AFSOC/NSW CAPABILITIES (NON-MATERIAL)

AFSOC NON-MATERIAL CAPABILITIES:

1. **Air Campaign Strategy (CAP174).**
   The ability of SOF personnel to assess, advise, train, and if tasked, assist, and integrate host nation aviation forces in the development and conduct of an air campaign strategy. **ET033**

2. **Air Campaign/Air Operations (CAP007).**
   Ability of individuals to function in a liaison or advisory capacity to integrate foreign aviation forces into combined special operations air campaign planning and execution processes. May function as a member of the special operations liaison element (SOLE) involved in air operations center (AOC) tasking and coordination of combined air operations. **ET033**

3. **C4 Systems (CAP187).**
   The ability of SOF personnel to assess, advise, train, and if tasked, assist, and integrate host nation aviation forces in the development of a viable C4 system. **ET033**

4. **Civic and Humanitarian Actions (CAP189).**
   The ability of SOF personnel to assess, advise, and train host nation personnel on managing and conducting civic and humanitarian relief actions**. ET032**

5. **Conduct Mission in Adverse Weather (CAP036).**
   Ability of the aircraft and personnel to operate in adverse weather, including clouds, rain, snow, strong winds, turbulence, icing, heavy dust, blowing sand, etc. This includes the ability to perform the desired mission without the benefit of normal vision. **ET073**

6. **Contracting Funds Availability (CAP196).**
   Ability to coordinate with finance functions to ensure that paying agents are designated to support the deployed contracting activity (i.e., establishing an Imprest fund, if necessary, and payment methods to support IMPAC and other contracting transactions). **ET041**

7. **Contracting Office Availability (CAP197).**
   Ability to establish and operate a contracting office in an austere/high threat environment. Ensure certified contingency contracting officers are deployable with the required resources as identified in applicable directives. **ET041**

8. **Electromagnetic Frequency Spectrum (CAP211).**
   The ability to manage and provide access to electromagnetic frequency spectrum issues to ensure we provide adequate information services to special operators and eliminate mission impediments because of frequency management issues. **ET028**

9. **Field Expedient Medically Related Services (CAP217).**
The ability to expeditiously medically retire personnel in the field. The ability to rapidly capture and use medically related personnel information. The ability to support mishap investigations in a special operations setting. The ability to identify and process newly deceased individuals. **ET045**

10. **Firing Ranges (CAP219).**
Ability to train on full distance firing ranges for SOF personnel. **ET039**

11. **Force Protection Training (CAP221).**
Ability to train deployable personnel in antiterrorism, unique force protection systems, and strategies. **ET046**

12. **Foreign Aviation Airlift (CAP223).**
The ability of SOF personnel to assess, advise, train, and if tasked, assist and integrate host nation aviation forces in the procedures, coordination, and conduct of airlift for airdrop/air-land delivery, infiltration/exfiltration, medevac, and resupply. **ET034**

13. **Foreign Aviation Close Air Support (CAS)/Convoy Escort (CAP224).**
The ability of SOF personnel to assess, advise, train, and if tasked, assist and integrate host nation aviation forces in the tactics, techniques, and procedures to conduct combat air support, convoy escort, and forward area aircraft refueling/rearming procedures. **ET034**

14. **Foreign Aviation Personnel Recovery (PR)/Combat Search and Rescue (CSAR) (CAP225).**
The ability of SOF personnel to assess, advise, train, and if tasked, assist and integrate host nation aviation forces in recovery operations such as personnel/equipment recovery and combat search and rescue tactics, techniques, and procedures. **ET034**

15. **Formal and Informal Training (CAP227).**
Ability to conduct formal and informal training programs, continuation training, and exercises to ensure AFSOF are capable of conducting their assigned mission/task. **ET027**

16. **Forward Arming and Refueling Point (FARP) (CAP215).**
Ability to conduct FARP operations. **ET008 (Far-Term: ET003, ET004, ET024)**

17. **Host Nation Aircrew Proficiency (CAP232).**
The ability of AFSOF to assess aviation aircrew training, currency, tactical proficiency, and risk management. **ET009**

18. **Host Nation Aviation Logistics (CAP233).**
The ability of AFSOF to assess host nation aviation support, maintenance practices, and supply procedures. **ET009**

19. Host Nation Aviation Safety (CAP234).
The ability of AFSOF to assess host nation aviation and aviation support safety procedures and practices, aircraft airworthiness, and reliability. **ET009**

20. Host Nation Infrastructure Development (CAP235).
The ability of SOF personnel to assess, advise, and train host nation aviation forces in developing aviation force infrastructure designed to integrate civil and military organizations. **ET032**

21. Host Nation Interoperability (CAP236).
The ability of AFSOF to assess host nation aviation and support operations and interoperability capabilities with US or coalition forces. **ET009**

22. Host Nation Medical Support (CAP237).
The ability of SOF personnel to deploy regionally and culturally oriented, language qualified medical personnel to provide training to host nation aviation and aviation support forces in emergent and non-emergent medical procedures and triage. **ET071**

23. Host Nations Weapons Systems (CAP238).
The ability of SOF personnel to understand and employ host nation weapons systems. **ET074**

24. Intelligence Sources (CAP248).
The ability of SOF personnel to use both US and host nation intelligence sources to ensure the highest probability of mission success/kill. **ET001, ET074**

25. Logistics, Infrastructure, and Deployment (CAP256).
The ability of SOF personnel to assess, advise, and train host nation personnel on logistics infrastructure, supply procedures and inventory, and logistics practices. **ET031**

26. Manage AFSOC Information Technology Funding and Electromagnetic Frequency Spectrum (CAP259).
Provide the capability to manage AFSOC information technology funding and electromagnetic frequency spectrum issues to ensure we provide adequate information services to special operators and eliminate mission impediments due to frequency management issues. **ET044**

27. Manage, Upgrade, and Troubleshoot Desktop Computers Remotely (CAP262).
Manage any/all devices connected to the AFSOF networks. **ET028**

28. Medical Deployment Screening (CAP264).
The ability to augment in-garrison pre- and post-deployment medical screening. The ability to screen personnel in theater in support of operational requirements. Real time visibility required to identify and replace/restore unfit deploying personnel. **ET042**

29. **Medical Intelligence and Surveillance (CAP138).**
The ability to compile and use information concerning medically related hazards and problems in the pre-/post-deployment and deployed setting. The ability to record, catalog, and analyze PAR medical data from intra/inter-theater locations. The ability to quantify deployed AFSOF health status. **ET042**

30. **Operating with Foreign Aviation in Denied Territory (CAP285).**
The ability of SOF personnel, when tasked by appropriate authority, to assist host nation aviation forces or operate in denied territory. **ET025**

31. **Plan the Execution of Security Assistance Support (CAP118).**
Ability to plan and execute security assistance-funded activities. Includes adherence to security assistance laws and procedures. **ET077**

32. **Population/Resource Security (CAP290).**
The ability of SOF personnel to assess, advise, and train host nation aviation personnel on population and resource control, and population security. **ET032**

33. **Provide Medical Support Autonomous of Host Nation (CAP128).**
Ability to provide medical support to deployed aviation training and advisory personnel independent of host nation capabilities, employing medical personnel who are regionally/culturally oriented, language qualified, and have the ability to teach in the host nation language. **ET029**

34. Provide Mission-Ready Aircrew Instructor Personnel (FID) (CAP129).
Ability to provide mission-ready enlisted and officer aircrew personnel in the required numbers to train and advise foreign aviation organizations, and to attain and maintain currency and proficiency in host nation, nonstandard aircraft (e.g., Mi-17, An-26, Gazelle, Aerospatiale) **ET077**

35. Provide Mission-Ready, Non-Aircrew Enlisted and Officer Personnel (FID) (CAP130).
Ability to provide mission-ready non-aircrew enlisted and officer personnel (e.g., maintenance) in the required numbers to train and advise foreign aviation organizations. This requires maintaining certification in host nation, nonstandard aircraft (e.g., Mi-17, An-26, Gazelle, Aerospatiale) **ET077**

36. Provide Qualified Academic Instructors and Curriculum Development (CAP131).
Ability to provide sufficient qualified academic instructors that function as platform instructors and developers of formal course curriculum. **ET077**

37. Provide Regionally Oriented Aviation Advisory Forces (CAP132).
Ability to conduct operations in the assigned theater with forces that are regionally oriented and culturally astute, to include host nation history, customs, and courtesies. **ET022**

38. Psychological Operations Direct Human (CAP135).
See classified description. **ET017**

39. Shipboard Capable/Compatible (CAP149).
Ability to operate from ships, to include aircraft carriers. Includes ability to move from flight deck to hangar deck on elevator, and may necessitate ability to perform arrested landings and catapult launches. Platforms must be HERO-capable to US Navy standards. **ET003, ET004, ET008, ET024**

40. Site Planning (CAP314).
Ability to pre-identify all site requirements associated with conducting military operations at a prepared/semi-prepared/unprepared landing zone, operating area, and forward operating location. Information includes, but is not limited to, soil characterization, airfield condition, water source availability, and site utility infrastructure. **ET051**

41. Space Awareness Education (CAP317).
Ability to educate and train SOF on space fundamentals, the capability, and limitations that space systems can provide and how they can contribute. The ability to provide instruction in the various USAFSOS and other SOF training forums is essential in demystifying and normalizing space integration in special operations. **ET067**

42. Space Expertise In-Resident Capability (CAP321).
Ability to provide space expertise resident within SOF. Ability to analyze and judge space capabilities and impacts to SOF. Ability to keep the resident space personnel proficient in providing space support. **ET069**

43. Space Support Liaison and Coordination (CAP322).
The ability to coordinate and influence the execution of space forces in support of SOF, similar to the current special operations liaison element (SOLE) function at the air operations center (AOC). **ET068**

44. Space Training/Support Facility (CAP323).
Ability to train SOF on space product exploitation and the utility, manipulation, and analysis of space data. **ET067**

45. Spoof Enemy Avionics (CAP154).
See classified description. **ET017, ET023, ET085**

46. Survival Training (CAP327).
Ability to train AFSOF in survival skills. **ET055**

47. Sustainability (CAP155).
Ability to maintain the necessary level and duration of operational activity to obtain military objectives. Sustainability is a function of providing for and maintaining those levels of ready forces, material, and consumables necessary to support military effort**. ET009, ET013, ET070**

48. UTC Tasking Fulfillment (CAP338).
The ability to utilize an agile work force to create smaller UTC requirements. Provide CINCs with a multi-skilled workforce to cover peak work periods. **ET057**

49. Vehicle Management and Control (CAP339).
The ability to provide vehicle operations and maintenance support for mission critical flight line and base operating support vehicles to operate in all environments. Includes the ability to provide traffic management services including inter- and intra base movement of personnel and cargo, both inbound and outbound. The ability to electronically manage command vehicle authorizations and assignment. **ET078**

50. Voice Deception (CAP167).
See classified description. **ET026**

51. Weapons Systems Supply Support (CAP342).
Ability to provide weapons systems support by requisitioning, receiving, storing, shipping, and issuing supplies and equipment. Ability to perform periodic inventories to ensure inventory accuracy and asset availability. This includes real time total asset visibility of parts and supplies throughout the distribution chain. **ET070**

52. Working Dog Teams (CAP351).
Ability to provide working dog teams to support global SOF taskings/ operations. **ET060**

53. Working Dog Veterinarian Services (CAP352).
Ability to provide veterinarian support to working dogs. **ET060**

NAVAL SPECIAL WARFARE NON-MATERIAL CAPABILITIES:

NSW85. Influence and leverage defense and civilian labs to keep SOF at the leading edge of technology and capability.

NSW86. Train personnel through a credentialized hierarchy of structured yet flexible courses to bring operators from basic through the most advanced NSW skills.

FCWG Concept Statements

The following are concept statements developed by the United States Special Operations Command Future Concept Working Group (FCWG) to support Desired Operational Capabilities (DOC):

FCWG1.	High-speed lift includes various multi-function vehicles: hypersonic, magneto hyperdynamic drive sealift (100+ kts) and flying submarines.
FCWG4.	To make “SOF stuff “ commercially transportable in interchangeable DOD-commercial (include Navy CODs) containers/pallets.
FCWG5.	The rapid delivery of personnel and equipment from space-based and/or high altitude craft with little or no warning; “Starship Troopers”.
FCWG6.	Provides mobility platforms/personnel with the ability to move with virtually no detectable signature.
FCWG8.	Transportable energy: capability to send and deliver energy to (remote) areas.
FCWG10.	Cloaking device envisions an active camouflage for equipment that presents the appearance of only the background environment across the spectrum.
FCWG13.	Exoskeleton as a protective suit, supports high altitude or spaceborne jump operations into denied areas.
FCWG19.	A compact man-sized helicopter that is small enough to be disassembled and transported in the trunk of a car.
FCWG23.	The need for better cultural/language understanding for mission planners and execution in denied areas, require SOF Academy course.
FCWG25.	The logistics and resupply support to SOF can be orchestrated along very precisely defined criteria. The maximum leverage of commercial means with minimal hands-on.
FCWG34.	Enhanced mobility of personnel and units using bio-medical technologies including paralyzing and suspended animation gas or pills.

FCWG35.	Underground mobility is a complete process from pre-hostility mapping to rapid on-site mission mapping of underground systems. Also required is a high speed-tunneling device.
FCWG36.	Signature management eliminating the available signature of personnel and assets so they are completely invisible to some portion of the electromagnetic spectrum.
FCWG37.	SOF assigned to forward areas; improves access and reduces the need for strategic airlift.
FCWG40.	Establish deception unit and staff organization to ensure deception is considered and utilized at all levels of operation.
FCWG42.	The active camouflage capability to blend into the environment/background (applied to material as well).
FCWG43.	The concept looks for a way to mask presence involving all of the animal sensory capabilities from the aural and olfactory to visual and haptic.
FCWG46.	The low observable technology (signature management) across the spectrum (includes all airframes).
FCWG48.	Maritime FOB (MFOB) positioned offshore/outside of national boundaries and weapon ranges providing full mission support (JSOTF) capabilities including aircraft.
FCWG49.	Hybrid air/sea mobility platforms to operate from or to, by sea or air; SSGN dry deck shelter, wing in ground effect (WIG) platforms and seacraft/plane for lift/ insertion/extraction.
FCWG50.	Operational concept includes: “Remote Warrior”, “the Unnoticed Operator”, “Surrogate Force”, “Chameleon Man”, and “Predator Man”.
FCWG52.	Multi-functional vehicle is a land, air, and sea capable vehicle with a 4-6-passenger capacity that will provide dedicated infiltration/exfiltration operational support to teams.
FCWG53.	Various types of weapons and equipment developed and produced with the intent to be disposable/non-traceable and rendered unrecognizable when discarded.

FCWG54	Multipurpose exoskeleton: an articulated, self-contained, powered suit, capable of land or water operations that can be worn operational for long duration mission.
FCWG55.	A program with selected civilian business or a business established by SOF to train selected personnel in how to blend into business situations around the world.
FCWG56.	Communication training becomes a basic skill that every SOF operator is taught, ensuring that everyone is fully versed in communications skills.
FCWG57.	C4I active/passive, two-way communications system link to operational locations, relays the mission as it unfolds allowing real time C2 and situational awareness.

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FCWG58. Allow SOF operators to dictate what the enemy sees, senses, hears and smells etc, thus increasing mobility in denied areas. It works against the full array of sensors.

FCWG59. Information manipulation sets conditions that enables mobility, distracts the enemy, and gets inside the enemy's decision loop.

FCWG60. Have delivery of equipment or personnel into an operational area by precise, stealthy and remote means from either space or air breathing machines.

FCWG70. Advanced C4I provides real-time control over actions in the field, using innovative tactics and technology; degrade enemy capabilities without direct contact with the target.

FCWG71. The logistics and personnel admin storefronts to the rest of the Command and SOCs. The storefront will respond to individual and support mission requirements.

FCWG83. SOF University – education starts it at the top and flows down to the junior officer level, fully integrated, not an elective in the curriculum.

FCWG103. SOF University virtual and campus should be a cradle-to-grave system providing appropriate education for personnel in different phases of their careers.

FCWG111. Training includes individuals from other counties and agencies to take place in the region of interest in order to immerse trainees in the culture of selected areas.

FCWG131. External education brings people in and sends people out, not just to schools but to OGAs and NGOs (SOF outreach).

FCWG137. Create an integrated education system that follows each SOF person throughout his/her career.

FCWG146. SOF PME is based around creating a mid-level; SOF specific, JPME course that operates on an equal basis with the intermediate service school.

FCWG157. Detection of target agents, develop phosphorescent anti-bodies that react with Chem/Bio agents to discern the presence of an agent(s).

FCWG158.	Have bioelectric sensing devices that replace existing biological sensing organs.
FCWG159.	Selectively filters/desensitizes senses: noise suppression, monitor vibrations and for “spikes”, isolate or focus on sound, feeling etc.
FCWG160.	Self-contained sensory package linked visually and physically to alert the carrier when their zone of protection (360 degrees) is breached.
FCWG162.	HUD/facemask/eyeglasses allowing visual observation of several data inputs on a common display. These could possibly be controlled by eye movement.
FCWG164.	Virtual reality training: systems that simulate many senses, and has levels of difficulty for continual training and mission rehearsal.
FCWG165.	Sensory training envisions a nonmaterial solution to a wide variety of sensory enhancements and skills.
FCWG169.	Vast improvement over current NVG technology; provides detection and built-in protection to users.
FCWG170.	Super bone microphone similar to the current mikes, but improvements allow visual feeds to the brain to see beyond his senses.
FCWG171.	Smart earplugs: improvement over current types allows for more discrimination and filtering of ranges of sound.
FCWG173.	A “pocket bomb dog”: device that can sense the proximity of explosive devices to the user.
FCWG175.	Language translator: small enough for mission environment; also as an aircrew survival device, programmable for different languages, dialects, etc.
FCWG179.	Swimmer echolocation device gives dolphin-like capabilities; possibly displayed in a HUD facemask.
FCWG190.	Nano robotics covering available: provide the operator with early warning, tracking, targeting and recon capabilities.
FCWG191.	“HAL”: processor developed to fuse operator and sensor inputs; includes a self-learning capability to store operator preferences.

FCWG192. Group of sensors that would provide improved situational awareness in all environments; aid swimmers by using passive sensors to detect and direct.

FCWG194. Lightweight HUD that processes multi-spectral sensory inputs, C2, provides identification and targeting, and displays external sensory in data.

FCWG200. "Tag" the world; survey (hidden) device when activated provides local data or becomes a homing beacon.

FCWG204. Weapon and/or weapon targeting systems that have the ability to distinguish IFF through unique biometric signatures.

FCWG205. Smart gas/juice: substances that activate or dramatically enhance the desired physical effect on selected human target or group.

FCWG209. The weapon would automatically optimize itself for accuracy and ensures 100% accuracy.

FCWG213. Star Trek Phaser: multiple anti-personnel settings, usable to halt some mechanical operations, regenerative power source.

FCWG217. Bullet with sensor emiting a signal that would be honed in on by smart munitions and provide these munitions with terminal guidance.

FCWG218. Multi-role, multi-purpose weapon operates as a covert sensor in advance of conflict, checks in periodically, serves as a beacon for weapons or become it's own.

FCWG226. Once a target is tagged, a mirco-UAV will track target, report, tag other targets or do harm.

FCWG232. Concealable eyeglass aiming device that uses line of sight to identify targets and guides munitions to target.

FCWG246. Prepositioned sensors that include a beacon that can be used to guide weapons upon the outbreak of hostilities.

FCWG247. Chem/bio-Markers: a bio-engineered organism or a chemical marker that can be used to mark selected military targets. Can become a weapon by acting as a corrosive agent after a certain time or by a remote command.

FCWG253. The concept is to recruit soldiers/civilians already possessing the skills needed for specific missions, and then train them to accomplish the mission (using the OSS model).

FCWG255. Chem/bio demining enzymes placed or sprayed on a mine or minefield; can be destroyed without detonating.

FCWG256. At a predetermined time a mine will deteriorate due to its composition or due to a chem/bio-engineered initiator.

FCWG257. “Rounds” that can actively discriminate among targets selected for attack, or attack but not activate unless they acquire the right target.

FCWG261. A breathable suit covering most of the body is treated with material designed to neutralize any chem/bio agents.

FCWG262. Biosensor(s) implants that are linked to physiological, medicines and antidotes and will automatically release what is needed for the individual.

FCWG263. The ultimate no-tech warrior survives based on what he knows, not just what he wears. Should be a continuing program to sustain, enhance personal survival skills.

FCWG267.	A mobile, lightweight, environmentally adaptable exoskin that encapsulates the operator, offering ballistic and signature protection.
FCWG273.	Use psychological, cultural, ethical and philosophical training and education to improve personnel survivability and effectiveness within their career fields.
FCWG274.	SOF Survival Reachback: assists the operator in survival related situations, provides researched responses and images as required.
FCWG277.	A passive, interrogatable electronic tag carried by the individual that provides a means to identify them to targeting systems and targeting activities.
FCWG281.	Advanced medic diagnostic tools for use by deployed medics that may or may not be employed with a reachback medical capability.
FCWG282.	Aircraft/vehicle decon skin: expandable substance that could be applied as a preventative measure, or apply and remove as a quick decontaminate after exposure.
FCWG297.	MPARE-C4I Linkage/Integration SOF needs to participate in the developmental process ensuring special operations-unique requirements are addressed.
FCWG299.	Neural network links the brains of operators to each other and a central data/fusion center or base.
FCWG302.	Allows SOF operators to produce training, PSYOP, CA products in a native language and dialect. Real-time translation capabilities in both print and voice.
FCWG329.	Secure push/pull system with info filters biomedical and IFF datalinks.
FCWG340.	Specially trained/bred animals/insects to detect a specific object, material, or person; could collect samples and return for analysis.
FCWG343.	Robotic/tele-robotic self-mobile unit, sometimes under human control, that can scout ahead of unit.
FCWG346.	Ability to “see” through solid substance to see individuals on the other side; differentiate between animate and inanimate objects.

FCWG351. Remote/mobile sensors that move as the SOF element moves through them; sensors update the element of the situation beyond immediate/organic sensory capability.

FCWG357. The ability to transmit information underwater using environmental “conduits” in the subatomic particle or other mediums bands.

FCWG365. Tactical UAV, small, lightweight UAV capable of being carried by a SOF team providing real-time video and acoustic reconnaissance to user.

FCWG371. Have sensors that can monitor, and interpret their sensors to see what they are surveying.

FCWG390. Sensor delivery UAVs that deliver remote (or the UAV itself is a) sensor(s) to areas that are not accessible by any other means, including the sides of building.

FCWG396. UAV sensor/munitions emplacement.

FCWG416. Precision underwater/underground navigation system to navigate in tunnels and water/sewer systems.

FCWG417. Modular, multi-purpose UVs: a series of tactical unmanned vehicles (UV’s), varying in size and possible configuration that support future special operations.

FCWG421. SOF satellite network to provide for secure connectivity to SOF C4I integrated with the SOF family of UV. Concerns: cost, training and vulnerability.

FCWG442. Unmanned Underground Vehicles (UUGVs) have a burrowing capability, fit and move through electrical and sewer conduit, gather and transmit data.

FCWG468. Universal NBC Detector can be used for personnel, mobility platforms, remote recon and UAVs; linked to “Pocket Doctor” for treatment.

FCWG472. Strategic WMD PSYOP plan: a coordinated effort to develop, package and deliver products aimed to deter the development of WMD in foreign nations.

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TOC