

The events of 9/11 set in motion a new rush to protect the security of America. Looking back, we can see how the events of 9/11 set us in motion to create a better, more efficient military that was capable of handling any situation around the world. The events of 9/11 led the U.S. Armed Forces to many overseas campaigns: Operation Anaconda, Operation Iraqi Freedom, and the newest military campaign Operation Raging Bull. The fact that the U.S. is dealing with a different type of enemy in these campaigns – that enemy being the invisible enemy – creates the need for new and better technology. What is meant by invisible is that this enemy does not wear uniforms. Just like the Vietnam War, you can not be too sure who the enemy is and who is not. The campaigns into Afghanistan and Iraq can be categorized as guerilla warfare especially after the Hussein regime was removed from power. The need for stronger more efficient bombs such as cave buster bombs can be directly associated to the search for Osama Bin-Laden. Afghanistan is a mountainous area with many caves burrowed deep in the mountain side thus creating perfect hiding stops for Bin-Laden and his followers. By creating stronger cave buster bombs it makes it harder for Bin-Laden to hide because the new bombs have stronger tips to enter deeper into the mountains and also have an explosion that is several times the magnitude as their predecessor. Also the fact that the U.S. has deployed troops to a desert climate area raises the need for lighter weight materials and clothing that will breath to prevent heat exhaustion.

More fundamentally is the fact that: in order to protect your county at any cost you need to have the best equipped and technologically advanced army in the world. In order to have the most technologically advanced army you need to have the best materials and resources available. Riding on the waves of this need comes nanotechnology. This fairly new technology is ushering the new wave of technological advances and on the frontier of this research is the Department of Defense. The National Nanotech Initiative has given roughly \$906 million¹ to the DOD since its inception in 2001. The reason all this money is being allocated to this tremendous amount of research is due, as stated above, to protect the U.S. Last year alone \$436 million² was funded to the DOD for its research needs. The applications the military is currently investing in can be broken down into three categories: **Weapons** and **Armor**.

Weapons

In the weapons realm, weapons can be split into two groups: **medical** and **conventional**.

Medical weapons include technology such as the nano-bomb, DNA recognition, and virus detection. The nano-bomb is a bomb that releases nano particles that effectively choke you to dead. Nano particles are so small that they can cause massive lung damage and can enter through the skin, entering the blood stream and go straight to the brain. Also attached to these particles can include harmful chemicals such as hydrocarbons.

¹ NNI 2006 budget.

² NNI 2006 budget.

Since there is no immunity to nano particles the human body has no way to protect itself. DNA recognition involves taking nano-bots and programming them to self destruct upon matching a person's DNA code. This totally changes the way leaders can be assassinated such that if a person is killed via this method all it will look like is a brain hemorrhage or stroke. The beauty of this technology is that only the specified person will die – so if the person is in a meeting only he will fall down dead while everyone else will be just fine. This helps conceal the assassination. With this new “nano assassin” comes the need for virus detection on the nano scale. Technology is needed to be able to detect the “nano assassins” and also to detect any type of biological weapons. Nano-bots can be programmed to detect certain type of materials set of alarms if anything is found. Their small size makes them ideal for permeating any type of barrier.

Conventional weapons include guns, bombs, and also nano-bots. Using nanotechnology guns will be lighter which will allow troops to carry more ammunition. Automatic firing self-guided bullets will be available such that if a person enters within the vicinity of the weapon it will go off only for the specific person. This is similar to DNA recognition nano-bots. Also gun scopes with nano-enhanced LCDs will be available to be able to see better in all weather, night or day. An important advancement is gunpowder has been made in some instances 1000 times more powerful. This involves the study of nanoenergetics (energy flow manipulation between molecules) which has created so-called superthermites. These are like chemical catalysts which increase chemical reaction by 1000 times by releasing more energy faster. Adding these materials to gunpowder has made gunpowder more explosive, more cost efficient, and lighter. Thus this helps reduce the cost of armaments because you have a higher concentration of energy using less raw materials. Bombs can also use the same gunpowder and thus become stronger. As said before, this is where the answer for stronger cave buster bombs came in. The new bombs were roughly 10 times smaller and 1000 times more powerful than their predecessor. Along the same guidelines, nuclear bombs can be created that can take down a whole sky scraper in a briefcase. Also since the superthermites burn at such a high temperature, underwater bombs can be made. Nano-bots can be made so they can eat through certain materials such as metal, rubber, etc. As technology is getting better it is becoming harder and harder to hide.

Armor

In the military if you want to survive you need armor. Almost everything is armor plated in the military. Soldiers wear armor and all military vehicles, whether they would be land, air, and sea, have armor. For the **soldier**, nanotechnology makes better clothing possible. Cloths are stronger and are also enhanced with nano materials. One enhancement is camouflage clothing. Nano materials embedded in the clothing react with the environment thus changing the garment color to match the environment. This brings stealth to a new level. Now you do not to worry about being stealthy as much as you have to be if you were not wearing this clothing. Also clothing changed reflectivity and also its insulation. This allows the nano soldier to be protected in all weather and terrain. Nano-clothing can absorb or reject certain materials. This makes it harder to get radioactive poisoning or even to get poisoned from chemicals, or as stated earlier nano-bombs. Cloths will also be much lighter which in addition to lighter guns makes soldiers more

agile on the battlefield. Nano-bots can be implemented into the body to help heal a wound or to help monitor vital signs in the body.

Armor has been developed for military **vehicles** of every kind. For all **seagoing** vehicles, advanced ceramics have been developed to help create higher strength plating that is lighter, paints that protect against corrosion and barnacle build up, as well impact resistance. Nano-metals have been used to build more efficient engines that have better crankshafts, propellers, and also higher viscosity hydraulics and oils. This helps reduce response time of an engine. Applications to **air** vehicles include nano-coated jet engines that have less wear, more service life, and stronger turbines. Superthermites can be used to create fuel propellant for missiles and rockets. This enables missiles to travel at tremendous speeds which are not easily evaded. Radar resistant nano-composites can be used to develop new airplane skins that make the aircraft invisible to radar. Stealth has been to such a new level that the enemy can be bombed without even knowing there were planes in the air. **Land** vehicles also benefit from nanotechnology. Improved diesel engines and lighter, stronger plating allow tanks to be faster and lighter. Thanks to superthermites, tank shells are more powerful. Also nano-filters can be created to filter the air so tank crews do not have to worry about getting poisoned in a certain area. In the grand scheme, you have a more agile land force. Military structures such as command bunkers can be made stronger using nano-metals.

While all the mentioned technology is not currently out and in use, much of the research for implementing these ideas is well underway. The more conventional sounding technology is currently in use such as paints, cloths, and better gunpowder. All this new and upcoming technology drastically takes war to the next level. Since nanotechnology is so small new arms control laws are going to have to be created. Current nuclear missiles are so big that they are easy to detect but suitcase nuclear bombs are going to be much harder to control. Also the fact that we can not see nano-particles is going to make it harder to control. New nanotechnology detectors are going to have to be created. Public awareness is also going to be a problem. If people find out about these new advances how with they react? Another pitfall here is that just because the U.S. is researching these advancements does not mean that no other country can produce the same technology. What happens if all this technology gets turned on the U.S herself? Then new technology will have to be created to surpass the current technology and so on and so forth. War will be redefined to the point where human soldiers are not needed anymore. With the push of a button you can launch a dozen nano-bombs and kill a whole army without ever seeing the enemy face to face. Planes, ships, tanks can be radio controlled and flown into battle zones without the fear of losing servicemen. Nano-supercomputers can be used to control these radio controlled vehicles thus removing all human judgment from the picture. For anyone who has seen Terminator 1, 2, or 3, think of SkyNet. With the advent of nanotechnology, war has been taken to the next level and has become much more dangerous.

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