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V. Évfolyam 3. szám - 2010. szeptember

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THE WAR OF FUTURE – THE FUTURE OF WAR

THE VIEWS OF THE UNITED STATES ON THE ARMED CONFLICTS OF THE 21ST CENTURY AND THE NEW DEVELOPMENTS OF MILITARY TECHNOLOGY OF THE USA PART 1

Absztrakt/Abstract

A szerző a tanulmányának első részében részletesen megvizsgálja az Amerikai Egyesült nézeteit, elképzeléseit a 21. századi hadviselésről. Továbbá elemzi az USA új technikai-technológiai fejlesztéseit, ennek kapcsán foglalkozik a nagyteljesítményű számítástechnika szerepével, az integrált harctér, a lézerfegyverek létrehozásának lehetőségével, és végül, de nem utolsó sorban az említett szuperhatalom csillagháborús terveivel. A cikk szerzője — többek között — arra keresi a választ, hogy a fent említett amerikai technikai-technológiai fejlesztések valóban csak a terrorizmus elleni küzdelmet szolgálják-e?

In the first part of his study paper the author gives a detailed analysis of the ideas and concepts of the United States of America on 21st century warfare. Furthermore he analyses the new technical-technological developments of the USA, deals with the role of highly powerful information technology, the potentials of creating integrated battlefield and laser weapons, and last but not least with the star wars projects of the above mentioned superpower. The author of the article seeks the answer – among others – to the question whether the above mentioned development projects are aimed at combating terrorism only.

Kulcsszavak/keywords: *háború, hadviselés, jövő ~ war, warfare, future*

Introduction

The end of the bipolar world order – in my opinion – involved much more than the end of the conflict between two superpowers and their alliances (NATO – Warsaw Treaty) since one of them, the Warsaw Treaty, broke up in 1991 and on 31st December the same year the Soviet empire also ceased to exist. However, the end of the Cold War did not mark the beginning of happy peace times. Analysts (Baylis, et.al. /ed./, 2005:10-11.) who anticipated that the Cold War had been a much simpler political and military-political structure than the era which followed and has been on to date proved to be correct. In their analyses these experts stated that the Cold War was a chess game where the two players (the USA and the Soviet Union) were able to keep the rest of the players well in hand. In the first period of time it was reconcilia-

tion which took the foreground and it is highlighted by the fact that defence expenditure fell from USD 1,200 billion per year, the top of the Cold War period, to USD 800 billion per year (see: figure 1.). However, it had to be realised that the new era generated completely new challenges. First of all the significant growth of international terrorism has to be highlighted. In connection with this notion the issue of Islamic terrorism should not be disregarded. After 11th September 2001 the USA and the western world – moreover a significant part of the Eastern countries too – launched significant arms programmes and began elaborating new combat methods under allowing them to fight terrorism. In this particular case the word "significant" means that the defence expenditures of the countries of the world exceeded the Cold War peak (approximately USD 1,350 billion a year). This growth is indicated by the graph below[1].

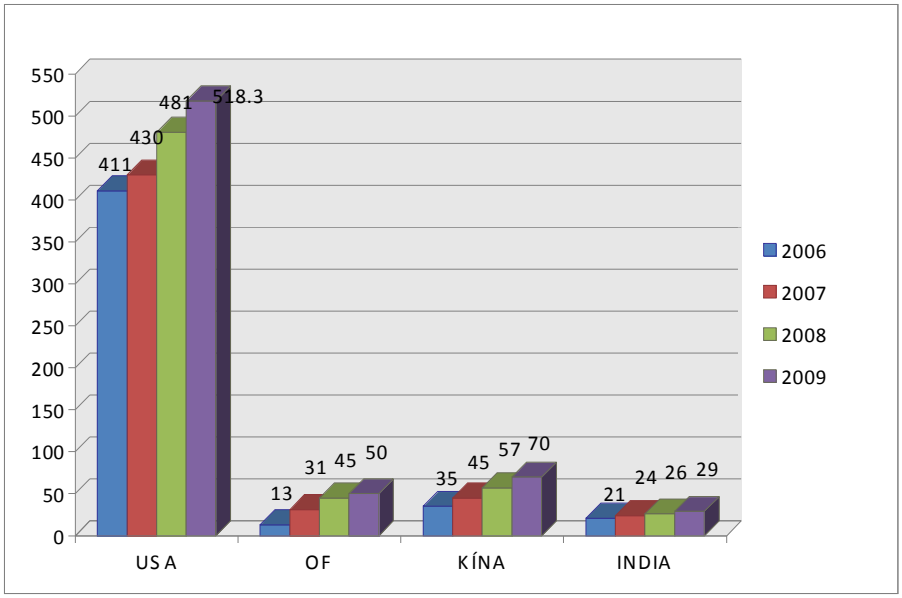

Figure 2[2]. Figure 2 above shows the defence expenditures of the four most significant powers of the world in billions of Euros. It clearly indicates that these expenditures continuously grew in the past period of time.

Let us take a look at some further figures on arms programmes:

[1] www. globalissues.org 2009. 12.11.

[2] www.iiss.org/publications/military-balance 2009. 12.11.

- the defence expenditures of the USA increased from USD 387 billion in 2000 to USD 709 billion out of which a "mere" USD 194 billion was spent on the wars in Afghanistan and Iraq;
- the USA spends 45% of its GDP on arms;
- the combined defence expenditures of states regarded by the Pentagon as potential adversaries (Cuba, Iran, Libya, Sudan, North Korea, and Syria and the two great powers – Russia and China) make up just 29% of the American military budget;
- the combined defence expenditures of the United States and its closest allies (NATO, South-Korea, Australia and Japan) make up 72% of the global military spending. (Hettyei, 2008)

In my opinion, however, it is not uninteresting to take a closer look at the issue and analyse how the USA, currently the only superpower of the world, sees the war of the future. It should be noted that future warfare including the trends in the technological development of conventional branches and services and even the blueprints in the stage of planning are expected to be dominated by the fight against terrorism. In my opinion – and the present study paper may highlight or even prove it – the significance of terrorism may slightly decrease compared with the anticipated global challenges in the near future. These include the lack of drinking water (the United Nations mentions water conflicts in the near future /Kerekes, 2006/[3]); negative impacts generated by the accelerated global warming, such as rising sea levels, migration from coastal megalopolises, decreasing arable lands which may lead up to food wars, easier exploitation of natural resources (see: North Pole conflict /Szerencsi, 2008/), and the list could be continued. However, these challenges go well beyond the issue of terrorism and in my opinion the future will not be an age of fourth generation warfare only – Lind theory (Lind, et. al., 1989:22-26.) – but third and fourth generation conventional conflicts, moreover a mix of warfare at a much higher level, may also get into the foreground. Naturally, the stronger party will force its will on the weaker one in order to achieve its objective. This was established as early as by Clausewitz therefore it can be stated that *revolutionary change of paradigms* labelled after Kuhn (Kuhn, 2000) cannot be fully identified in military science.

Returning to objectives, it is probable that from the fundamental elements possessing drinking water or that of arable lands will be priority and become the main causes of conflicts in the future, besides conflicts erupting due to cultural-religious-civilisation causes as identified by Huntington.

In order to prove my hypothesis, below I examine how the USA military leadership – I wish to repeatedly emphasise under the aegis of combating terrorism – envisages future warfare and what technological-technical developments are conducted at the branches and services in this framework.

A serious analysis helps answer the question: *"ARE THESE WEAPONS TRULY PRODUCED FOR DEFEATING TERRORISM?!"*

The concept of a war of the future

Military people, researchers of military science, and even outsiders often put the question what the war of the future will be like.

From the Hungarian researchers of military science – without striving to completeness – the persons and their study papers listed below must be mentioned as they focus on 21st century warfare and particularly on military theories.

[3] „ForestPress quotes a UN study paper according to which wars may break out for water in regions where rivers and lakes belong to several countries. Allegedly even now a minimum of ten African countries are ready to go to war for the water of the river Nile." (Kerekes, 2006)

- Braun, László: *A magyar katonai erő újszerű alkalmazása a 21. században* [The New Use of the Hungarian Military in the 21st Century] (Braun, 2005)
- Deák, János: *A katonai műveletek hadászati jellemzői napjainkban* [Some Strategic Characteristics of Modern Military Operations] (Deák, 2005)
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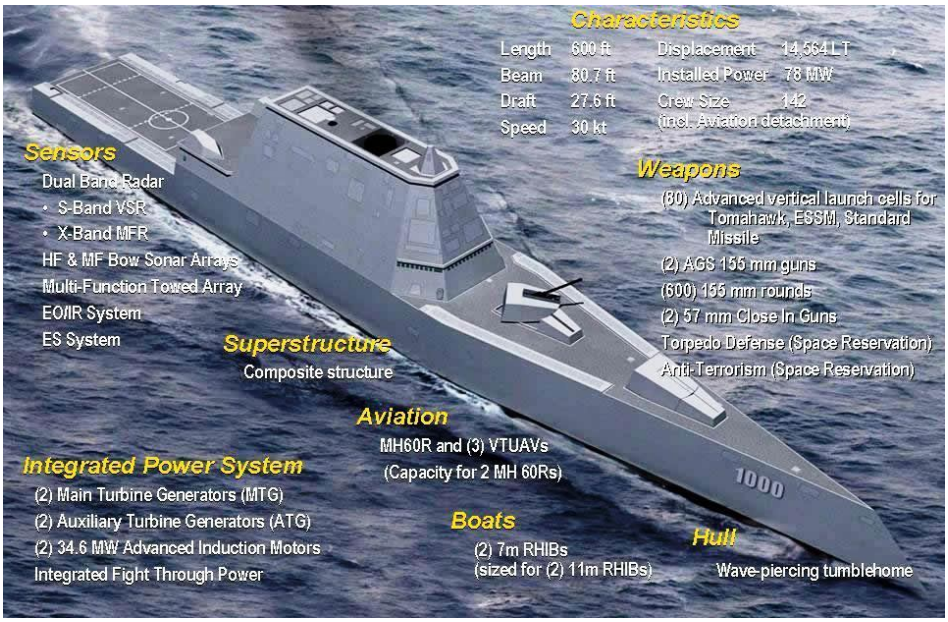
- Szternák, György: *A katonai műveletek megvívásának jellemzői napjainkban, levonható következtetések hatása a hadtudomány fejlődésére* [The Characteristics of Conducting Modern Military Operations and the Influence of Lessons Learned on the Evolution of Military Science] (Szternák, 2010)

Below let us take a look at how the opinions of American experts forecast a future was, *mainly from technological-technical aspects*.

According to the American ideas the countries will fight rebels hiding among civil population and against terrorists possessing bombs, missiles, rockets, or even weapons of mass destruction, with the use of new technology. A number of new (counterterrorist?) assets are in blueprint versions only but a few of them have already been commissioned.

The following situation – presented by American experts in a study paper – describes the near future: an unmanned aerial vehicle (UAV) – for example a Global Hawk – scouts an enemy held area. It forwards the target coordinates to advancing ground troops. The terrain is scouted by robot vehicles and the data are sent to the command centre. Simultaneously the information is also sent to the missile defence system of a DDG-1000 destroyer[4] 80 kilometres off the coast; to other battlefield units; and to the Supreme Command, thousands of kilometres away.

[4] It should be noted here that according to American newspapers the Pentagon may halt the development project of the ship because one single DDG-1000 destroyer has cost USD 5 billion to date. (Eisman, 2008)



Picture 1. DDG-1000 destroyer[5]

An unmanned combat aerial vehicle (UCAV) takes off from a CVN-class[6] aircraft carrier in order to deliver a strike at enemy forces. At the command post the information from several sources is analysed and an operational plan is elaborated.

Picture 2. CVN-79 CG[7]

Then the tasks for the battlefield unit commanders and assets are identified, and the order to open fire is issued. The above mentioned destroyer launches long-range attack missiles. A

[5] www.globalsecurity.org 2010. 06. 23.
[6] Carrier Vessel Nuclear
[7] http://blog.usni.org/2010/01/18/uss-enterprise-cvn-79-petition-update 2010. 03. 21.

Virginia-class submarine launches a cruise missile in order to destroy a distant ground target and F-35 fighter bombers provide air support to ground units.

The military operation is coordinated by the future combat computer system. The fundamental components of future warfare are made up by new technologies, network-based information systems, sensitive sensors, GPS-equipped missiles, piloted stealth aircraft, and UAVs.

According to American experts the high technology systems under development in laboratories will transform our visions on the future warfare. Most probably everything will be different from that envisaged a few years ago. The information superhighway will be the fundament for the future warfare therefore the USA armed forces are building a tremendous communication network.

"The expression 'network-centred' comes from the American navy in the mid 1990s. It reflects the different approach of the navy. The communication with each other and the High Command on the coast has always been a problem for individual ships. In the 1990s the Navy realised that a lot of information can be sent to the ships through satellite links. Data transfer can be established between the High Command and ships; aircraft and ships; satellites and ships. It was realised that navy units can be combined into a network this way and individual ships are allowed to operate as independent systems." (Pike, 2004) The same network, if enlarged, is able to link Ground Forces, Air Force, and Navy, allowing the establishment of a unified command structure. In the future the relevant commander can choose on the basis of the current situation what assets to use from warships, aircraft, missiles, armoured personnel carriers, or UAVs to deliver a strike at enemy targets. The system is based on a technology well known in civil life: silicon-based microchips.

High-power information technology

As it has already been mentioned above, the USA armed forces are working on the development of a gigantic network. To this end high capacity hardware is under development by the army. New methodology should be discovered for linking man and machine. The complex design work and technological development are supported by huge capacity computers.

The key to future warfare is information technology (IT). The USA Armed Forces uses very fast and powerful computers to do calculations on movements, air-flow, structural mechanisms, and simulations.

Such highly powerful computers produce realistic 3D images. Through simulation a designer is able to get a nearly real picture on whether ceramic plates can protect various combat vehicles or weapons systems from a shell or bullet. By now technological development has exceeded imaging and the data from other sensors can also be entered into calculations. USA Army Research Laboratory researcher Jerry Clark claims that high-capacity IT is only part of modern weapons design. Soon high-capacity computers are integrated in military uniforms, unmanned ground vehicles, and UAVs too. They will be omnipresent which will have its impact on data processing. More and more information will be possible to process in less and less time. (ARO, 2009)

A lot of information arrives from a modern battlefield. However, the cluster of data and risks can only be managed if they are transformed into a unified picture: integrated tactics, integrated battlefield.

Integrated battlefield

First of all it should be stated that thanks to the current development level of IT data transfer has achieved the speed of light. IT devices have become increasingly small and powerful. They can be further developed and military forces can be virtually interconnected at a global scale. The USA uses its IT systems for the rapid deployment of its military forces anywhere in the world. This way information can be receives from the battlefield which allows a more efficient planning and execution of actions. On the basis of sensors and precise target data appropriate weapons can deliver a strike at the right time.

The aim of the military and the leadership is to establish an integrated battlefield which provides a picture on the battlefield through various sensors and communication. It is able to identify combat vehicles on land, the air, and water, including their crews and detachments even in adverse weather conditions. The information is forwarded to all of the involved elements from the High Command down to executive levels, from navy to air force and ground forces units. The same battlefield and targets are seen by all players who are aware both of their own positions and those of the enemy. Integrated tactics was used by the Navy both in Afghanistan and Iraq, where sea and air were controlled through AEGIS tracking and combat system[8]. With the computer-guided radar more than 100 targets were tracked simultaneously on the ground, in the air and sea. The commanders can monitor the entire theatre which allows them to give immediate responses. The most important is information superiority that is to be better informed than the enemy. According to HSI[9] Director Trish Hamburger this requires better sensors, better intelligence, better communication, and a better linking of information. (Hamburger, et.al., 2001) In the case of the air force this involves better tracking of enemy in order to intercept, identify, target, follow, and fight anyone, anywhere, anytime. Situation assessment is similarly important on the ground, in the air and sea but the projection of forces including their comprehensive support – another significant factor of victory – can be a theme for another study paper.

Radio controlled war

Enemy forces can be defeated in radio controlled combat quickly and at a lower risk to friendly forces. Most of the long-range combat weapons are robots.

Picture 3.UAV in action[10]

Let us take some examples: Predators fly in a combat formation and mini UAVs support their activities. Military personnel can check the area behind a hill through a model plane.

[8] Aegis Combat System http://en.wikipedia.org/wiki/Aegis_Combat_System 2010. 07. 28.
[9] Human Systems Integration
[10] www.spektrumtv.hu 2009. 02. 19.

With the use of remote controlled vehicles convoys and patrols check suspicious objects then defuse them from a safe distance. The biggest advantage of robots is that their personnel are safe during their actions

Picture 4. TALON military robot[11]

During the Cold War the world was under the surveillance of spy satellites. The intercontinental ballistic missiles targeting big cities were the means of ultimate deterrence. All this is, of course, useless against terrorism. Finding terrorists hiding among civilians is extremely difficult and requires strikes of surgical precision against enemy territories, which is a job for robot warriors.

Picture 5-7. Shot of the UAV[12]

[11] http://abcnews.go.com/Technology/AheadoftheCurve/story?id=7049327&page=1
„In this file photo, A remotely-operated TALON explosives ordinance disposal robot prepares to defuse a roadside bomb during an IED-clearing mission by US soldiers from Fox company, 4th squadron, 2nd Stryker Cavalry Regiment in western Baquba, northeast of Baghdad, on July 20, 2008. Armed robots working for militaries worldwide are not regulated...yet. (Ali Yussef/AFP/Getty Images)" 2010. 09. 01.

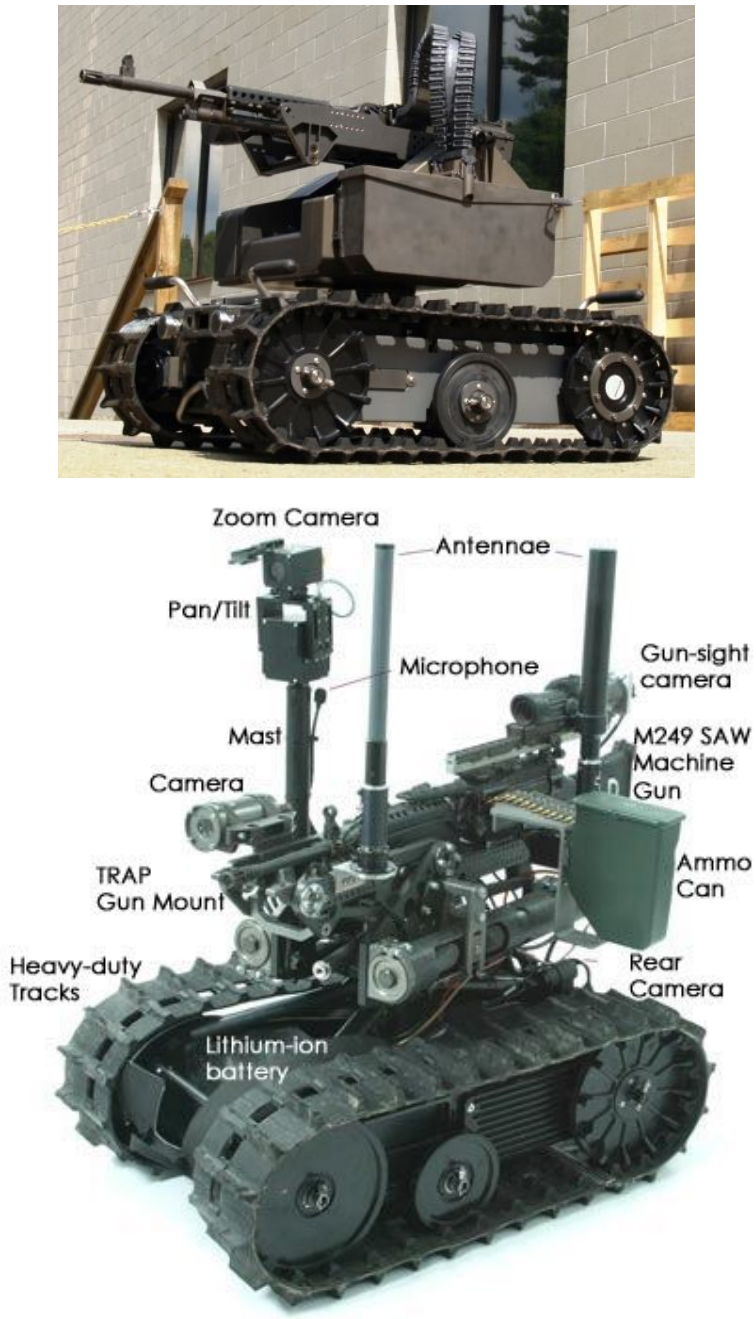
[12] http://www.tacticalwarfightergear.com/tacticalgear/catalog/Military_Robots.php 2010. 09. 01.

When a UAV identifies a target in dozens of kilometres from the battlefield, it sends a video footage to the command post on the other side of the planet, then the CP sends the precise target coordinates to an artillery unit in 30 kilometres from the target via radio. The artillery battery using precision weapons opens fire and with a single shell destroys the target. In the past this job required a lot of rounds as they could not get within the sight of enemy.

Picture 8. F-35[13]

Air force commanders can choose from UAVs, manned or unmanned fighter planes. Then a squadron can include both F-35s and F-22s where each plane participates in a well planned air combat action and it does not matter whether the planes in the formation are piloted or not. This is the battlefield of the future. The assets are tailored to the tasks and missions, regardless of their manned or unmanned feature. The main point is their impact. Not every robot is equipped with wings, like UAVs. Robots provide assistance on the battlefield with simple but dangerous tasks even today. They are telemetric machines guided by people through joysticks. In the future they will be permanent participants in military operations. In the decades to come robots capable of independent decision-making and action will be used. Their role will be more than simple re-supply and they may even play decisive roles however strange it may be. Today there are combat robots and even robots with heavy armament. A device recently used only for mine clearing, tomorrow will be equipped with automatic cannon.

[13] http://www.abc.net.au/news/stories/2008/09/24/2373045.htm?site=news 2010. 09. 01.



Picture 9–10. Robot with weapon[14]

"A robot is more efficient, versatile, and easier to maintain than a human. If it gets damaged in the battlefield it is sent to the repair shop, if it is destroyed no mourning card is to be sent to a family. After war it is taken to the store until its next deployment. In peace time it needs no support. It will fundamentally change warfare. All this may turn reality in a few decades and we are on the right track to have robots fight instead of us. The time may come when no war will have to be waged and if a conflict breaks out robots will be deployed and they will prevent the escalation of war." (Whelan, 2003)

If robot warriors seem too fantastic what opinion could be shaped on the following weapons?

[14] www.spektrumtv.hu 2009. 09. 19.

Laser weapons

Up to now laser weapons only existed in films but soon they appear on battlefields too. A laser is a narrow beam of energy aimed at its target like the death rays in sci-fi movies. High-energy laser can burn a hole through the armour of a tank or into a missile. The navy experiments with free electron laser: with various wavelengths a target can be tracked and destroyed from aerial vehicles or naval vessels.

Picture 11. Laser weapons[15]

Picture 12. Laser weapons[16]

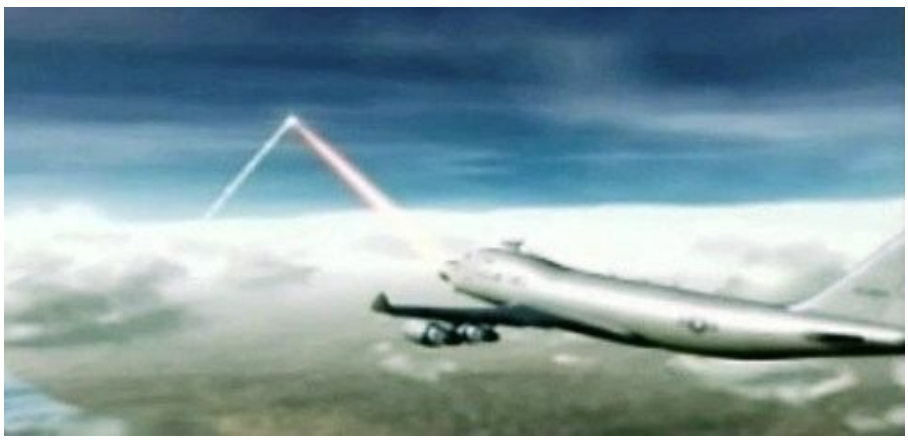
Thanks to its accuracy this laser can become an ideal defence tool of ships against cruise missiles. Since it works at the speed of light the target can be destroyed on time.

The air force entered the laser weapons experiments with an onboard laser mounted on a transformed Boeing 747.

[15] http://www.tacticalwarfightergear.com/tacticalgear/catalog/Military_Robots.php 2010. 09. 01.
[16] www.spektrumtv.hu 2009. 02. 19.

Picture 13. Boeing 747 with laser weapon[17]

The plane at an altitude of 10,000 metres is able to detect and lock on a missile in its initial, acceleration, stage. Then a gas laser beam is emitted from a port in the nose of the aircraft and destroys the missile before it could hit its target.



Picture 14–15. Boeing 747 with laser weapon in action[18]

According to certain American experts in 20 years from now fighter planes will be armed with both attack and defence lasers which will be electric and liquid. The engine will generate

[17] www.spektrumtv.hu 2009. 02. 19.
[18] www.spektrumtv.hu 2009. 02. 19.

electricity which will feed the laser. It will work like a magazine with endless number of rounds. One day it may be laser weapons that will save our World from an attack[19].

Star wars

Below let us examine an interesting imaginary fiction, or maybe a partly existing situation.

An external attack is approaching. A country is willing to deploy ballistic missiles. Can they be stopped? The biggest threat today and in the future is presented by hostile nuclear powers. The USA renewed its contradictory and widely disputed programme. President Reagan's Star Wars programme was aimed at providing the entire country with an umbrella. A smaller version of the missile defence system could be seen in Operation Desert Storm.

Picture 16. Patriot missiles[20]

Patriot missiles[21] were first deployed in 1991 but they did not prove to be as good as it had been expected. The upgraded version was deployed in the second Gulf War and some short range missiles could be destroyed with them[22]. Currently the USA is working on a system capable of destruction of long-range missiles.

The further objective is a global weapons system allowing the destruction of a long-range missile at any points of its trajectory. With a new technology this may be possible. A missile defence system based on kinetic energy can destroy a missile in the acceleration stage of its flight directly after launch when the trajectory of a slowly moving missile is calculable, making its destruction easy if the appropriate weapon is at hand. This has been the first missile defence system of the United States since it terminated the treaty on limiting missiles. The system consists of a mobile launch pad, a command vehicle, and a missile interceptor.

[19] E.g.: Col. Michael Leahy, Director, Air Force Research Laboratory

[20] www.spektrumtv.hu 2009. 02. 19.

[21] http://www.globalsecurity.org/space/systems/patriot.htm 2010. 07. 23.

[22] http://hu.wikipedia.org/wiki/MIM%E2%80%93104_Patriot 2010. 09. 11.

Picture 17. Patriot missile defence system[23]

This system is deployable anywhere in a relatively short period of time, within hours. The initially ground-based system can also operate from ships. After the satellite message on the launch of an enemy missile is received the operator launches a missile interceptor which ascends into the upper atmosphere in the first stage, in the second it takes up its position, in the third phase it approaches the ballistic missile near the point of interception, and finally a small kinetic warhead is activated which exploiting its kinetic energy – through its mass and velocity – hits and destroys the target.

Another element of the defence system – SM3 missile – guards seas[24].

Picture 18. RIM-161 Standard Missile 3[25]

[23] http://www.globalsecurity.org/space/systems/patriot.htm 2010. 09. 11.

[24] GlobalSecurity.org: RIM-161 SM-3 (AEGIS Ballistic Missile Defense) http://www.globalsecurity.org/space/systems/sm3.htm 2010. 09. 11.

The ship-based weapon cooperating with AEGIS system destroys short- and medium-range missiles. The ballistic missile defence system includes a communication and sensing system that did not even exist a few years ago. Today information can be forwarded to ships integrated into major systems and the data in the system comprise crucial elements of the operation of individual ships.

AEGIS calculates the launch time and ascent of hostile missiles then identifies the point of interception. An SM3 missile is launched which is in direct radio contact with the ship. The AEGIS guides the missile into space with radio control, where stage 3 launches the warhead which locks on the ballistic missile and destroys it within minutes.

Picture 19. Guides the missile into space[26]

Does this system work? Of course, this is efficient only if it can detect the ballistic missile in the first phase of its flight. This requires sensitive long-range radars. The prototype of the space-based defence system is already operational: the geostationary satellite network conducts permanent surveillance and early warning. Its task is to detect and monitor the launch of hostile missiles, to forward trajectory data to the ground control in order to allow them a timely response. A Cobra Dane radar is deployed on the Aleutian islands. This radar scans space from the Pacific coast to South-East Asia.

Picture 20. Cobra Dane-radar[27]

[25] http://en.wikipedia.org/wiki/RIM-161_Standard_Missile_3 2010. 09. 11.
[26] www.spektrumtv.hu 2009. 02. 19.
[27] http://www.missiledefenseadvocacy.org/web/page/1043/sectionid/557/pagelevel/3/interior.aspx 2010. 09. 11.

In Great Britain an even more modern radar operates with a 360 degree sight over Europe, the Middle East, and the Atlantic. A radar station, commissioned in the 1980s at a California air base, has recently been renovated thus it is capable of detecting and tracking missiles.

Besides the AEGIS system another new device in being tested: a sea-based X-band radar (SBX-1)[28] (GlobalSecurity.org.na), which is able to send precise sensing and tracking data to the ground based missile defence system.

Picture 21. SBX underway[29]

The SBX is 85 metres tall and more than 120 metres long. It weighs 50 thousand tons that is three times heavier than a DDG-1000. It was tested in the waters of Alaska and in the future it will become an important element of the missile defence system. In principle the system operates well but there are some problems. It is extremely expensive, its deployability is disputed, and the results have been limited so far. "For two decades the USA has spent USD 125 billion on missile defence, which is equal with the amount spent on the Apollo program and the landing on the Moon. And how much more is needed for a spectacular result? The course may be wrong. Some say the USA has no edge in the field of missile defence and if a missile was launched at the United States it would not be certain the missile may be destroyed."[30] (MoD, 2002)

Proper missile defence may be a too hard job to do but there is another, potentially more efficient, strategy: the elimination of satellites.

No modern armed forces are able to operate without high-speed communication, data transfer, and satellite-based air surveillance. Therefore, if these devices are knocked out, the activities of the military are paralysed.

During the Cold War both parties tested anti-satellite missiles but there were many warnings that the debris in space may pose a threat to other satellites too. There was a general fear of the militarization of space therefore the American Congress cancelled the program after the Pentagon destroyed an obsolete research satellite in 1985.

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[28] http://www.globalsecurity.org/space/systems/sbx.htm; http://en.wikipedia.org/wiki/Sea-based_X-band_Radar 2010. 09. 11.

[29] http://missiledefense.wordpress.com/2009/08/ 2010.01. 28.

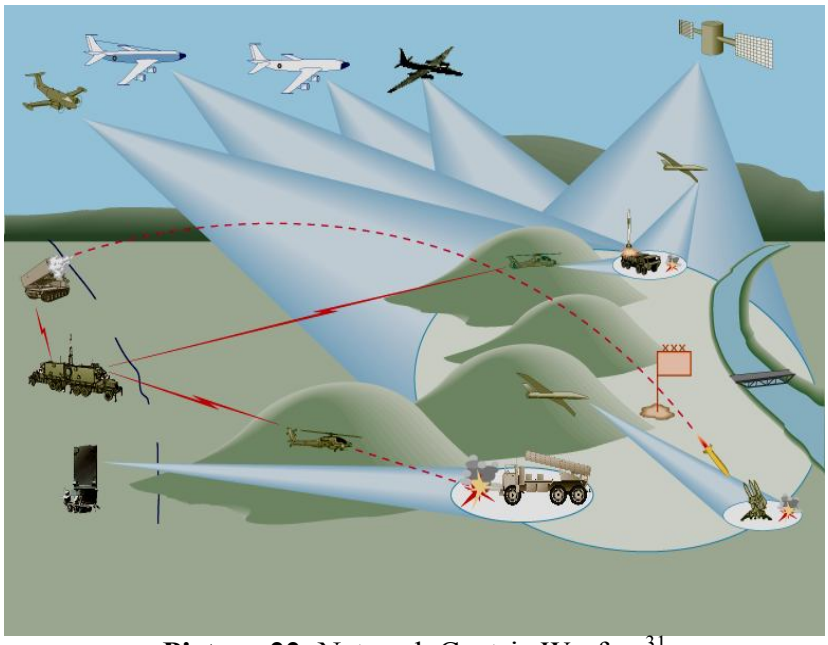
[30] http://www.globalsecurity.org/space/library/report/2002/missiledef.pdf#xml=http://www.globalsecurity.org/cgi-bin/texis.cgi/webinator/search/pdfhi.txt?query=missile+defence+system&pr=default&prox=page&rorder=500&rprox=500&rdfreq=500&rwfreq=500&rlead=500&rdepth=0&sufs=0&order=r&cq=&id=4c8496302a 2010. 09. 11.

Modern anti-satellite weapons use lasers instead of missiles. Satellites are particularly sensitive to laser and there is no need to use a very high-power beam. A medium strength beam is capable of temporarily blinding or permanently damaging optical and infrared sensors. A more powerful laser will destroy the electronics preventing the satellite from exploding and generating a cloud of debris in space.

Smaller lasers can paralyse enemy satellites on the ground or in space. There are serious technical and political barriers but if the international protest fades, these improved weapons may be integrated into the arsenal of future.

Conclusion

One day an enemy attack may be preventable. Combating terrorism requires the development of new weapons, defence systems, and intelligence technologies. This is the only hope for security.



Picture 22. Network Centric Warfare[31]

Is it the new military technologies only that can provide protection in the case of a new conflict?

The present study paper is based on the question whether the above discussed weapons systems are able to combat terrorism and terrorists only. In my opinion these new weapons are perfectly capable of waging a conventional but high-tech armed conflict or even war.

In the following part of the study paper the author will analyse the developments in progress at the services.

[31] www.globalsecurity.org 2010. 04. 05.

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