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IMPLICATIONS OF NEW MILITARY TECHNOLOGIES AND DOCTRINES FOR THE EVOLUTION OF NATIONAL DEFENSE STRATEGIES IN RELATION TO NATO

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INTRODUCTION

NATO has always tended to utilize technology to solve its defence problems.

In the '50s it was nuclear technology. At that time, the Soviet conventional superiority was balanced by the introduction of nuclear weapons in Europe. These weapons were considered the easiest way out of the economic and political problems the European countries were faced with in trying to cope with the force goals set by the Atlantic Council in Lisbon in 1952.

In the '60s and '70s the technological edge of the allied weapons systems, coupled with the deterrent effect of American nuclear weapons, was seen as the key qualitative factor capable of offsetting, at least partially, the Soviet quantitative advantage.

Today, emerging technology (ET) is at the center of NATO's attention. Again, technology is seen as the alternative to Europe's unwillingness to increase its conventional forces and is considered "the solution" to defence problems which would require a more articulated approach.

This time it is conventional technology which is supposed to constitute the "fixing" factor of a deteriorated military balance. However, the strategic and tactical framework is radically different from the past. The economic picture is also different. The framework is one of strategic parity between the superpowers and of Soviet nuclear superiority in the European theater. In addition, the adoption of new technology weapons systems will not represent a saving, as was the case when nuclear weapons were introduced in lieu of conventional forces.

The operational framework has also changed. The American propensity towards the eventual regional employment of nuclear weapons has decreased, while the Soviet doctrine has gradually moved towards the recognition of the possibility of a protracted conventional war in Europe.

On 9 November, 1984 NATO's Defence Planning Committee formally approved the long-term planning guidelines for Follow-On Forces Attack (FOFA).

This mission concept was subsequently included in the NATO Military Committee's May 1985 Conceptual Military Framework for NATO Long Term Defence Planning.

Having adopted this concept, NATO now faces the problem of making it work. The issues were very clearly outlined in the American OTA's report to the Congress of July 1986 (1). Quoting from the report, the issues were outlined as follows:

1. Which concepts for FOFA should be pursued and how should resources be allocated among them?

2. How much capability is needed?

3. Are dedicated forces required, and if so, what?

4. How are competing demands for procuring forces for FOFA to be balanced?

5. What is to be bought? Who will produce it? Who will pay for it?

6. Will the NATO command structure and its operating procedures have to be modified?

7. Will FOFA require changes in national intelligence policies and procedures?

8. What are the implications of possible Warsaw Pact responses to FOFA?

Obviously, this discussion paper does not intend to attempt to answer these very difficult questions. Its scope is simply to identify some of the new ET weapons systems and then try to assess what their introduction in allied forces will mean for the defence of the southern NATO fronts. The paper will not address the issue of the utilization of nuclear weapons, either in a pre-emptive mode on the part of the Soviet Union, or in a selective way by NATO in the context of its flexible response strategy. In other words, the analysis will be restricted to the conventional aspects of the defence of NATO's southern region countries in the face of NATO's present drive towards emerging technology weapons systems.

1. THE GENERAL FRAMEWORK

It appears evident that both NATO and the Warsaw Pact have moved away from the perspective of a war in Europe which entails the use of nuclear weapons in its initial phase.

The possibility of a protracted conventional conflict is gaining credibility, even though NATO has restated the full validity of its doctrine of flexible and graduated response and of first use of nuclear weapons, and even though NATO commanders believe that, due to Soviet conventional power, the Alliance has reverted to a "delayed trip-wire" strategy. In fact, the point is how protracted a conventional war in Europe could be, considering the repeated warnings issued by the Supreme Allied Commander of NATO forces in Europe, Gen.

Bernard Rogers, about NATO's conventional inferiority. Gen. Rogers has stressed that "if war broke out today, it would only be a matter of days before I would have to turn to our political authorities and request the initial release of nuclear weapons." (2)

A further point is if and how the ET systems will effectively raise the nuclear threshold improving NATO's capability to defend itself with conventional weapons, or if they would simply protract the conventional phase of the war, simply delaying the still needed use of nuclear weapons as a last, uncertain and risky resort to bring the conflict to a halt and reach a diplomatic solution.

It is likely that the opening days of a NATO-Warsaw Pact conflict in Europe, although conventional, will be marked by a warfighting pace and intensity very different from WWII and even higher than that seen during the Arab-Israeli wars.

The new technology weapons systems tend to increase these characteristics. In fact, they will permit the fighting to go on regardless of whether it is day or night and of weather conditions. Furthermore, the precision with which the weapons can be delivered and the high destructive potential of the new warheads tend to equate the effect of the high technology weapons systems to those of small yield nuclear weapons. The high lethality of today's and tomorrow's highly technological conventional battlefield will result in a killing rate unimaginable in past wars, while the proliferation of area coverage, distributed munitions warheads will dramatically increase the number of wounded for whom treatment will not be possible or available. Another point to be underlined is the substantial and growing difference between early and follow-on war stages (3). The early phases will be characterised by mass attacks along fairly predictable corridors and against known, selected targets with the aim of disrupting NATO defences, opening avenues of penetration, effecting a rapid pace of advance, and provoking the collapse of the whole front under attack. Only if and when this phase is terminated with negative results for the aggressor, will the war be likely to continue with sustained combat by maneuvering units in a way similar to WWII military operations, although with the peculiar features outlined above.

A final point to be taken into consideration is the fact that the aggressor will not only choose the moment and place of the attack but will also maintain the initiative in the early phase of its military operations.

All this means that the defender has at least three imperatives: first, he must capitalise on the warning, no matter how small and imperfect, that the enemy provides in preparing its aggression. No time should be lost. If the multinational decision-making process is too slow, preparatory actions in the framework of the SACEUR Alert System should be implemented on a national basis in order to set up the main elements of defence. Although excessively belligerant actions should be avoided, the weight given to the political element of "provocation" should not jeopardize the necessary preparation for defence.

Second, the defender must stop the initial attack before it gains momentum. This can be achieved by a series of active military responses - with

FOFA being part of them - and by a set of peacetime erected fortifications to impede the rapid advance of armored units.

The political and social problems connected with the fortification of border areas are well recognized. However, even in this field new technologies provide acceptable solutions in terms of low environmental damage, small areas required for the construction, low visibility of the supporting infrastructures, limited militarized zones.

Third, the defence of key assets - in particular air assets in the rear areas - is of paramount importance. This can be carried out with both active and passive defence measures (hardening and dispersion).

One can rightly say that there is nothing really new in these imperatives. What is new, in fact, is the adoption and the application of new technologies either in the form of weapons systems or supporting assets (surveillance, detection and targeting, command, control, communication and intelligence (C3I), electronic warfare, etc).

2. NEW TECHNOLOGIES

Frank Barnaby has recently written that "if technological developments hold sway, the fully automated battlefield will be with us, at least in the industrialized countries, by about the year 2010" (4).

Even without fully endorsing Prof. Barnaby's prediction, it appears evident that technological developments are radically changing the way of waging war. The technological impact is felt on the whole range of military hardware and on its supporting elements. Let us briefly examine some of the fields where changes are more significant.

a. Weapons systems

In the weapons systems field the most striking developments have taken place in the guidance, and hence in the high killing ratio, of air-to-surface and surface-to-surface weapons systems.

The so-called smart weapons are not totally new. They were employed for the first time during the Vietnam war. The traditionally told story about their effectiveness refers to the destruction of the Than Hoa bridge at Hanoi. From 1965 to 1968 the American air force unsuccessfully conducted more than 600 fighter bomber sorties against the bridge, dropping a total of 2000 tons of conventional bombs and suffering the loss of 12 to 30 aircraft. In 1972, using laser guided bombs, 8 sorties were sufficient to drop the bridge during the first mission (5).

Apart from laser, electro-optic and infrared guidance systems, new systems providing very small CEPs are microwave radiometry, radar area correlation (RAC) and Satellite Position Fixing using the data provided by the Global Positioning System. With these guidance systems, CEPs of less than 10 meters are obtainable.

The technological trend points towards the development of air-to-surface weapons with a fully autonomous capacity to search for, recognize and attack the target. This capacity would be provided by the use of sophisticated sensors and artificial intelligence.

Another significant development is taking place in the field of cluster weapons. The aim is to make the submunitions intelligent so as to search out an area with electronic sensors and selectively engage the targets they find. For example, the submunitions would be capable of looking for the most valuable targets, attacking the tanks instead of the armored infantry vehicles or the trucks.

The CEPs of the more sophisticated air-to-surface weapons can be obtained also by the cruise and surface-to-surface missiles. For the cruise, the precision is provided by the TERCOM (Terrain Contour Matching) system, while for the SSM the small CEP is obtained through the use of manouverable warheads. The American Pershing-2 has been reported to possess a 30-45 meter CEP.

While the London-based International Institute of Strategic Studies still assigns a CEP of 300-350 meters to the Soviet SS-21, SS-12 mod. and SS-23 missiles (6), Mr. Richard de Lauer, former US Under Secretary of Defense for Research and Engineering, in a press interview, credited "the new models of SS-21, SS-22 and SS-23 missiles with accuracies making it possible to hit within 30 m. of a target" (7). If this CEP is proved to be true, the threat represented by the Soviet short-range ballistic missiles will significantly increase. Armed with conventional area coverage, distributed munitions or air-field denial warheads, these missiles can dramatically enhance Soviet conventional first strike capacity, in particular against NATO's vital airpower.

The same applies to other types of weapons (anti-ship, anti-tank and anti-aircraft) where sophisticated guidance systems, coupled with very effective warheads, tend to increase the vulnerability of air, naval and ground assets. The future will bring a growing direct correlation between targeting and killing. If the targeting has been positively accomplished, the target will be hit and destroyed unless it is defended by a system with better performances than the attacking weapons. This means, as Danied Deudney, an American expert in information technology, has lucidly said, that the future will no longer be the traditional confrontation between offensive and defensive systems, but "rather a competition between the visible and the hidden, between transparency and stealth" (8).

b. Mines

In the field of mine warfare, new technology has brought three significant developments. First, the diversification in the methods of disseminating mines. Today, mines can be remotely dispensed from artillery, rockets, or aircraft. Second, the increase in the lethality of mines against armored targets. Third, the smart mines, capable of controlling a wide area (and thus the ability to target what is moving on a road from a concealed position on one side) and to discriminate between tanks and lower value targets. Among the most effective mines presently in production and in development: the USAF GATOR mine, the US Army ADAM and RAM; the German air-delivered MIFF antitank mine and the AT-2 mine to be carried in the Multiple Launch Rocket System (MLRS); and the USAF ERAM (Extended Range Antiarmor Mine) smart mine.

c. Target-acquisition systems

This is another field where developments have been impressive and where research is actively proceeding. Among the systems in production or in the developmental phase the most significant are the following:

The Low Altitude Navigation and Targeting Infrared System for Night (LANTIRN), which will provide the tactical aircraft with a day and night low altitude navigation/precision attack capabilities in all weather conditions.

The Tactical Reconnaissance System, to be flown on the TR-1 aircraft, to pass reconnaissance information to ground stations in near real time.

The Advanced Synthetic Aperture Radar System (ASARS-2), a high resolution radar imaging system capable of producing high-quality imagery at long standoff ranges in strip mapping and spotlight modes. The system is also supposed to be installed in the TR-1 aircraft.

The Precision Location Strike System (PLSS), a system capable of detecting, accurately locating, identifying and directing strikes against enemy radar emitters in near real time.

Other systems include the Pave Spike, Pave Penny and Pave Tack pods, normally mounted on fighter-bombers, for the accurate delivery of their ordnance. The Pave Tack System was utilized by the American F-111s during the air strike against Libya last April.

d. Command, control and communications (C3)

The large amount of different information available to the commander and the need to take decisions in a very short time pose problems which can be resolved only with the aid of computers. Automation is gaining ground and computers are not only handling the information process but also increasingly taking over the decision-making process. When the response has to be immediate - for example the defence against short range ballistic missiles with flight times of 2-5 minutes - the tendency is to take the man out of the decision loop. As computers increase their capacity they are being increasingly utilized by the C3. Eventually, it will be possible to fully computerize all C3 operations. As Frank Barnaby says "computerized C3, together with autonomous weapons, are the essential elements of automated warfare" (9).

In summary, considering in particular those systems which will reach maturity in the next several years and which could have important implications on the application of the FOFA concept, the most significant ET developments are as follows:

- ASARS II (synthetic aperture radar surveillance system);
- PLSS emitter location system;
- Joint STARS (Surveillance Target Attack Radar System) moving target radar and weapon control system;
- LANTIRN navigation and targeting system for tactical aircraft;
- Army TACMS (Tactical Missile) ballistic missile;
- Smart antiarmor submunitions such as Skeet and SADARM (Search and Destroy Armor), and the MLRS/TGW (Terminally Guided Warhead for the Multiple Launch Rocket System);
- AGM-130 air-to-surface missile;
- RPV/TADARS, an army reconnaissance and target designation system;
- various electronic warfare capabilities.

In 1984 the NATO Conference of National Armaments Directors listed eleven candidate ET projects designed for deployment in the next ten years. Some systems are similar or identical to those being developed in the United States.

- NATO IFF (Identification Friend or Foe);
- Electronic warfare systems for helicopters;
- Electronic jamming systems for tactical aircraft;
- Standoff radar surveillance and target acquisition system (based on, or similar to the JSTARS);
- Ground-based electronic support system to process sensor data;
- Short-range anti-radiation missile (SRAM);
- Low-cost powered dispenser for use against fixed targets;
- Terminally guided warhead (TGW) for the MLRS;
- Medium-range RPV (Remotely Piloted Vehicle) for battlefield surveillance and target acquisition;
- Autonomous precision-guided munitions for 155mm artillery;
- Artillery locating system (counterbattery radar).

3. THE ET AND THE DEFENCE OF THE SOUTHERN REGION

To analyze if and how the ET weapons systems could effectively improve the defensive posture of NATO's southern region countries, it is necessary to refer to their geostrategic and military strengths and weaknesses.

a. Italy

Geostrategically, Italy has the advantage of bordering two neutral countries, Austria and Yugoslavia, ready to fight to safeguard their territorial integrity and unwilling to open their frontiers for the passage of Warsaw Pact divisions in case of an East-West crisis in Europe. Furthermore, Italy has the geostrategic advantage of presenting a single, limited avenue of ground invasion at its north-eastern border, characterized by mountainous, rugged terrain for most of its extension. Except for the narrow Gorizia gap, mass armor operations would not be possible. The terrain is well suited for dug-in, fortified defenses. The employment of remotely deliverable mines - antitank and antipersonnel of the types indicated in paragraph 2b - seems particularly attractive to block roads and passages. Their dissemination along valley roads would retard and impede movements of armored and mechanized units, providing for an increase of fixed, lucrative targets.

Furthermore, Italy's unique geostrategic position protruding in the Mediterranean Sea, accentuated by Sardinia, Sicily and the islands of Pantelleria and Lampedusa, constitutes both an element of defensive liability and of operational advantage and opportunity.

On the one hand, Italy's extensive coastline makes surveillance more difficult, while its Mediterranean projection makes it more vulnerable to any southern threat and to submarine launched cruise missiles (10). On the other hand, that same Mediterranean projection and the islands allow for greater air and sea coverage of the Mediterranean, enhancing the role of ground-based air power.

In addition, the relative width of the Sicily Channel allows for easy monitoring, control and filtering, if necessary, of maritime surface and submarine traffic in case of conflict.

New technology can help the Italian defensive posture by offering more sophisticated sensor and weapons systems (torpedos, mines, depth charges) for the antisubmarine warfare (ASW) and very precise air-to-surface and surface-to-surface antiship missiles with longer standoff ranges and better resistance to deceptive measures.

A new element of vulnerability is represented by the new Soviet SS-12 mod. and SS-23 SSMs. The 900 km range SS-12 mod. from Czechoslovakia can cover the Italian territory up to Naples and Taranto, while the 500 km range SS-23 from Hungary can hit targets in the northern battle area up to Verona. This threat would increase in quantitative and geographical terms if SS-23s would be deployed in some North African countries.

The present technology does not offer a reliable, effective anti-tactical ballistic missile (ATBM) system. However, research and development is being conducted in the United States and in Europe to field an ATBM architecture complementing the long-range and short-range air defense missile system.

b. Greece

Greece's most evident geostrategic disadvantage is the short distance between the Greek-Bulgarian border and the Aegean Sea coastline. It would be impossible to trade space for time. There is no alternative to forward defense. New technologies can help to defend at the border. As in the case of the Italian north-east border, active defense can be coupled with fortified interlocking bases, remotely fired gun and mortar positions, hardened and concealed electronic jammers, smoke and chaff generators, etc., exploiting the characteristics of the terrain to their maximum.

Another defense liability is the limited size of Greek territory. While the airbases are within range of the Soviet bombers and Su-24 type fighter bombers - some also of the Bulgarian Mig-23BM aircraft - there are not enough of them for the redeployment and dispersal of vital air assets.

New technologies can provide for effective air defense systems, in particular surface-to-air missiles with shorter reaction times, stronger resistance to countermeasures, higher lethality warheads. Even recent developments in AA guns appear as attractive solutions for point defense problems against the Warsaw Pact air threat.

On the other hand, Greece, with its more than 3,000 islands, can utilize new technologies for the control of the Aegean Sea. Long-range stand-off air-to-surface missiles can provide a significant capability for a thorough sea denial role. Passage through the Aegean Sea of Soviet Black Sea Fleet naval forces, in case of Soviet control of the Turkish Straits, can be denied by the employment of missile-armed fast patrol craft, easily dispersed among the island ports and attacking with woolf-pack technique, by aircraft armed with sea-skimming ASM, and by mobile ground-launched SSM deployed on the islands controlling the most important sea passages and choke points.

Finally, new technology sensors and mines are other assets that can turn the tide in favour of NATO forces in the anti-surface ship and anti-submarine warfare operations in the Aegean Sea.

The SSM threat will significantly increase when Bulgaria replaces its 40 FROGs and 36 SCUDs with the new SS-21 and SS-23 missiles. The 120 km SS-21s will be capable of covering the entire Thrace area, while the SS-23s the majority of the Greek territory. The SS-23s could be employed for a conventional pre-emptive strike against the airbases and other key military targets.

c. Turkey

Turkey's geographic position, which is at the root of its strategic importance for NATO defense, is also at the root of the complexity and difficulty of Turkey's defense problems.

A geostrategic analysis reveals a number of negative elements in terms of defense. In the event of an East-West conflict, the Turkish armed forces would find themselves engaged on three separate fronts: the Turkish Thrace, the Straits and the Black Sea coast, and the Eastern Turkish-Soviet border. Moreover, it is not to be excluded - though the hypothesis seems very unlikely - that Turkey might also be engaged on the southern front if Syria decided to side with Moscow.

There are, however, few beaches on the Turkish Black Sea coast that are suitable for massive amphibious operations - and the Soviet Black Sea Fleet amphibious force counts only 25 ships and 12 craft - while advances towards the interior are made difficult by the Pontus mountain range. The terrain on the Turkish eastern border is largely inaccessible, unsuitable for armored or mechanized units operations, and with few practicable passes. The terrain bordering on Syria is also particularly rough and mountainous, especially near Iskenderum.

The weakest and most vulnerable area is the Thrace, along the border with Bulgaria, where there are easy lines of attack through the Vardar Valley, the Struma Pass and the plains that lead directly to the Aegean Sea and the Straits. The terrain is suited for the use of armored divisions, while the shallow depth prevents the adoption of defense manouvering and makes forward defense a necessity.

As far as the Turkish-Soviet border is concerned, the characteristics of the terrain should be used to its own advantage, with active and passive defense measures, as in the cases of Italy and Greece.

The Straits can easily be closed to maritime traffic, and in this case the new technologies can simply provide more sophisticated and effective means of doing that.

For the defense of the Black Sea coast new technologies can provide a vast array of new sensors to monitor, pick up, and discriminate any surface or submarine threat. This early warning and control system can be integrated by mobile surface-to-surface missiles for the actual defense. The new mines can also be used for the purpose of interdicting the easiest approaches to the Turkish beaches.

The defense of the Thrace area can be improved not only with those physical "barriers" which can be erected, according to the features of the terrain, to constrain, impede, slow down, re-direct the forward thrust of the armored units, but also equipping the ground forces with new technology antitank missiles and the airforce with the most sophisticated distributed munitions and area coverage weapons systems.

The replacement of FROG, SCUD, and SS-12 missiles with the new SS-21, SS-23 and SS-12 mod. missiles in the Soviet forces deployed in the Odessa Military District and in the southern TVD, which will be presumably completed in the next ten-year period, will increase the conventional SSM threat.

While the threat of the SS-12 mod. missiles will not change, since the new models have the same range as the missiles they replace, the upgrade from the SCUDs to the SS-23s would permit the Soviets to target the northern part of the Turkish territory from the Crimea peninsula and from the Krasnodar area, and the eastern part from the Georgian and Armenian regions.

The Soviet Union could reach even deeper into central and southern Turkey if SS-12 mod. missiles were deployed into Bulgaria, in the same way that they were deployed in Czechoslovakia and East Germany in 1984.

4. CONCLUSIONS

Both within NATO and the Warsaw Pact a tendency has emerged in the last few years to consider the protracted employment of conventional weapons as the likely scenario of a war in Europe.

For NATO, three factors are pushing toward the conventional option: the decreased American propensity to consider the use of nuclear weapons in Europe as a viable defensive option; the drive towards new technologies to enhance NATO deterrence and military posture, and to raise the nuclear threshold; the European political parties' and public opinion's attitude against nuclear weapons. For the Warsaw Pact, the recognition of the fact that nuclear strategic parity between the Soviet Union and the United States, coupled with its superiority in the regional nuclear balance and in the conventional balance, at least in quantitative terms, gives a clear military edge over NATO, making the use of nuclear weapons unnecessary except for retaliatory purposes.

Apart from the questions raised by the adoption of the FOFA concept, it appears evident that the emerging and emerged technologies cannot, by themselves, solve all NATO's defense problems. It seems to me that what is needed are defensive solutions based mainly on ingenuity - in particular if forward defense remains at the base of NATO doctrine - and on new ways of force employment. In 1940 the tank and the fighter bomber were not new technology weapons systems. It was the way they were employed by the Third Reich which represented the winning factor of WWII initial military operations in Europe.

Conventional new technologies are very costly. Furthermore, they also tend to raise the time and cost of training. How many systems would the NATO southern region countries be able to buy, considering the constraints imposed on military budgets ? Where should the limit between quantity and quality be set and how should the best mix between old and new weapons systems be decided upon? A major effort by the European countries to share R&D costs and to join in industrial ventures aimed at achieving a deeper interoperability and a better standardization is certainly and badly needed. But this effort would be possible only if narrow nationalist approaches to the European security as a whole were abandoned. The United States can help with a more open attitude towards the European request for a more balanced "two-way street" in transatlantic production and export of ET weapons systems.

It appears that new technologies make defense much more cost-effective than offense. It has often been said that is much cheaper to destroy the "offensive" weapons, than to buy them. In fact, this should not be overstressed, not only because it is impossible to distinguish between "offensive" and "defensive" systems, but also because technology works on both fronts. In other words, it also works to make "offensive" weapons more cost-effective. It is the traditional struggle between sensors and decoys, between radar and stealth technology, between sonar and quiter submarine engines, between antiradar missiles and high-velocity, frequency-hopping radars.

As mentioned before, it is true that new technologies are increasing the pace of warfare and its destruction potential. However, although the new weapons systems allow to operate day and night, without weather restrictions, the human element will still impose its biological and psychological rhythms. A war without pauses can be waged only by robots. This is a long-term scenario for a fully automated battlefield in the distant future.

New technologies could arouse the temptation to pre-empt. Very precise SSM with effective conventional warheads, stealth attack aircraft, long-range stand-off missiles, sophisticated ECM systems, are all essential elements of a first strike. These elements, together with the capability of detailed and precise coordination offered by reconnaissance, navigation and C3 satellites, could furnish a strong incentive to pre-empt in a crisis, thus gaining a decisive edge. Deterrence can be maintained only if new defensive technologies are perceived by the adversary as being capable of effectively meeting the threat and blunting any first strike attempt.

There is little doubt that electronic warfare will play a predominant role in any future conflict. Growing automation means growing reliance on computers, electronic sensors, electronic C3 assets, etc. Possessing the capability to confuse, deceive, disrupt, deny the use of the adversary's electronic systems means to have the key of one of the most important winning factors of any future conflict. Would this fact push towards the detonation of low-yield nuclear warheads at such altitudes as to reap the best of the disruptive effects of the EMP, at the same time limiting the other damages provoked by the explosion ?

An ATBM system for Europe will very likely be a development of new technologies in the year 2000. However, the following questions remain open: will the system defend only a few NATO countries - the ones which will have the financial resources to buy it - or, like the AWACS, will it become a NATO system defending all the members of the Alliance ? Would a dedicated system be developed, i.e. against ballistic missiles only, or instead, a system capable of addressing also the threat posed by the Soviet ground-launched cruise missiles which will come into service in the near future? What would be the reaction of the Soviet Union in terms of countermeasures ?

Greece, Italy and Turkey have on order weapons systems which can be considered of "emerged" technology (11). Greece is acquiring improved TOW antitank guided weapons (ATGW), AH-1S Cobra attack helicopters, and Mirage 2000 aircraft. Italy is acquiring Stinger surface-to-air missiles, A-129 Mangusta attack helicopters, Multiple Rocket Launchers, Maverick air-to-surface missiles, and Spada surface-to-air systems. Turkey is acquiring AH-1S Cobra attack helicopters, Rapier surface-to-air missiles, Meko-200 frigates, F-16 aircraft, Maverick air-to-surface missiles and Super Sidewinder air-to-air missiles. The most significant developments are the acquisition of attack helicopters, high performance aircraft such as the F-16 and the Mirage 2000 and more effective antitank and antiaircraft missiles. However, none of these systems is really revolutionary new technology, even though their introduction in the NATO inventory will enhance the southern region countries' conventional deterrence and defense. On the other hand, it should be recognized that technology, except in a very few cases, is evolutionary more than revolutionary, and even improvements in the weapons systems on hand constitute a qualitative jump that should not be underestimated.

The process of technological development is part of the Western way of life, both in the civilian and military sectors. Thus, it is logical that technology is often assumed to be the best solution for NATO defense problems. But technology should not mesmerize our judgment and it should not be seen as the "only" way to solve the contradictions of the Western defense posture.

NOTES.

1. Technologies for NATO's Follon-On Forces Attack Concept, A special report of OTA's Assessment on Improving NATO's Defence Response, Office of Technological Assessment, United States Congress, USGPO, Washington, July, 1986.

2. Gen. Bernard Rogers, "Follow-On Forces Attack (FOFA): Myths and Realities", NATO Review, December 1984, pp. 1-9.

3. Leonard Sullivan, "New Opportunities for the Initial Defense of Fixed Borders", presentation to a conference on "Emerging Technologies: Deliverance or Delusion ?", Center for the Study of Foreign Affairs, Washington, 28 October 1986.

4. Frank Barnaby, "The Automated Battlefield", The Free Press, New York, 1986, p. 6.

5. The loss of 30 aircraft is reported by Cecil I. Hudson Jr. and Peter H. Haas, "New Technologies: the Prospects", in Johan Holst and Uwe Nerlich, ed. "Beyond Nuclear Deterrence", New York, 1977, p. 109. The loss of 12 aircraft is reported by Graham T. Allison and Frederic A. Morris, "Precision Guidance for NATO: Justifications and Constraints", Holst and Nerlich, op. cit. p. 207. Norman Augustine talks of 873 sorties. Cited by F. Barnaby, op. cit. p. 15.

6. The Military Balance 1986-1987, The International Institute for Strategic Studies, London, 1986, p. 205.

7. The Washington Times, 1 November 1984.

8. Cited by F. Barnaby, op. cit. p. 38.

9. F. Barnaby, op. cit. p. 14.

10. The Soviet Union is developing the SS-N-21 cruise missile that would be carried by the Victor III and modified Yankee class submarines, and by the new Akula, Mike and Sierra class submarines. Due to its small dimensions, the SS-N-21 can be launched from torpedo tubes.

11. The Military Balance 1986-1987, op. cit. pp. 69-72 and pp. 78-79.