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MARS IN CATHEDRA

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Mededelingen van het bestuur

Adelborstenprijs 1990

Bij de uitreiking van de getuigschriften aan de afgestudeerde 5e jaars officieren-cursist aan het Koninklijke Instituut voor de Marine op 11 januari 1991, gaf ook de Vereniging „acte de présence". De aanleiding hiervoor was de toekenning van de adelborstenprijs 1990 aan luitenant ter zee der 2e klasse H. Warnar voor zijn afstudeerscriptie „Tactieken voor actief laagfrequente sonarsystemen".

De scriptie omvat de resultaten van een onderzoeksstage, die Warnar bij de afdeling Operationele Research van het Fysisch en Elektronische laboratorium TNO (FEL-TNO) volgde. Voor dit laboratorium was de scriptie een „pilot"-project, waarvan het hoofddoel was te onderzoeken of speltheoretische methoden vruchtbaar konden worden gecombineerd met de bij het FEL-TNO ontwikkelde uitgebreide simulatie- en rekenprogramma's om strategieën voor de detectie van onderzeeboten te ontwikkelen. In tweëerlei opzicht betreft het onderzoek een uiterst actuele kwestie. Enerzijds vergt het steeds stiller worden van Sovjet-onderzeeboten naast een uiterst technische inspanning ook de ontwikkeling van steeds geavanceerder zoekstrategieën. Anderzijds verschuift het Westerse militaire belang naar inspectie en verificatie.

Opvallend bij het verrichten van het onderzoek zijn de fundamentele aanpak van Warnar en zijn sterke motivatie om theorie aan praktijksituaties te koppelen. Op deze wijze kon hij tot de kern van de zaak doordringen, en met een relatief eenvoudige, maar geheel doordachte en verantwoorde analyse met praktisch bruikbare resultaten komen, zowel voor de monostatische als de bistatische zoektechniek.

De bevindingen van het onderzoek hebben het karakter van tactische aanwijzingen en leveren daarnaast schattingen op van minimaal te garanderen gemiddelde detectiekansen. Dit laatste relativeert nog voordat zulke systemen in de praktijk zijn gebracht, het aanvankelijk optimisme ter zake van het verbeteren van detectieresultaten door bistatische sonarinzet.

De voorzitter, generaal-majoor G. J. Folmer, reikte met enkele passende bewoordingen de prijs uit aan de uitverkoren officier-cursist.

Verslag van de Algemene ledenvergadering

gehouden op maandag 6 mei 1991 te 's-Gravenhage

Op 6 mei 1991 werd aansluitend op de lezing van prof. dr. P. H. Baehr in de Constant Rebecque Zaal van de Prinses Julianakazerne te 's-Gravenhage een algemene ledenvergadering gehouden.

Om 21.45 uur opende de voorzitter, luitenant-generaal G. J. Folmer, de vergadering.

Achtereenvolgens werden de volgende verslagen aangenomen:
het verslag van de vorige algemene ledenvergadering, het jaarverslag 1990 van de secretaris, en het jaarverslag 1990 van de penningmeester. Tevens werd het verslag van de kascontrolecommissie aangenomen, waarna de oud-penningmeester, kol J. R. Karsing, werd gedechargeerd.

Omdat een aantal bestuursleden kenbaar had gemaakt niet herkiesbaar te zijn, had het bestuur een aantal nieuwe bestuursleden voorgedragen. Ter vergadering werd de voordracht van het bestuur aangenomen, waardoor het voltallige bestuur met ingang van 6 mei 1991 bestaat uit de volgende leden: voorzitter: brigade-generaal P. Huijsman; vice-voorzitter: kolonel drs. R. H. Rozeboom; penningmeester: luitenant-kolonel M. P. Dekker; secretaris: majoor A. G. D. van Osch; hoofdredacteur Militaire Spectator: brigade-generaal T. de Kruijf; leden: luitenant-generaal b.d. prof. G. C. Berkhof, kolonel der mariniers mr. drs. C. Homan, kolonel J. C. W. Rhaesa, tweede-luitenant drs. M. de Haas, jhr. mr. J. P. de Savornin Lohman, drs. F. J. J. Princen, kapitein-luitenant ter zee R. A. A. Klaver, luitenant-kolonel P. W. Gorissen, ledenadministrateur: de heer J. Nijman.

Ter vergadering heeft slechts één lid, de heer J. Weller, zich bereid getoond plaats te nemen in de kascontrolecommissie. Het bestuur zal uitzien naar nog een tweede kandidaat.

Geen van de aanwezige leden heeft gebruik gemaakt van de rondvraag.

Bij afwezigheid van de nieuwe voorzitter heeft luitenant-generaal G. J. Folmer aan het einde van de vergadering het voorzitterschap overgedragen aan de vice-voorzitter, kol drs. R. H. Rozeboom. De vice-voorzitter maakte gebruik van deze gelegenheid door nogmaals de luitenant-generaal G. J. Folmer uitgebreid te bedanken voor het vele werk dat hij voor de Vereniging heeft verricht. Tevens gaat onze dank naar de overige oud-bestuursleden, brigade-generaal J. C. A. C. de Vogel, kolonel J. R. Karsing, kolonel der mariniers H. T. F. M. Mallant en kapitein-luitenant ter zee mr. R. Simonis, van wie in het afgelopen bestuursjaar reeds afscheid is genomen.

Om 22.15 uur sloot de vice-voorzitter de vergadering.

Voordracht

Op maandag 4 maart 1991 werd in Den Haag een voordracht gehouden door Group Captain Andrew Vallance, Director of Defence Studies for the Royal Air Force over het onderwerp:

The importance of Air Power within the 21st century

De tekst van de voordracht wordt hierna onverkort weergegeven, gevolgd door een samenvatting van de discussie.

Introduction

It is a great pleasure and privilege to be invited to address this distinguished institution on 'The Importance of Air Power in the 21st Century'. That of course is a very large and important question, and one which could be approached from several directions: for example industrial, military and political spring to mind immediately. But within the forty minutes or so available to me, I would like to concentrate specifically on the possible contribution that air power could make to overall defence capabilities in the next century. The views I shall give will be entirely my own and should not necessarily be interpreted as official Royal Air Force policy.

Air power: a distinct form of military power

Air power — which I define as the ability to use platforms operating in or passing through the air for military purposes — is unquestionably as distinct a form of military force as is land power or naval power. Air, land and sea operations each take place in very different environments and — as a result — air power, sea power and land power have quite specific and characteristic strengths and limitations. The strengths of air power can be summed up in five words: speed, reach, concentration, responsiveness and flexibility.
Air vehicles clearly travel far faster than land vehicles or ships at sea and can therefore project military power far more rapidly. In terms of strategy, speed facilitates surprise and saves time. In terms of tactics, it reduces exposure to

hostile fire and enables a greater number of tasks to be undertaken within any given period of time.

Air power also prossesses unrivalled reach in that it can be used to project military power over great distances in any direction unimpeded by surface features such as mountain barriers or water expanses. And that makes air power truly ubiquitous; whereas thirty per cent of the world is covered by land and seventy per cent is covered by sea, one hundred per cent is covered by air!

Speed and reach — when taken together — enable air systems to concentrate military power in time and space to an extent which at present cannot be achieved by land or sea systems. For example a squadron of Tornados could deliver 50,000kg of ordnance onto a target in a matter of seconds; in contrast, a regiment of M-109 155mm artillery guns would take nearly ninety minutes to do the same job, assuming of course that they were in the right position. This unique ability of air power to concentrate firepower, when and where it is needed, facilitates not only destruction, but also shock — and consequently — delay, demoralisation, disruption and dislocation. While the operational analyst finds these effects very difficult to quantify, historical experience suggests that they — even more so than physical destruction — which tend to be the main factors in winning battles.[1].

Another key strength of air power is its flexibility. Air power can be used to perform a wide variety of actions, produce a wide range of effects and be adapted with comparative ease to meet changing circumstances and new situations. For example, a modern fighter-bomber can be used for defensive and offensive tasks; it can attack land and sea targets, fixed and moving targets, hard and soft targets, air and surface targets. It can even undertake several tasks during a single sortie. At present, no other weapon system can offer anything like this level of flexibility.

Finally air power is uniquely responsive. It can be generated for war within a very few hours at any time of the day or night on any day of the year; NATO Air Forces have regularly proved this during Tactical Evaluation exercises. Air power can either fight directly from its peacetime bases, or it can be deployed rapidly into distant theatres, either to deter aggression or to provide visible and timely support for friendly forces or nations under attack. The British reinforcement of Belize with Harriers in 1972 and again in 1977, and our deployment of strong air forces to protect Saudi Arabia last August illustrates this point. It is important to note that in each of these cases, air power acted as a major stabilising influence; indeed, it was the only military instrument at the disposal of the British Government which could get to the crisis area in time, and with sufficient force, to deter further aggression.

These strengths allow air power — in a phrase — to „get there fastest with the mostest". And that, as the military historians amongst you may recall, is the quality that General Nathan B Forrest (the distinguished American Civil War cavalry leader) often claimed to be the secret of success in war!

Of course air power has its limitations as well as its strengths. Aircraft cannot stay airborne indefinitely, and therefore air power is an impermanent form of military power. Aircraft also carry relatively small playloads and need large bases if they are to operate effectively. But these limitations are not necessarily crucial. Speed can compensate in part for relatively low payloads; it is worth remembering that during the 1973 Yom Kippur War while the majority (74%) of US military equipment supplied to Israel was sent by sea, none of it actually arrived in Israel before the shooting had stopped.[2] Similarly, the impermanence of air power can often be a very valuable asset because it allows influence to be exercised over an area while avoiding a physical presence in that area. For example, the 1988 US AWACS operations in sub-Saharan Africa and the middle-East provided both a warning and an implied deterrent to potential aggressor states in those regions while avoiding any direct physical or political commitment.[3]

Nor is dependence on bases a characteristic unique to air power. Armies in the field need support depots, and navies need harbour and dockyard facilities. The dependence of air power on its bases only becomes a weakness if those bases are vulnerable, something which increasingly in recent years has not been the case. In the recent Gulf War the Iraqi Air Force — which had large and relatively survivable bases — proved far easier to destroy in the air than it was on the ground. Indeed, the unique ability of air forces to fight directly from their peacetime bases can be a major advantage as it enormously simplifies logistics.

These then are the basic strengths and limitations of air power; they are the characteristics which distinguish it from sea power and land power and they provide the foundations for its contribution to overall defence capabilities. What factors then are likely to affect the importance of that contribution to overall defence capabilities in the next century? I would suggest three factors in particular stand out as being of key importance: the evolving operational environment, technological developments and doctrinal development.

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[1] The importance of dislocation and delay can be seen in the German experience in France on and after D-Day in June 1944. The German Panzer Lehr division lost two hundred and twenty vehicles (about 10% of its strength) to air attack during its drive from its base at Le Mans to Normandy, but more importantly it was badly dislocated as a fighting unit and entered the battle in uncoordinated and generally ineffective 'penny-packets'. Two other German Panzer divisions, transferred from Russia, covered the 1,000 miles from the Eastern Front to Nancy in only five days but — because of air attack — took another nine days to cover the two hundred miles to the battle area, by which time the battle was effectively lost. Sources 'The Struggle for Europe' by Chester Wilmot p 300; 'Air Power in War' by the Lord Tedder AM Pamphlet 235 p 48.

[2] 'The Air Force and US National Security: Global Reach — Global Power' US Department of the Air Force white paper dated June 1990 p 10.

[3] Ibid p 15.

The evolving operational environment

In trying to assess the nature of the future operational environment we clearly face major difficulties. The relatively fixed scenarios on which Western European countnes have based their defence planning for the last forty years and more have now all but disappeared. Although many 'risks' of conflict still exist, long-term 'threats' are increasingly difficult to define with any degree of precision. And because we cannot define a precise threat, we cannot really formulate a clear military strategy to deter, contain or defeat that threat. That in turn means we face major difficulties in formulating a force structure — the required mix of capabilities, weapons and people — to prosecute the strategy, let alone in deciding the exact contribution that air power might make to that force structure. Notwithstanding these caveats, it is possible to make three general assertions about the future nature of the operational environment.

Firstly, the events of the last three years, let alone of those of the last seven months, should leave none of us in any doubt about the difficulties involved in charting the way ahead for defence. The defence equation today is highly complex and contains an unprecedented number of variable factors which makes it extremely difficult to formulate future scenarios. The Prussian Field Marshal Helmuth Von Moltke (the elder) summed up the problem nicely when he warned his staff: 'Gentlemen, when you consider any situation you will normally find that three courses of action are open to your enemy. And in the event he will invariably choose the fourth!' In the future, even more so than in the past, bein able to deal with that 'fourth course of action' will be the acid test of defence effectiveness. The key to that is likely to be flexibility, which suggests that the importance of the flexibility offered by air power will increase.

My second general assertion about the evolving operational environment within Europe is that, as forward-deployed forces are drawn down, so the importance of mobility will increase. NATO nations will need increased mobility to project military force forward rapidly — and possibly at short notice — to safeguard Alliance boundaries; they will need it to project military force laterally so that they can respond to geographically diverse threats; and they will need it to allow them to concentrate military force in time and space to defeat aggression. Because air power is highly-mobile, it has an increasing contribution to make in this context as a source not only of firepower, but also of transport.

My third and final assertion about the future operational environment is that it is likely to demand far more responsiveness in our forces than has hitherto been the case. Force levels within Europe are set to fall under the impact of CFE and the 'Peace Dividend', while potential operational space will expand due to the unification of Germany and the democratisation of Eastern Europe. The resulting reduction in force-to-space ratios will favour offensive action, at least at the tactical level of war. The defenders will be more thinly spread and have fewer the local reserves, whereas the attacker's ability to concentrate will be unimpeded. Indeed — by simplifying the attacker's task of concentrating sufficient forces in space and time to saturate the defences — it will make it easier for him to achieve tactical success. Thus, if we are to be able to counter this enhanced offensive potential, we will need to increase the responsiveness of our forces.

The need for increased responsiveness will also apply for crisis management and operations outside the NATO area. The timely arrival of a small but powerful force within a crisis region is far more likely to seen as a tangible earnest of political intent than the promise of much larger forces some weeks hence. Air power because of its responsiveness is easier to insert, easier to extract and involves far less human, financial — and thus arguably political — liability than large-scale ground forces. Air power is uniquely capable of reaching a crisis region rapidly and — by posing a counter-threat in depth — of deterring an aggressor.

Should deterrence fail, and crisis degenerate into conflict, then air power could also make a major contribution to prosecuting operations successfully and with minimum loss of life. Recent events in the Gulf have demonstrated air power capabilities in high intensity conflict — the dangers of which, arguably, are increasing as developing countries acquire ever more sophisticated and capable weaponry. And — as I shall argue shortly — the capabilities of air power in high-intensity conflicts — seem set to grow rather than decline. But before moving on to that it is worth making the point that air power also seems set to play an increasingly important part in lower intensity conflicts.

And here, the French experience in Chad in recent decades provides us with a highly illuminating case study. During its first deployment — between 1968-71 — the French joint force consisted mainly of ground forces, supported by a small air component. In each of their three subsequent deployments, the French increased the size and the relative importance of their air component. During their final intervention — Operation Epervier in 1986 — the traditional hierarchy between French air and land force components was reversed. The air component acted as the principal force element, and ground forces operated primarily in their support.[4]

During their four interventions in Chad, the French learned that there were marked advantages in using air power rather than ground forces as the principal force element: ease and speed of insertion and extraction and the ability to dominate vast and sparsely populated regions proved to be key attributes. They will probably be no less relevant to any other future out-of-area operations by European nations.

Summarising the impact of developments in the operational environment, we can say that the increasing need flexibility, mobility and responsiveness — which future opera-

[4] See RAND Corporation Report R-3660 AF 'Air Power in Peripheral Conflict — The French Experience in Africa' by Dr Mark A Lorell. Abstract in 'Air Power — Collected Essays in Doctrine' by Group Captain Andrew Vallance pp 76-91.

tional conditions would seem to demand — is set to favour an increased air power contribution to overall defence capabilities. This will apply in and out of the NATO area, for deterrence and crisis management and for high and lower intensity conflicts.

Technology

The second factor that I suggested could affect the air power contribution to future defence capabilities was technological development. Air power is a product of technology, and the extraordinary pace and dynamism of technological development has — far more than any other factor —driven air power development and expanded air power capabilities in recent years. Moreover, it has done so at a far greater rate than of sea power and land power.

For example, in the airborne electronics field, if motor-car technology had progressed at the same rate as semi-conductor technology over the past 20 years, a Rolls Royce motor car would now cost less than $ 4, would have a fuel consumption of a million miles to the gallon, would deliver enough power to drive the QE2 ocean liner, and six of them would fit onto the head of a pin! Advances in semi-conductor technology have of course had a major impact on many types of weapon systems, but none more so than air systems which are inevitably at the cutting edge of technology.

A second and perhaps more practical illustration of the dynamism of air power technology is the rapidly increasing effectiveness of air delivered weapons. The kill rates of the air-delivered anti-tank weapons introduced in the 1970s — such as the BL 755 — were four times greater than the weapons they replaced, while those of the sensorfused munitions now under development (such as the US Skeet) are assessed as being four times greater again: in other words a sixteen fold increase in kill rates in little more than twenty years.[5] Small wonder then that the USSR Academy of Sciences estimated in 1989 that „if 45 years ago 100 aircraft could destroy 1,000 combat vehicles on the average in 35 days, they can now perform a similar mission in 36 hours".[6]

Aircraft reliability has also increased, bringing with it an important growth in sortie rates — a key parameter of air power effectiveness. In World War 2, fighter-bomber aircraft flew on average about once every four days. In Korea they flew once every three days, in Vietnam the figure was four days out of every five and today we expect a typical western fighter bomber to sustain in war three sorties every two days and also to be capable of 'surging' to far greater sortie rates for short periods. Higher sortie rates mean greater combat power for the same investment and thus give increased cost-effectiveness.[7]

Perhaps the net effect of all of this can best be illustrated by showing how much more effectively a famous World War 2 air operation could be carried out today. On 17 August 1943 the USAAF despatched two hundred and thirty B-17 bombers to attact the German ball bearing factories in Schweinfurt, losing thirty six of them in the process.[8] Today the same weight or ordnance dropped by those B-17s could be delivered onto an equivalent target complex by just eight F-16 fighter bombers.[9]

That comparison is all the more striking when one remembers: firstly, that in 1943 the B-17 was the largest and most powerful American combat aircraft, whereas today the F-16 is one of the smallest; secondly, that — thanks to its greater speed, maintainability and reliability — an F-16 can fly three sorties in the time taken by a B-17 to fly one; and thirdly, that the support and human costs generated by force of eight single-engined, single-man F-16s are a tiny fraction of those generated by a force of two hundred and thirty four-engined, ten-man B-17s!

The cost-effectiveness of air power has also been increased by the development of defensive and penetration aids which sustain survivability. There has of course been no shortage of claims that manned combat aircraft are becoming increasingly vulnerable, particularly to surface-to-air defences. However, combat experience tells a different story.

In World War 2, the overall US combat air loss rate was 9.7%; in Korea it fell to 2.0% and in the Vietnam War it was only 0.4%.[10]. Even in Operation Linebacker 2 — the December 1972 bombing of Hanoi and Haiphong when the USAF were opposed by a sophisticated and unprecedentedly dense air defence system — the loss rate was still less than 2%.[11] In the Falklands Conflict, Argentina's 6% combat air loss rate was relatively high (due largely to unwise tactics and a total lack of defensive aids), but that of the Britisch air forces was less than one half of one per cent.[12] And during the Gulf Conflict the overall Allied combat air

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[5] RAND Corporation briefing to author October 89.

[6] 'Disarmament and Security, 1987 Yearbook' Oleg Amirov et al Novosti Press, 1988 p 364.

[7] 'Military Reform — The High Tech Debate on Tactical Air Forces' by Walter Kross, NDU Press P 76. The figures are based on those supplied by The Department of the (US) Air Force, Office of Air Force History.

[8] 'The Schweinfurt-Regensburg Mission' by Martin Middlebrook, Allen Lane, 1983.

[9] The attacking B-17 force dropped 954 × 500lb bombs of which 80 hit the factory complex. Source ibid based on figures in United States Strategic Bombing Survey Overall Report, Europe. An F-16 can lift up to 12000lbs of stores but would typically carry a lower weapon load. Even allowing pessimistically for one aircraft lost en-route to the target, seven F-16s would be more than capable of placing 40,000lbs of bombs onto a factory.

[10] 'The United States Air Force in Southeast Asia — The War in Vietnam — The Years of the Offensive 1965-1968' by John Slight p 219. Published by The Office of Air Force History, USAF, Washington.

[11] 'The Air War in Vietnam, 1961-73' by Colonel AL Gropman in 'War in the Third Dimension — Essays in Contemporary Air Power' by AVM RA Mason p 56.

[12] Figures are drawn from 'Air War in the Falklands' by Ethel and Price.

loss rate was far lower even than this: one quarter of one per cent by the end of the first week of the war and the end less than one thirtieth of one per cent — an unprecedentedly low figure.

All this tends to show that technological developments have tended to strengthen, rather than reduce, the survivability of combat aircraft since World War 2. Moreover, air power survivability seems set to continue to increase in the future as precision-guided stand-off weaponry and 'stealth' technology become increasingly common.

Precision-guided stand-off weaponry — by greatly enlarging defensive perimeters and increasing enemy engagement problems — will erode disproportionately surface-to-air defence capabilities, particularly for shorter-range systems such as anti-aircraft artillery. Moreover, by greatly increasing the probability of a single-shot kill, precision-guided stand-off weapons will markedly reduce the number of aircraft that need to be risked to destroy a given number of targets.

Similarly, stealth — which incorporates a large number of signature reduction technologies — will degrade all of the three main functions of air defence weapon systems: surveillance, fire control and kill capability. Significant advances have already been claimed for stealth; the radar cross section (RCS) of the B-2 bomber is reportedly a tiny fraction of that of the B-52. According to one operational specialist in this field:

'An aircraft with an RCS of one metre can be detected at a distance of 200 miles by a modern early-warning radar. If . . . the RCS was reduced to one millimetre (the estimated RCS of the B-2), the aircraft would not be detected by the same radar until approximately four miles'.[13]

It could be argued that revolutionary developments in air defence weaponry or the discovery of a stealth 'Achilles heel' may balance such developments, but neither is in prospect at present. Certainly, the US counter-stealth programme — which involves over forty different technologies — has so far failed to provide a viable answer.[14]

Of course stealth is expensive at present, and the apparently rapid rise in the cost of combat aircraft during recent years has been seen by many as limiting the cost-effectiveness of air power. A World War 2 Spitfire cost the equivalent of US$180,000 whereas the forecourt price for a Tornado F3 is today US$32m, and the unit production cost of the projected European Fighter Aircraft is likely to work out in excess of US$44m apiece. And we can be sure that current prices will be cheap by turn-of-the-century prices. The US Advanced Tactical Fighter is currently estimated to cost $106m whereas the B-2 stealth bomber may have an overall unit cost of over $814m.[15] Indeed, one US commentator calculated that — if the worst projections of current costs turn out to be true — the whole of the US defence budget would be needed to buy just one aircraft by the year 2054!

But such analyses are specious. Firstly, they imply that cost is somehow unique to air vehicles which is simply not true. Costly as it is, the B-2 bomber is no more expensive than a next-generation frigate and in many ways has far greater capabilities. All highly capable systems are costly, especially if they are produced in small numbers. Moreover, the implication that there is a direct correlation between increasing aircraft costs and decreasing front line numbers is also unsound. During the last thirty years the cost of RAF combat aircraft increased by a factor of ten, but the size of the RAF's front line decreased by only 30%.[16] A similar pattern can be discerned in the evolution of the front line of the USAF — and one suspects — most other air forces.

In fact, the major effect of increased costs has not been to make front lines smaller, but to make them older as aircraft are kept in service for longer periods. It is worth noting that the Phantom fighter has now been in front-line service with the air arms of the world for thirty three years and that the operational life of the United States Air Force's KC-135 airborne tankers — which are planned to serve until 2040 — is likely to be over seventy years.

But quite clearly, the cost-effectiveness of an aircraft cannot be measured merely in terms of what it costs, let alone by how easy or how difficult it is to shoot down; like any other weapon it must be measured by what the aircraft achieves before it is expended. And using that criterion, aircraft are increasingly cost-effective. For example, tanks — because of their relatively small size, good mobility and armour — are perhaps the most challenging target for air attack. Studies show that fighter-bombers armed with next-generation weapons attacking front-line tanks protected by a modern Soviet-style air defence system should on average be able to destroy one tank and several softer-skinned vehicles per sortie, while sustaining in the process a 2% loss rate. Thus, for every one hundred sorties flown, two fighter bombers would be lost and 100 tanks destroyed.

A 50:1 exchange ratio is not bad even in pure accounting terms, when one considers that the cost of a modern fighter bomber is perhaps ten times that of a modern battle tank.

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[13] 'Armed Forces Journal International' January 1991 p 49, 'Future US Fighters are at a Cost/Technology Crossroad' by Colonel Randolph H Brinkley.

[14] 'The Case for the B-2 — An Air Force Perspective', US Department of the Air Force document dated June 1990 pp 11-13. Some of the counter-stealth concepts evaluated included: acoustic systems, bi-static radar systems, infra-red detection systems, corona discharge detection, interaction with cosmic rays, passive coherent detection schemes, radar shadow detection, land mines, magnetic disturbance detection, hybrid bi-static space radar, high-frequency surface wave radar, detection of aircraft emissions, radiometric detections, air vehicle aerodynamic wake detection, ultra-wideband (impulse) radar).

[15] ATF figures drawn from Congressional Research Service Issue Brief IB87111 by Bert H Cooper Jnr updated 7 August 1990. B-2 figures drawn from 'The Case for the B-2 — An Air Force Perspective', US Department of the Air Force document dated June 1990 p 19.

[16] Figures drawn from unpublished paper 'The Rising costs of Aircraft and Equipment Maintenance' by Director of Air Engineering (RAF) p 56.

And developments in stealth and stand-off weaponry should enhance this still further. But material exchange rates are only one factor in the cost-effectiveness equation for air operations. Of at least equal importance are the consequential effects such as dislocation, delay, diversion and demoralisation, and — as I mentioned earlier — air power is uniquely capable of producing these effects.

Force structure

At present, fixed wing aircraft provide the overwhelming mass of our air power force structure, but we cannot assume that that will always be the case. Some have suggested that technological developments now mean that surface-launched ballistic and cruise missiles, unmanned air vehicles and combat helicopters could be viable alternatives. But while each of these systems enjoys certain advantages, they all suffer from significant limitations.

Surface-launched ballistic and cruise missiles can hold high readiness over long periods, and they have a high probability of arrival on the target. But they lack strategic mobility, carry low payloads and are very costly in relation to their destructive power. They are also single-shot and single-role weapons and thus lack flexibility. Similar objections also apply to unmanned air vehicles. On the credit side, unmanned air vehicles save manpower, involve no aircrew risk, are lighter, smaller, less costly and more difficult to hit than fighter-bombers. On the debit side they are inflexible, have poor damage tolerance, are essentially fair-weather systems and have limited range and payloads. Moreover, the operators of unmanned aircraft face major problems of situational awareness which makes the UMA unsuitable for the more complex air operations.

There are also major problems with using attack helicopters as a stand-alone substitute for fighter-bombers. Advanced combat helicopters such as the AH-64 Apache are less expensive than fighter-bombers but by no means cheap. One could probably get only 2-3 Apaches for the same outlay as an F-16 fighter bomber.[17] Bearing in mind that the range, speed and payload of F-16 are respectively two, six and seven times greater than those of Apache, this is not such a good deal as at first it may seem.[18] It is even less of a good deal when one remembers that multi-role fighter-bombers such as F-16 can be used for the full spectrum air operations, whereas combat helicopters — which are highly vulnerable when operated forward of friendly troops — can do little more than close air support tasks, and even then they have marked limitations.[19]

All of this does not mean that attack helicopters, surface-launched missiles and unmanned air vehicles cannot make a useful contribution to the future force-mix, On the contrary, if funds can be made available, they could provide a valuable supplement to current air power capabilities. But as stand-alone solutions they make neither economic nor military sense at present.

Nor is this likely to change fundamentally in the future. The limitations that I have described are inherent in the nature of these systems; they are not the sort of thing that can be cured with a technical breakthrough, and therefore they are likely to exercise lasting limitations over the usefulness of these systems.

Summarising these thoughts on the impact of technological developments on air power, the pace and dynamism of technological progress — which has brought about vast increases in the relative cost-effectiveness and utility of air power since World War 2 — seems set to continue into the next century. And while the contribution of other air power systems is likely to increase in value, that of fixed-wing manned aircraft seems certain to continue to provide the core capability of air power for the foreseeable future.

Doctrinal development

With all the technological opportunities on offer, it is tempting to assume that technology alone can provide all the answers needed for future air power development. But such a view is — for several reasons — highly dangerous. Firstly, because technology always delivers less than it promises, later and at a greater cost; secondly, because only a proportion of the vast range of technological opportunities now on offer could ever be afforded; and thirdly and more importantly, because it is all too easy to be dazzled by technology and seduced into opportunism. Technology is a good servant but a very bad master, and this 'technology trap' can only be avoided if, in the future, our doctrine drives our technology, rather than as has tended to happen in the past, our technology driving our doctrine.

But creating a firm doctrinal base from which to guide the future development of air power capabilities poses some difficult challenges. Firstly, for many military men, and most civilians, air power is something of an intellectual enigma. As Sir Winston Churchill pointed out 'Air power is the most difficult of all forms of military force to measure, or even to express in precise terms'.[20]

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[17] F-16 unit cost estimated as about US$28m based on reported agreement by US to sell 12 F-16s (plus service and support equipment) to Indonesia for US$337. (Source. Aviation Week and Space Technology 16 April 1990 p 57). US Army unit 'flyaway' price (ie no R&D costs) of AH-64 quoted as $11m (Source: Interavia 7-90 p 545).

[18] Source: Jane's All the World's Aircraft 1991. Ferry range, speed and payload for AH-64 and F-16C are quoted as being respectively 918nm 197 knots/1700lb and 2100nm Mach 2.0/12000lb.

[19] Commenting on the misuse of combat helicopters in the Vietnam War, Colonel Robert H Scales (Commander of the US Army Field Artillery Training Centre) has remarked: ' Armed helicopters were never intended to take on hardened targets. Heavy artillery could be used against such targets, but the heavies were slow and success against small point targets problematical. Close air support from fighter aircraft was, and remains today, the surest way to deliver overwhelming firepower quickly and precisely against tanks, fortifications and bunker complexes'. Source: 'Firepower in Limited War' by Robert H Scales (NDU Press 1990) p 96.

[20] 'The History of the Second World War', Sir Winston Churchill.

That problem is compounded by the fact that aviation, as David MacIsaac has pointed out, tends to attract 'adventurous souls . . . **physically adept**, mentally alert and pragmatically rather than philosophically inclined'.[21] Airmen are — by nature — rarely inclined to study the deeper aspects of their profession, and they tend to offer little encouragement to those who are. Hardly surprising then that, in Europe especially, the number of defence academics and analysts working in the air power field is tiny in comparison with those studying land and naval warfare.

The net result of all this is a widespread lack of understanding about air power doctrine: that fundamental and enduring set of principles which guide the use of air power in support of national or multinational defence objectives. Such basic or strategic doctrinal principles are of fundamental and pervasive importance; they underpin air power operational doctrine and — through that — tactical doctrine, and they shape the air input to joint-Service doctrine. Yet — despite their importance — they continue to be imperfectly understood, even by military professionals.

For example, air power continues to be seen by most armies and navies not as an equal partner in the joint battle, but essentially as a supporting or auxiliary capability; surface force action — many soldiers and sailors often appear to believe — is alone capable of achieving a decision in war.[22] Terms such as 'close air support', 'offensive air support' and 'tactical air support for maritime operations' sustain those misconceptions. The power of such terminology on our thinking should not be underestimated; it tends to channel ideas and constrain the vision needed to exploit to the full the expanding potential of air power in joint defence.

Two points are important here. Firstly, because the developing capabilities of air systems have outstripped those of surface systems, Air Forces have — for many years now — been equal partners with the surface forces in the joint maritime/air battle and the joint land/air battle. In practice, the air and surface forces work together synergistically, offering each other mutual support to achieve joint objectives. In some operations the air forces will act in support of the land and sea forces; in others — as in the Gulf War — the roles will be reversed.

Secondly, it is important to remember that the use of air power is not restricted purely to joint operations. It can be employed largely independently of the surface forces for strategic air offensive operations to damage the enemy's will and abuility to wage war and for counter-air operations to deter, contain or defeat the enemy's air forces. Both of these independent applications of air power are strategic in their nature as they can have a major effect on the course and outcome of a conflict.

The fact that this is sometimes seen as a source of contention within the world's defence community is due in large part to the failure of airmen to articulate their doctrine in a coherent and convincing fashion. While NATO's Air Forces have devoted a great deal of effort to developing their technical and tactical expertise, little work has been carried out on the doctrines upon which that expertise must ultimately be based.

The nearest that NATO comes to a statement of basic air power doctrine is at present ATP-33b — the NATO Tactical Air Doctrine manual. Last revised in 1986, although much older in concept, it falls far short of what is now needed. It consists mainly of definitions which — while essential — do not constitute doctrine. That — as I have said — describes the fundamental and enduring principles which guide the use of air power in defence. Moreover, ATP 33b fails to delineate any clear doctrinal line. It also omits any mention of strategic air offensive and maritime air operations, and — in an age when virtually any combat aircraft can play a part in all of the three strategic applications of air power — it persists with the obsolete distinction between 'strategic' and 'tactical' air power. When F-16 fighter-bombers are used for strategic bombing and B-52 'strategic' bombers are used for close air support and battlefield air interdiction, what possible purpose — except to confuse — can such a distinction serve?

Not before time several Air Forces in NATO and elsewhere are now developing the doctrinal frameworks needed to guide the development and employment of air power into the next century. The United States Air Forces is about to re-issue its basic doctrinal manual AFM 1-1, and the German Luftwaffe has produced its own doctrine manual LDV 100. The RAF — after a gap of over twenty years — is publishing its own doctrine manual (AP3000), and other excellent doctrinal work is being carried out by individuals in the Royal Netherlands Air Force and the Royal Norwegian Air Force. Outside NATO, the Royal Australian Air Force has led the field by establishing an Air Power Studies Centre and publishing its own doctrinal statement, AAP 1000.

In each case, the reasons given for this renewed emphasis on the need for a clear doctrine share similar roots. They are described variously as 'the need to promote a more cohesive approach to air power education within the respective Services', 'the need to establish a sound foundation on which the air power contribution to joint-service and alliance doctrines can be based' and 'the need to enhance the understanding of air power within the surface forces, government and the general public'. These are important aims

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[21] 'Voices from the Central Blue: The Air Power Theorists' by David MacIsaac p 626 in 'Makers of Modern Strategy' by Peter Paret.

[22] Three examples from World War 2 clearly show this is false. In 1943, the Italian fortress islands of Pantellena and Lampedusa (garrisoned by 11,000 men) surrendered after concentrated Allied air attack before any assault troops were landed. In France, in August 1944, Allied air power attacked German forces south of the Loire (numbering 30,000 men) which — although at no time engaged by sizeable Allied ground forces — were forced to surrender, in fact, to an air force — the USAAF 19th Tactical Command. In January 1945 air power was used to take the fortified town of Gangaw in Burma from the Japanese. In his book 'Defeat into Victory', the commander of the British 14th Army in Burma, Field Marshal Viscount Slim, remarked 'Gangaw was taken by the air force and occupied by the Lushai Brigade — a very satisfactory affair.'

and their achievement is — I believe — fundamental to the effective development and employment of air power in the future.

But a deeper level of analysis, the reason why so many Air Forces are now focussing in on doctrine may be because we have at last amassed sufficient experience to enable us to judge with a high level of confidence what air power can and cannot contribute to national and multi-national defence and security. And that permits us to build a far sounder doctrinal base than has hitherto been possible. Perhaps not the time is ripe for Air Forces to come in from the intellectual cold?

Conclusion

And that brings me to the end of my talk. It seems clear that — because of the evolving operational environment and the likely thrust of technological development — the potential air power contribution to overall defence capabilities is certain to grow in the future. But that potential contribution cannot be translated into an actual contribution unless it is underpinned by equally vigorous doctrinal development. Without that, we will be in danger of building a house with a splendid superstructure but with its foundations sunk into quicksand. Bearing in mind the importance of the potential contribution that air power can make to our security in the next century, that is surely something which we must avoid.

Na afloop van de voordracht was er de gelegenheid tot het stellen van vragen. Hier volgt een samenvatting van wat toen aan de orde werd gesteld. Aangezien sommige begrippen zich moeilijk laten vertalen is er voor gekozen de Engelse terminologie te handhaven.

Bottom up of Top down

Gesteld wordt dat de luchtmacht sterk afhankelijk is van de kwaliteit van de 'joint doctrine' en de 'combined doctrine'. De vraag is welke benadering bij de ontwikkeling van deze doctrines de beste is: Top Down of Bottom Up?
Vallance antwoordt hierop dat er twee manieren van benaderen mogelijk zijn. Een joint doctrine kan worden geformuleerd met de volgende vraag als uitgangspunt: wat wordt er verlangd van de drie afzonderlijke krijgsmachtonderdelen. Daarna wordt de bijdrage bepaald van deze krijgsmachtonderdelen aan de doctrine en vervolgens worden deze bijdragen van boven naar beneden geïntegreerd. Een andere benadering is uit te gaan van de mogelijkheden van de verschillende onderdelen en deze te gebruiken als een fundament waarop de doctrine wordt gebaseerd. Welke benadering ook gekozen wordt, bij beide dient integratie plaats te vinden. De verstandigste manier lijkt om de joint doctrine te baseren op de afzonderlijke krijgsmachtonderdelen, en binnen deze onderdelen te bepalen wat de mogelijkheden en beperkingen zijn en dan deze mogelijkheden met elkaar te integreren.
Voor de ontwikkeling van een strategie geldt dit niet. Deze ontwikkeling zal moeten geschieden vanuit een Top Down benadering. Eerst zal een overkoepelende strategie moeten worden geformuleerd en dan dient de bijdrage bepaald te worden van luchtmacht, landmacht en marine.
Er is dus een duidelijk verschil tussen doctrine en strategie. Strategie betreft planning en doctrine is een geheel van richtlijnen waarbinnen deze plannen ontwikkeld worden. Als een combined doctrine — dat wil zeggen een alliantie doctrine — geformuleerd moet worden dan zal dus ook uitgegaan moeten worden van de afzonderlijke landen. Het idee lijkt te bestaan dat een doctrine als het ware vanzelf voortkomt uit een organisatie als de NATO. De ontwikkeling van een doctrine vraagt echter om nationale initiatieven. Een doctrine is een dynamisch proces dat dient te worden gevoed met nieuwe ideeën. De NATO-doctrine is statisch omdat we de neiging hebben te denken dat landen zich juist moeten aanpassen aan deze doctrine in plaats van bijdragen te leveren tot vernieuwing.

De betekenis van 'air defence capability'

De vraag is of de betekenis van air power zal afnemen bij de toenemende inspanning in air defence, zoals bijvoorbeeld de patriot die dodelijk lijkt te zijn voor air power.

Wat volgens Vallance moet worden bedacht, is dat air defence aircrafts en surface-to-air defence systemen zijn die elkaar aanvullen. De kracht van surface-to-air defence is dat deze gedurende langere tijd kan worden ingezet, snel kan reageren zowel bij dag als nacht. De zwakte is het geringe bereik, lage mobiliteit en het gebrek aan flexibiliteit. De zwakte van vliegtuigen is dat ze niet onbeperkt in de lucht kunnen blijven; je kunt een vliegtuig in de lucht van brandstof voorzien, maar niet van nieuwe bemanning of bewapening.
Daarentegen is een vliegtuig veel mobieler dan een afweersysteem en heeft een groter bereik.
Wat bepaald moet worden wanneer deze systemen met elkaar vergeleken worden, is de verhouding in de toepassing van de systemen. Dit is voornamelijk afhankelijk van de diepte van defensie en dit wordt gedeeltelijk bepaald door de beschikbare techniek. Hoewel de patriot technisch superieur leek, kostte daarentegen de destructie van het door de NATO geweldig geachte Sovjet-afweersysteem slechts drie dagen.
Als we de ontwikkeling zien van bijvoorbeeld Stealth dan moeten we constateren dat het belang van air defence systems zal afnemen. Hoe groter het bereik van dergelijke vliegtuigen zal zijn, hoe moeilijker de taak wordt van afweersystemen, zeker gezien de beperkte detectiemogelijkheden.

De golfoorlog en logica

Het volgende punt dat aan de orde wordt gesteld is de vraag in hoeverre de oorlog in de Golf representatief genoemd kan worden. Mogen er bijvoorbeeld wel conclusies over de waarde van het Sovjet luchtafweersysteem worden getrokken; het was bepaald geen logische oorlog.

Vallance stelt dat inderdaad elke oorlog uniek is en dat men voorzichtig moet zijn om geleerde lessen in andere situaties toe te passen. De oorlog in de Golf geeft wel aanleiding om te denken dat surface-to-air defence systemen relatief gezien verzwakt zijn. Maar we moeten bedenken dat de coalitie een geweldig luchtoverwicht had, niet alleen in aantallen maar ook voor wat betreft training, techniek en doctrine.
Interessanter is om vast te stellen dat het voor de RAF mogelijk is ook op lower level te kunnen opereren met relatief weinig verliezen. De doctrine was altijd gebaseerd op opereren op high level met de daarbij behorende voordelen van grotere inzetbaarheid van vliegtuigen en wapens.

Naval air power

In het kader van de veranderende politieke verhoudingen in de wereld waarbij conflicten een mondiaal karakter krijgen, wordt de vraag gesteld of de behoefte aan naval air power niet zal groeien gezien de eisen van mobiliteit en flexibiliteit.

Vallance verduidelijkt dat wanneer hij zich een voorstander toont van air power hij daarbij niet per se de luchtmacht voor ogen heeft. De bezitter van de grootste air power is de Amerikaanse landmacht.
Wie de bezitter is en of deze zijn basis heeft op de grond of op zee is van ondergeschikt belang. Grotere landen als bijvoorbeeld de VS kunnen het zich veroorloven vier verschillende 'luchtmachten' te onderhouden. Kleinere landen kunnen dat niet en dienen de air power te centraliseren waarin training en organisatie en ondersteuning die nodig is bijeengebracht wordt. Vliegdekschepen zijn buitengewoon bruikbaar als je je deze kunt veroorloven. Bovendien kan een schip zich niet verdedigen, dus zijn er minstens twee of drie nodig. Dat betekent ook dat slechts een beperkt gedeelte van de air power beschikbaar is, aangezien een groot deel wordt aangewend te eigen verdediging. Het is gewoonweg niet economisch air power te verdelen over de verschillende andere krijgsmachten. Er is eigenlijk maar één land dat zich dat kan veroorloven en dat is in ieder geval niet Groot-Brittannië.
Wie de eigenaar ook is, het commando over air power dient te liggen op het hoogste tactische niveau. Alle wapensystemen dienen namelijk beheerst te worden op het niveau dat het best hun bereik weet te benutten. Omdat air power zich over het gehele front beweegt dient het commandoniveau het hoogste niveau te zijn.

Hiermee is het punt van naval air power echter nog niet afgerond. Gezien de huidige ontwikkelingen lijkt de noodzaak tot de bereidheid tot out of area operations toe te nemen. Hoewel er sprake is van de wens om het defensiebudget terug te brengen, toont het conflict met Irak aan dat een rapid deployment systeem vereist is, waarbij naval air power dan toch een belangrijke rol speelt.

Vallance ontkent deze behoefte niet, maar geeft aan dat het een kwestie van nadruk is: waar wordt het beperkte materiaal ondergebracht. Een belangrijk aspect in out of area operations is dat het conflict in de kiem gesmoord wordt voordat het zich ontwikkelt tot een omvangrijke crisis. Om dat te kunnen, moet je snel ter plaatse zijn. Als we de intenties van Saddam Hoessein eerder hadden doorzien en vliegtuigen naar Koeweit hadden overgebracht voor de invasie, dan zou een betrekkelijk kleine macht mogelijk in staat zijn geweest het conflict te beheersen. Het was in dit geval niet mogelijk, maar het zou in de toekomst wel tot de mogelijkheden kunnen behoren. Een grote reactiesnelheid is dus nodig. Wanneer je in dergelijke situaties kunt opereren vanaf bevriende grond, dan verdient dit de voorkeur boven het opereren vanaf schepen. In de meeste out of area operaties zal naval aviation niet essentieel zijn.

Technologische ontwikkelingen

Air power zal een belangrijke rol spelen in de 21ste eeuw. De vraag is of er de komende tien jaar nog een belangrijke doorbraak te verwachten is op technologisch gebied.

Vallance geeft aan dat technologische ontwikkelingen in de luchtmacht veel sneller zijn gegaan dan bij de andere krijgsmachtonderdelen. Echter, een grote doorbraak lijkt niet waarschijnlijk. Duidelijk is wel dat de marine en de landmacht kwetsbaarder zijn geworden. Dat wil niet zeggen dat daarmee de landmacht en de marine overbodig worden, integendeel; de verschillende krijgsmachtonderdelen vormen een complementair systeem. De vraag is alleen wat hun respectievelijke bijdrage kan zijn. Door de grotere kwetsbaarheid en door de technologische ontwikkelingen zullen we een verschuiving zien optreden naar de luchtmacht. In een land als Canada is de luchtmacht al groter dan de landmacht en marine. Hoewel geografische motieven hieraan ook ten grondslag liggen, geeft het wel een indicatie voor de toekomst. De luchtmacht geeft een scala van mogelijkheden met een betrekkelijk laag risico van verliezen.

Offensief versus defensief

In de voordracht is gesproken over een meer offensieve rol voor air power. De ontwikkelaars van vliegtuigen met name in de Verenigde Staten lijken zich echter meer te richten op de uitvoering van een defensieve taak. Zijn deze ontwikkelaars nu op het verkeerde spoor of is het idee van de offensieve taak vooral ingegeven door de strijd met Irak waarin de coalitie het initiatief heeft gehad.
Vallance stelt dat air to air power niet defensief is. De vraag wat defensief en wat offensief is, blijkt moeilijk te beantwoorden. Er wordt natuurlijk gestreefd naar een systeem

waarin beide rollen kunnen worden benut. Aanval en verdediging zijn eveneens complementaire vermogens. Air power is historisch gezien een offensief systeem dat tactisch het best functioneert als het aanvallend wordt benut. Het is dus niet zo dat de ontwikkelaars op de verkeerde weg zijn. Bovendien kunnen de Amerikanen het zich veroorloven systemen te ontwikkelen die meer gericht zijn op defensieve taken. Zij zullen daarnaast investeren in de ontwikkeling van het offensieve vermogen.

Luchtmacht als bezetter

Vastgesteld wordt dat de luchtmacht inderdaad onontbeerlijk is als ondersteuning en zelfs in staat is zelfstandig te opereren. Echter, in een militair conflict speelt het innemen en bezetten van grondgebied een sleutelrol en het probleem wordt aan de orde gesteld dat de luchtmacht geen land kan bezetten. De vraag is of het belang van air power niet moet worden afgezet tegen het veiligheidsrisico dat bijvoorbeeld nog altijd bestaat met het oog op de Sovjet Unie, maar ook in low intensity conflicts. Daarnaast zijn er ook nog peacekeeping operations. Bij dergelijke taken, die ook nog lijken toe te nemen, is de inzet van air power veel moeilijker. Wat zal dus de rol zijn van air power in bijvoorbeeld low intensity conflicts.

Vallance geeft aan dat de luchtmacht inderdaad geen grond bezet kan houden, maar ontkent dat de luchtmacht niet in staat zou zijn om grond in bezit te krijgen of er juist voor te zorgen dat anderen het niet in bezit kunnen krijgen. Verschillende situaties uit de Tweede Wereldoorlog tonen aan dat dit laatste wel mogelijk is. Hoewel dus de inzet van de landmacht vaak een praktische oplossing is bij de bestrijding van vijandelijke troepen, zijn er andere opties. Daarbij komt dat het bezet houden van land uiteindelijk ook zelfs geen landmachttaak is, maar een taak van de politie. De taak van het leger is namelijk het verslaan van de vijand en niet het bezet houden van grond. Het is inderdaad goed om onderscheid te maken in de verschillende soorten conflicten, waarbij gesteld kan worden dat landtroepen een belangrijke rol zullen spelen in low intensity conflicts. Het hangt van de omstandigheden af wat de bijdrage zal zijn van de verschillende, complementaire krijgsmachtonderdelen.

Taakspecialisatie

Zal er bij de ontwikkeling van een doctrine sprake zijn van een tendens naar taakspecialisatie op een nationale basis juist om in deze tijd van beperkingen het vermogen op hetzelfde niveau te kunnen houden.

In een perfecte wereld zou dit volgens Vallance ongetwijfeld de beste oplossing zijn; wie een taak het beste kan uitvoeren, doet dit ook. Zo zouden de Nederlanders zich bezig kunnen houden met air defence, de Belgen met Awacs enzovoort. Helaas werken allianties niet zo en zeker de NAVO niet. De NAVO is een unieke alliantie, uniek omdat deze bestaat in vredestijd met oorspronkelijk als verwachte vijand de Sovjet Unie. De vraag is of de NAVO zal blijven voortbestaan al wordt het nog altijd gezien als belangrijke veiligheidsstructuur. De mogelijkheid moet wel worden erkend dat bij de afname van de dreiging vanuit de Sovjet Unie de bijdrage van de verschillende landen onder druk zal komen te staan. Als dus een land zijn bijdrage vermindert, kan mogelijk een bepaalde taak niet meer worden uitgevoerd. Een bepaald vermogen verdwijnt en het kan dan jaren duren voordat dit weer wordt hersteld. Dit geldt in het bijzonder voor air power. Het klimaat is gewoonweg niet gunstig voor vergaande taakoriëntatie en -specialisatie.

Koninklijke Vereniging ter Beoefening van de Krijgswetenschap

Opgericht 6 mei 1865

De Koninklijke Vereniging ter Beoefening van de Krijgswetenschap stelt zich ten doel, het bevorderen van de krijgswetenschap in de ruimste zin.

Voor het verwezenlijken van die doelstelling worden bijeenkomsten georganiseerd waar, over belangwekkende onderwerpen, inleidingen worden verzorgd door deskundigen van binnen- en buitenland. De tekst van de voordrachten wordt met uitgebreide samenvattingen van de discussies gepubliceerd in het verenigingsorgaan "Mars in Cathedra". Daarnaast geeft de vereniging het maandblad "Militaire Spectator" uit.

Voorts bekostigt de vereniging, daartoe mede in staat gesteld door subsidiering door Defensie, de bijzondere leerstoel in het militaire straf- en tuchtrecht aan de Universiteit van Amsterdam.

Ook kent de vereniging jaarlijks een prijs toe voor de beste scriptie van een cadet aan de KMA en een adelborst aan het KIM, die door de voorzitter van de vereniging wordt uitgereikt.

Vervolgens beloont de vereniging publicisten die zich hebben onderscheiden met artikelen e.d., op het gebied van de verenigingsdoelstelling, met het toekennen van de Militaire Spectator legpenning.

Al deze activiteiten worden mogelijk gemaakt door de leden van de vereniging. Om het voortzetten van dat alles te kunnen verwezenlijken is het gewenst dat het ledental op peil wordt gehouden en zo mogelijk wordt vergroot.

Het is daarom dat het bestuur van de vereniging U om steun verzoekt, zijnde Uw aanmelding als lid van de vereniging voor de redelijke contributie van ƒ 30,- per jaar.
Leden woonachtig in het buitenland betalen ƒ 40,- per jaar.
U ontvangt daarvoor Mars in Cathedra én de Militaire Spectator.

Aanmelding kan geschieden met behulp van de nevenstaande aanmeldingskaart.
Bent U reeds lid van de vereniging, werf dan een nieuw lid.

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