

ASPECTS OF NATO

Series 1

No 9

Armaments Cooperation, Planning and Support

As NATO is not a supranational organisation, it has no mandatory powers over national governments, and thus the responsibility for equipping and maintaining forces remains a national one. With the exception of certain areas such as communications, airborne early warning and control, and common infrastructure works, NATO is not directly involved in the research, development and production of equipment. The role of NATO is one of advice and coordination, with the purpose of fostering cooperation in order to enhance military posture and thus strengthen the collective defence effort of the allies.

The period 1949 to 1966 – organisational steps

The first attempts to rationalise defence production in NATO were made by the Military Production and Supply Board, set up in November 1949, and its successor, the Defence Production Board. On the basis of studies prepared by specialists, recommendations were formulated on the means of increasing production in fields where deficiencies were greatest. One of the responsibilities of the Temporary Council Committee, set up in 1951 and the purpose of the Annual and Triennial Review procedures adopted subsequently, was to develop proposals for the reconciliation of military requirements including arms and equipment, with the resources available to NATO countries for defence.

A Defence Production Committee was set up in 1954. Four years later, its terms of reference were broadened to enable it to deal with questions of applied research and development, and it became the Armaments Committee. A Production and Logistics Division had already been set up in 1952 as part of the newly created International Staff and in October 1960, it became the Production, Logistics and Infrastructure Division. On September 1, 1967, its title was changed to the Defence Support Division as part of the reorganisation which took place upon the transfer of NATO from Paris to Brussels. This broader title now includes defence research activities.

In January 1979, as the result of further reorganisation the Infrastructure, Logistics and Council Operations Division was created, leaving to the Defence Support Division the area of armaments, including Command, Control and Communications, and Air Defence Systems.

Early cooperative efforts

In the first years of NATO, the main emphasis in the equipment field was laid on the provision of arms and other items for the European forces being assigned to the Alliance. North American aid, in the form of off-shore procurement orders and grants towards the cost of establishing new plants, was a significant factor in the increasing allied defence production capacity. An extensive range of North American war material was also made available to member nations. This ensured some degree of uniformity of equipment ("standardisation"), though the importance of this was not stressed at that time, as the economic pressures and operational imperatives which subsequently drove nations to study the procurement of common standard items, had not yet made themselves felt.

Standardisation in the early days of the Alliance was mainly confined to procedures or to equipment components or parts, which became the subject of Standardisation Agreements (STANAGs) promulgated by the Military Agency for Standardisation. A well-known example of an equipment STANAG concerns the 7.62 mm NATO basic round for small arms. The preparation of such agreements has continued steadily throughout the years, and they now run into hundreds. This cooperative activity within the Alliance remains extremely important, although it has now been overshadowed, as far as equipment is concerned, by efforts to agree on major items or systems.

Another early example of cooperation arose as a sequel to the acquisition by European countries of North American material. The need to find sources of spare parts to maintain those items, especially the aircraft, caused countries to collaborate in joint procurement. This activity expanded and later gave rise to the NATO Maintenance and Supply Organisation (NAMSOS) which is described in Chapter 18.

Correlated production programmes

As a first task in 1952, the International Staff made plans for correlated production programmes of major items of equipment, including aircraft, artillery, small arms, radar and wireless sets, vehicles, ships and various types of ammunition.

This approach to cooperation was taken in April 1953, when contracts were signed between several countries for combat aircraft. Already in 1949, Belgium had undertaken to manufacture Derwent Jet engines for installation in British Meteor aircraft to be built in the Netherlands. France had undertaken to build Vampire aircraft and to manufacture Nene Jet engines. Appropriate licensing arrangements had been negotiated with British firms. The 1953 programme embraced the production of British, French and United States aircraft in five Western European nations. Principal features of the programme were the production of Hawker Hunter and Vickers Supermarine Swift aircraft in the United Kingdom, of Dassault Mystère aircraft in France, the joint production of Hunter aircraft in Belgium and the Netherlands, and the assembly of American F.86 all-weather fighter aircraft in Italy.

As an early example of a "two-way street" in transatlantic cooperation the United States commenced production in 1953 of the British Canberra bomber. Production was phased over a six year period and a total of 403 B.57 of versions A, B, C, D and E were built.

Useful results were also obtained under correlated production programmes for electronic equipment and for ammunition.

The correlated programme concept, however, came increasingly to be called into question. The programmes were limited in scope. No attempt was made to draw up any overall master plan for the equipment of all NATO forces which would parcel out production to the most efficient or economical sources. Such ideas, canvassed in the early days of NATO, ran into a number of obstacles. National authorities naturally tended to favour home industries and to be reluctant to finance multinational projects. Member countries were at differing stages of economic and industrial development. There were serious problems in respect of security. Furthermore, large programmes imposed upon industries would have had the effect of smothering incentive and reducing useful competition in the private industrial sector of many of the countries concerned.

Individual project approach

With the gradual abandonment of the correlated programme concept, there was tacit agreement that any approach to production should be on the basis of individual projects. The steadily increasing complexity and cost of weapon systems gave added impetus to the need to collaborate in producing the following new major items of equipment.

Joint Aircraft Production – the G.91

This first multinational venture for development and production within NATO of a very light jet fighter for close support of ground troops began in 1954. Designs were drawn up and prototypes developed, constructed, and tested. The Italian Fiat G.91, with the British Bristol Orpheus engine, was selected for the first generation of the NATO light weight tactical reconnaissance aircraft.

Over 600 aircraft were produced in Italy and, under licence, in Germany, and many of them are still in service. 40 G.91 aircraft are also in service with Portugal. A twin-engined version, the G.91Y was also produced in Italy. Many useful lessons in cooperative ventures were learned from this first experience.

NATO Maritime Patrol Aircraft – the "Atlantic"

This multinational project started in 1957. Basic military requirements were formulated by the NATO Military Authorities, and a group of experts set up by the Defence Production Committee converted them into operational characteristics. Technical specifications were then circulated to aircraft companies in various countries.

The selected design was the French Bréguet 1150, which was given the name "Atlantic", and cooperative arrangements were worked out between the origi-

nal four European producing nations, Belgium, France, Germany, and the Netherlands, and the United States Government. Italy joined the project in 1968. Design and manufacture were entrusted to an industrial consortium, and the division of prototype work among the European countries set the pattern for the sharing of work and equipment in the production phase. Most of the electronic equipment has been supplied by the United States and built under licence in Europe. 87 aircraft have been produced; 20 for the German Navy, 40 for the French Navy, 9 for the Netherlands Navy and 18 for the Italian Navy. Three simulators have been built for training purposes. An International Supply and Logistics Centre and an International warehouse provide for joint logistics and spare parts for European users of the Atlantic. An "Atlantic New Generation" (ANG), using all available technology, is now being developed by France on its own. Other potential NATO users are being kept aware of progress.

Advanced weapon programmes

Towards the end of 1956, the United States, aware from its own experience of the full cost and complexity of planning and producing new equipment, began to make suggestions for coordinated efforts for the introduction of advanced weapons.

At the Heads of Government meeting in December 1957, President Eisenhower offered to make available his country's technical knowledge and experience to further joint European weapons production. The first two projects selected by European nations, in discussion with the International Staff, were a surface-to-air and an air-to-air missile system.

HAWK Programmes

In 1958, Belgium, France, Germany, Italy and the Netherlands accepted the offer by the United States for the production in Europe of a surface-to-air missile system – the HAWK. Five European firms participated in the production under the supervision of the Board of Directors of the NATO HAWK Management Organisation. The programme was completed in 1967. In November of the same year, the participating countries embarked on the study of an improvement programme for the HAWK weapon system – The HAWK European Limited Improvement Programme (HELIP) – which was intended to enhance the capabilities of the system and prolong its useful life. The preliminary studies were completed in 1970 and were followed in 1971 by a series of trials in Europe with a United States Improved battery. Greece and Denmark joined the programme in 1972 and in 1974 respectively. The Improved HAWK Programme was launched in 1974, and was followed in 1979 by a Product Improvement Programme which will further increase the capabilities of the system to match the evolution of the Warsaw Pact threat.

Sidewinder Programme

The air-to-air missile SIDEWINDER was the second existing United States missile to be chosen for production in Europe, this time by Belgium, Denmark,

Germany, Greece, the Netherlands, Norway, Portugal and Turkey. A German firm – Fluggerätewerk – was selected as prime contractor. Production arrangements were agreed by the Council in December 1959, and the first missiles assembled in Europe in November 1961. Most of the flight tests were performed in Europe with the assistance of France, who ordered several hundred missiles. Production, which involved a programme of the order of 10.000 missiles, was completed in December 1966, and responsibility for logistic support transferred to NAMSA.

Armaments Committee and advisory groups

In April 1958, the European countries submitted proposals to a meeting of Defence Ministers for specific items which might be produced jointly. The terms of reference of the Defence Production Committee were changed to pave the way towards the establishment of the Armaments Committee. The ability of this Committee to address questions of applied research and development was in itself recognition of the fact that allied cooperation in the armaments field needed to precede the production stage. In order to help with naval equipment, a NATO Naval Advisory Group was set up in 1958, to be followed by similar Army and Air Force Groups in 1962.

Procedures for cooperation

In parallel with the introduction of the advanced weapons programmes and the changes in the committee structure, attention began to be focused on procedures. Equipment planning procedures cannot, of course, guarantee the success of cooperative ventures, but they can help to promote collaborative efforts. Although equipment development and production is the responsibility of the sovereign member nations, the Organisation itself clearly has an important role to play in providing, at the international level, procedures within an appropriate framework to assist the allies in cooperating in the interests of collective defence.

The first attempts at cooperative production had revealed the complexity of the problem. It was clear that the potential advantages of joint production were dependent upon the right kind of cooperative planning at the earliest possible stage. Agreed procedures were needed to cover the entire life of a cooperative project, right from the time of its inception through to the day when the resulting equipment entered into service.

NATO Basic Military Requirements (NBMRs)

To meet this need a new system was devised, which can be described as the NBMR approach. Introduced in 1959, it represented a determined Alliance effort to enhance cooperative prospects. Under this the NATO Military Authorities were to establish agreed NATO-wide basic military requirements, which would be the starting point from which operational characteristics and their technical specifications would be derived, in the hope that common

equipments could then be developed to meet these requirements. Although originally intended to be used flexibly, the system in practice became too rigid.

Member countries had differing military requirements, and harmonising these to produce unanimously agreed NATO requirements was far from easy. Then there were economic and political factors which came into play. Although forty-nine NBMRs were in fact produced, none resulted directly in the cooperative development or production of equipment items. This underlined the difficulty of achieving NATO-wide cooperation in the face of competing national economic and trade pressures – a fact of life still relevant today.

Further cooperative programmes

Nevertheless, the NBMR approach did encourage the Armaments Committee and the Service Advisory Groups to look for cooperative possibilities, while several programmes based on existing equipment were undertaken in the next few years.

The Starfighter Programme

In December 1960, Belgium, Germany, Italy and the Netherlands, agreed to participate in a coordinated production programme, in Europe, of the United States F-104G Starfighter aircraft. This became a NATO programme, in June 1961, and was completed in 1966, with United States assistance, by which time nearly 1,000 aircraft had been produced. Canada was closely associated when producing similar aircraft for the Canadian Forces. This integrated production programme, the largest of its kind, marked a great step forward for the European Aerospace Industry.

Bullpup Missile Programme

Following discussions within NATO, Denmark, Norway, Turkey and the United Kingdom decided to procure the US Bullpup air-to-surface missile for their forces from a common European production source. In May 1962, the Council set up the NATO Bullpup production organisation, with headquarters in Oslo, to produce Bullpup missiles on a cooperative basis. The production programme, the amount of which exceeded \$ 38 million, was shared among the participating countries roughly in proportion with their orders. Production of more than 5,000 missiles was completed in 1967 and the liquidation of the production organisation and transfer to NAMSA of responsibility for logistic support was completed in 1968.

AS-30 Missile Programme

In June 1962 the Council set up a NATO Steering Committee for the production of the French developed AS-30 air-to-surface missile. France, Germany and the United Kingdom committed themselves to adopting the missile, and production of nearly 2,000 missiles was completed in 1966. The Steering

Committee was disbanded in June 1966, and an agreement made between the interested nations to coordinate logistic support.

M-72 Light Anti-Tank Weapon

In July 1963, the Council set up a NATO Steering Committee for the production of the M-72 US light anti-tank weapon. Canada, the Netherlands and Norway undertook to adopt the missile and production, involving expenditure of more than \$ 10 million, was completed in 1968.

The Period 1966 to 1980: new forms of armaments cooperation

The early efforts in armaments cooperation, described above, had brought tangible benefits, but it was clear that more could and should be achieved. The NBMR approach had proved unsatisfactory, and the NATO Military Authorities found themselves in a situation which was both illogical and uncomfortable in that they were approving NBMRs without having responsibility for developing and producing the resulting equipment, and in many cases without having adequate scientific and technical advice or political and economic guidance.

It became evident, after a few years, that a fundamental reappraisal of the whole approach to cooperation was needed, and so in October 1965, an exploratory group was set up by the Council to examine the question thoroughly and propose new solutions.

This group prepared a report, setting out the principles on which cooperation should be based, the procedures which should be followed, and the proposed structure for putting them into effect. This report, approved by the Council in May 1966, became the standard work of reference on all matters concerning cooperation in research, development and production of military equipment.

A flexible approach

The new procedures embodied a change in philosophy based on recognition of the fact that countries cannot be compelled to cooperate nor constrained to observe rigid procedural rules. They emphasised flexibility, and the need to make cooperation as easy and as advantageous as possible. The mandatory aspects of the earlier system were abandoned. The NBMRs were abolished, and it was agreed that cooperative action could start on the basis of proposals from any country or from the NATO Military Authorities. If at least two countries express interest in a proposal, a group can be formed to discuss it. Gradually those member countries who have no intention of participating in the project or making any commitments drop out. The remainder draw up characteristics, plan the development and production of the equipment, and prepare cost estimates. When they are ready to make final commitments to proceed, they present a report asking for the project to be designated as a NATO project. From that point on, participating countries make their own arrangements, the only conditions being that they must make an annual report to NATO and that, if other NATO countries wish to join at a later stage, they can do so on reasonable

and equitable conditions. The body managing the project is called a NATO Steering Committee and takes whatever form the participants wish. Projects can start at any point in the research, development and production process, but for completely new items of equipment, it is preferable to begin as early as possible in the research stage before countries have taken firm decisions on them.

The Conference of National Armaments Directors (CNAD)

A certain number of organisational changes were made by the Council to give effect to the new procedures. The Armaments Committee was disbanded, and a new high-level body, the Conference of National Armaments Directors – the CNAD – was established to act under the authority of the Council.

At present, there are six "Main Groups" operating under the CNAD. The existing three Service Advisory Groups were transformed in 1966 into Service Armaments Groups, and are now called the NATO Naval Armaments Group (NNAG), NATO Air Force Armaments Group (NAFAG), and the NATO Army Armaments Group (NAAG). At the same time a Committee of Defence Research Directors, which had been set up in early 1964 was changed into the Defence Research Group. The two other Main Groups set up subsequently are the Tri-Service Group on Air Defence (TSGAD), and the Tri-Service Group on Communications and Electronic Equipment (TSGCEE). (The TSGAD was disbanded in the Spring of 1981 when the major part of its work was taken over by the NATO Air Defence Committee.) A seventh Group, not officially designated as one of the Main Groups but considered as having equal status with them, is the NATO Industrial Advisory Group (NIAG) which provides advice and assistance on industrial matters to the CNAD and the Main Groups.

There are also bodies known as "Cadre Groups", which undertake activities of general interest to all other groups in the structure, such as the NATO Group on Intellectual Property and International Cooperative Arrangements, the Group of National Directors on Codification, the Group of National Directors for Quality Assurance, the Group on Rationalisation of Design Principles, Test and Safety Criteria for Explosive Materials and Explosive Stores, and the Group on Materiel (ACSM) Standardisation. The latter group has been designated as a senior Cadre Group. It was created to deal with materiel standardisation in the areas of assemblies, components, spare parts and materiel (hence the ACSM) – and one of its responsibilities is to supervise and direct the work not only of any sub-groups it may form itself but also, if the CNAD so decides, of any other Cadre Group which is concerned with ACSM.

All the Main and Cadre Groups have subordinate bodies which are variously called sub-groups, panels, working groups or study groups. In many cases they in turn have their own sub-bodies, normally of an ad hoc nature.

The National Armaments Directors' Representatives (known as the "NADREPS") are members of the national delegations to NATO and are concerned with armaments cooperation. They meet regularly under the chairmanship of the Assistant Secretary General for Defence Support to carry out the routine

tasks of the CNAD and to undertake any such additional tasks as the CNAD may direct. One of their tasks is to direct the work of the Cadre Groups on behalf of the CNAD.

The CNAD organisation not only encourages and assists the countries to join together in equipment and research projects, but also provides the means for exchanges of information on operational concepts, national equipment programmes and appropriate technical and certain logistical matters where co-operation can benefit NATO and the nations, even if no particular project as such is likely to materialise. It further encourages discussions on longer-term research activities, with a view to providing guidance on the possibility of meeting future military needs through the application of advanced technology or new scientific discoveries.

The initial experience with the new procedures and organisation was most encouraging. There was a new air of freedom and a greater readiness to bring forward proposals for projects, and to discuss ways and means of cooperating. The fact that there no longer had to be NATO-wide agreement on requirements helped to encourage proposals, as it was realised that if only two countries cooperated to produce a weapon for their forces, this was better than nothing, and there was the hope that one day more countries would agree to join the endeavour.

In the first years, many of the proposals concerned items which were already at a late stage of development in one country or another. However, once these items had been thoroughly examined, the tendency was to look further ahead, and this encouraged countries to exchange information on ideas and intentions. This has been and is extremely valuable in helping to harmonise national concepts and practices in a variety of fields, thus making a broader contribution to the cohesion of the Alliance than is revealed by merely totalling up the projects which have so far been designated as "NATO Projects" under the new procedures. These new procedures brought with them the prospect of an enhanced role in defence equipment cooperation for the smaller and less industrialised nations of the Alliance, whose special needs in this area have been increasingly recognised.

Cooperative programmes under the new procedures

Many successful cooperative programmes have been undertaken, as a result of the work of the CNAD Main Groups and their subsidiary bodies. Examples are given below grouped by arm of service (navy, air force, army).

NATO Sea Sparrow

NATO Sea Sparrow is a new generation anti-air point defence missile system for employment on board naval units of frigate size and above. The project, which is now in the production phase, is the successful result of multinational cooperation initiated in 1968 with the participation of Belgium, Denmark, Germany, Italy, the Netherlands, Norway and the United States. Cooperative

logistic support of the system among the participating nations is being implemented, and modifications to improve the performance are being cooperatively undertaken.

NATO FORACS

The NATO Naval Forces Sensor and Weapon Accuracy Check Sites in Europe (NATO FORACS) programme is the result of multinational cooperation initiated in 1974 by the NATO navies. The aim of the programme is to acquire, equip and operate two ranges, one in the northern and one in the southern region, for the purpose of checking the accuracy of all sensors connected with shipborne weapon systems. The required works are being carried out under NATO common infrastructure funding. The Northern Range in Stavanger, Norway, was completed in 1978 and is now fully operational. The completion of the Southern Range in Souda Bay, Crete, is expected in 1981.

NATO Frigate for the 1970s

Through this NATO project, initiated in 1975, Germany and the Netherlands are joining their efforts in research, development and production for the acquisition of frigates having common operational characteristics and a high level of standardisation. The latter is obtained by means of common ship design and common procurement of equipment and weapon systems. The entire programme calls for 12 standard frigates for the Netherlands and 6 Type 122 frigates for Germany to be in service by 1984.

NATO Sea Gnat

NATO Sea Gnat is a cooperative project, established in 1977, with the purpose of developing decoy systems to protect ships against the threat posed by sophisticated guided missiles. Participants are Denmark, Germany, Norway, the United Kingdom and the United States.

Co-operative Support for the 76/62 OTO Melara Compact Gun

This NATO programme was established in 1978, with the aim of coordinating the logistic and technical activities of the NATO navies operating that type of gun.

NATO Jaguar Tactical and Training Aircraft

The Jaguar aircraft is an Anglo-French cooperative venture, initiated in 1965, to meet the common need of the United Kingdom and French General Staffs for a tactical and training aircraft. This single or two-seater, twin-turbo-fan engine, strike/ground attack or advanced trainer aircraft met all the requirements set up for the first type of aircraft studied by the NATO Air Force Armaments Group Sub-Group 3 on Ground/Attack Aircraft.

Four versions have been built, namely the United Kingdom Tactical and Trainer versions and the French Tactical and Trainer versions. Development and production on both airframe and engine were shared by French and British industry working as subcontractors to two joint companies, set up to act as prime contractors. Deliveries of over 400 production aircraft to the United Kingdom and French armed services began in 1971.

The Anglo-French Helicopter Package Deal

The tactical transport helicopter SA/330 PUMA, the light observation helicopter SA/341 GAZELLE, and the multi-purpose helicopter WG/13 LYNX, were the subject of an Anglo-French helicopter package deal adopted by the CNAD as a NATO project in February 1969.

Many roles have been devised and a number of versions developed for these three helicopters which have been ordered and produced in great numbers, primarily for the armed services of France and the United Kingdom, and also for a number of other NATO countries, under the management of the NATO SA/330, SA/341 and WG/13 Helicopter Project Steering Committee.

NATO Multi-Role Combat Aircraft

Established as a NATO project in September 1969, the NATO Multi-Role Combat Aircraft – TORNADO – is a two-seater, twin-engined, variable geometry aircraft developed by three international industrial consortia: Panavia (BAC, MBB and AERITALIA), Turbo-Union (Rolls Royce, MTU and AERITALIA) and Avionica (EASAMS, ESG and SIA). The aircraft is required to operate in night/adverse conditions and its avionics fit has been optimised for this purpose in the various roles. The three participating countries – the Federal Republic of Germany, Italy, and the United Kingdom – have agreed to the co-production of 809 aircraft (324 for the Federal Republic of Germany, 100 for Italy, and 385 for the United Kingdom). Full production is now under way.

NATO F-16 Combat Aircraft

Established as a NATO project in October 1975, the F-16 Air Combat Fighter has been developed by General Dynamics Corporation. This aircraft has been selected to meet the Belgian, Danish, Dutch, Norwegian and United States air force requirements for a fighter aircraft that can perform an acceptable spectrum of tactical air warfare tasks at a reasonable cost, thereby permitting the much needed modernisation and expansion of tactical fighter forces. The five nations have formed a consortium and have agreed to the co-production, with an extremely high degree of commonality, of 998 aircraft (650 for the USAF and 348 for the European participating countries). Full production is now under way within the consortium and deliveries are being made at a rate of 13 aircraft per month.

NATO Patriot Programme

In 1978, seven NATO nations agreed to plan collectively for the introduction of the United States surface-to-air missile system, PATRIOT, as a common air defence system. To this end, the nations established a Steering Committee to direct the work of the PATRIOT Management Office, the main aim of which is to establish possible arrangements for acquiring the system, including the potential for involving European industry. The work is progressing, and various production possibilities have been identified, together with the associated cost, which will provide a sound basis for the decision on procurement.

NATO 155 mm Towed Howitzer (FH 70)

This weapon system has been developed jointly by the Federal Republic of Germany, Italy and the United Kingdom, and is being produced in these countries. Completion of the delivery programme is planned by early 1982.

NATO 155 mm Self-Propelled Howitzer (SP 70)

The same three countries are developing a self-propelled version of the 155 mm Howitzer. Technical development of this equipment is progressing satisfactorily. Engineering tests and a short user test have been completed. Full-scale trials will be conducted during the next phase of the programme followed by trilateral acceptance and approval.

Combat Vehicle Reconnaissance, Tracked (CVRT)

Belgium and the United Kingdom adopted a family of light armoured reconnaissance vehicles developed in the United Kingdom. Production of all variants by Belgium was completed in 1979. Deliveries to the United Kingdom forces will be completed in 1981.

MILAN Guided Anti-Armour Weapon

The NATO Steering Committee on MILAN is composed of delegates from Belgium, France, Germany, Greece, Italy and the United Kingdom. The Steering Committee monitors the configuration control of this successful weapon system developed jointly by France and Germany. It also provides a forum for discussion of logistics, training and safety matters.

Rapid Fire Gun MK 20 RH 202 and Anti-Aircraft Mount HS 669 N

Two nations, Germany and Norway, have undertaken the first stage of development for this weapon system and its ammunition. A Steering Committee was established to deal collaboratively with all problems concerning this equipment, and to discuss joint solutions.

Small Arms and their Munitions

Most of the member countries of the Alliance will procure a new generation of individual weapons during the 1980s, in order to satisfy their tactical requirements and enhance the effectiveness of portable infantry weapons. Several countries also wish to procure new support weapons.

In this area, it has long been recognised that standardisation of munitions is essential, and that for weapons it is desirable. Member countries have agreed in the CNAD that only two calibres should be adopted for small arms, one of them being the existing NATO 7.62 mm calibre.

In order to determine the second calibre, a joint weapon and munitions evaluation programme formulated in 1976 was established by Belgium, Canada, Denmark, France, Germany, Greece, Luxembourg, the Netherlands, Norway, the United Kingdom and the United States. As a result of this exclusively technical and military programme, 5.56 mm has been adopted as the second standard NATO calibre for small arms and the Belgian SS 109 ammunition has been selected as a basis for standardisation.

NAVSTAR Global Positioning System (GPS)

In April 1978, nine NATO nations signed a Memorandum of Understanding with the United States on their participation in the full-scale development phase of a United States programme for the establishment of a satellite-based, worldwide positioning and navigation system known as the NAVSTAR Global Positioning System (GPS).

Defence Research Programmes

In addition to the equipment-oriented projects, there are also joint ventures of a scientific or technical nature, initially sponsored by the Defence Research Group.

Azores Fixed Acoustic Range (AFAR)

In 1967, eight NATO nations (Canada, France, Germany, Italy, the Netherlands, Portugal, the United Kingdom and the United States) took the initial step towards the construction of a deep-water acoustic range in the Atlantic Ocean off the Island of Santa Maria in the Azores. The transmitting and receiving antennas were implanted in 1970 and 1971, and the range was operational from May 1972 until May 1979, yielding a large amount of data on underwater sound propagation, and thus enhancing the Alliance's capabilities in underwater detection.

Mobile Acoustic Communications Study (MACS)

In 1976, three of the AFAR Nations – France, Germany and the United States – agreed to carry out underwater sound propagation measurements between

mobile platforms in various maritime environments to complement the AFAR data, especially regarding bulk and bottom effects. Four sea trips took place in 1976 and 1977, and the project was terminated in 1979, after completion of the data evaluation.

European Transonic Windtunnel (ETW)

In 1978 France, Germany, the Netherlands and the United Kingdom embarked on the preliminary design of a large-scale transonic windtunnel of the cryogenic type, i.e. operating at a very low temperature. The work is directed by a multinational technical group in Amsterdam, and the preliminary design was completed by the end of 1980. The following phases will cover the final design and the windtunnel construction.

NATO Industrial Advisory Group

In 1968, the NATO Industrial Advisory Group (NIAG) was established under the CNAD, to provide a forum for free exchange of views on the various industrial aspects of NATO armaments questions, to foster a deeper feeling of international involvement in research, development and production, to seek closer cooperation amongst the industries of member countries, and to encourage the timely and efficient exchange of information between member governments and their defence industries.

Since its creation, NIAG has provided advice and suggestions for action in a number of areas covering legal, management, economic and technical problems. It has also identified a number of obstacles to cooperation with recommendations for overcoming them. In addition, the NIAG has undertaken "pre-feasibility" studies on a wide range of subjects, with a view to establishing the technical feasibility and estimated cost of possible solutions, assessing trade-off points and the penalties involved in adopting certain courses of action, and identifying areas where more detailed study was required. Subjects covered include advanced approach and landing systems, battlefield surveillance, expendable targets, compatibility of naval data handling equipment within ships, certain radar problems, anti-surface ship missiles, anti-ship missile defence, air-delivered weapons, and important aspects of air defence.

NIAG has amply demonstrated the technological capability of industry in many equipment areas, and has become a significant aid in NATO's cooperative equipment endeavours. Member nations are becoming increasingly aware of the support it has to offer.

Work of the cadre groups

The following paragraphs describe the work of the cadre groups under the CNAD and the broad problems which they handle, ranging from general management to legal and administrative matters.

NATO Codification System

An important factor in management of support for national armed forces is the supply problem. Huge stocks with millions of individual items necessitate a system of handling that is fast, flexible and precise. The NATO Codification System provides a uniform method of supply classification and item identification and is thus an ideal tool for data management. It also helps inventory managers in the simplification of supply and procurement procedures and can form a basis for standardisation. A particular asset is the use of one number for one item in NATO projects, regardless of origin, which is a sine qua non for efficient cross-servicing. The system has resulted in a reduction in items and stocks, a decrease in management costs and an improvement in the determination of assets.

Use of the system is spreading to the civilian departments of government, to international organisations and also to countries outside the Alliance.

The system is fully computerised, and is based on the principle that the country of production codifies and makes the item-identifying data available to procuring countries. Data is exchanged between countries on computer media, thus facilitating the maintenance of data files which form the basis for materiel management systems.

The Group of National Directors on Codification, which comes under the Conference of National Armaments Directors, operates Panels which cover all codification procedures and methods, and Sub-Groups which supervise the coordination of codification of all joint NATO projects. It establishes the codification policy and supports the day-to-day operations of the thirteen national codification bureaux of the NATO nations.

Quality Assurance

As soon as NATO countries and agencies started to implement equipment programmes in which the manufacture of various components was entrusted to industries of different countries, it became clear that requirements for uniform and adequate quality standards could not be met satisfactorily unless the participants in cooperative projects followed common rules and procedures. The task of drawing these up was given to the Group of National Directors for Quality Assurance specially established for this purpose. As a result of its work, the basic requirements of the NATO quality assurance doctrine and policy have been established and published as NATO Allied Quality Assurance Publications (AQAPs).

The Group is continuing its work in developing quality assurance requirements in those areas related to procurement which most affect the attainment of quality targets: the preparation of software quality control system requirements and the development of the reliability and maintainability assurance policy. The scope and impact of NATO quality assurance policy will continue to grow, both within the Alliance and beyond, as is the case with codification.

Rationalisation of Design Principles, Test and Safety Criteria for Explosive Materials and Explosive Stores

The increase in international collaboration and standardisation in the weapons field and the purchase by nations of foreign weapons has given rise to problems caused by differing national approaches to design principles, safety and suitability for service.

This in turn has led to differences in national criteria and procedures for the safety appraisal of weapons and those parts of weapon systems in which explosives are used. In undertaking appraisals of foreign weapons, it is difficult to establish what test (or what equivalent to national tests) a weapon has undergone and with what results.

A group of experts under the Conference of National Armaments Directors on Rationalisation of Design Principles, Test and Safety Criteria for Explosive Materials and Explosive Stores, has therefore been tasked to establish agreed international terminology, design principles, criteria, procedures and tests to cover all aspects of the process, by which assessments of safety and suitability for service are made, since it is these criteria and procedures which provide guidance for the weapon designers.

Assemblies, Components, Spare Parts and Materials (ACSM)

A review of activities within NATO concerned with the standardisation of assemblies, components, spare parts and materials indicated an urgent need for improvement in this field. Only a limited number of standardisation documents related to these items had been agreed, and effective implementation had often not taken place. It was against this background that the Conference of National Armaments Directors established the Senior Cadre Group on Materiel (ACSM) Standardisation in 1977, to develop an effective NATO standardisation policy and programme; to further the coordination of short and long range standardisation activities in the area of ACSM; and to promote utilisation to the maximum practical extent of national and international industrial standards, military standards and specifications. The Group draws up proposals for engineering design (ACSM) standardisation, monitors progress in this field and provides advice and assistance as appropriate. It also surveys the work of CNAD subsidiaries concerned with ACSM, and coordinates or directs the work of subsidiaries as CNAD decides.

Intellectual Property Problems

The ever-increasing flow of technology among the members of the Alliance and their industries, in the framework of armaments cooperation, requires the adoption of measures for protecting the intellectual property rights involved and facilitating the transfer and use of proprietary information. One of the CNAD Cadre Groups, the NATO Group on Intellectual Property and Cooperative Arrangements, studies these problems and provides appropriate solutions and advice.

The "NATO Agreement on the Mutual Safeguarding of Secrecy of Inventions relating to Defence, and for which applications for Patents have been made", of September 21, 1960, is one of the important legal instruments established by the Group. By committing governments to safeguard the secrecy of such inventions, this Agreement makes it possible for nations to lift prohibitions on the filing of patent applications in other countries, which, in the past, had adversely affected the promotion of NATO cooperation in research, development and production of military equipment.

The "NATO Agreement on the Communication of Technical Information for Defence Purposes", of October 19, 1970, was prepared by the Group, in order to provide adequate protection to the owners of technical information exchanged between member governments or NATO organisations, thereby encouraging industries in NATO nations to make their technology more readily available for purposes of armaments cooperation.

In an effort to increase and harmonise licensing and co-production policies in NATO nations, the Group established its "Intellectual Property Principles and Guidelines in the field of Licensing and Co-production for the purpose of Armaments Standardisation and Interoperability", which were completed in 1979, after close consultation with NIAG, and endorsed by the Conference of National Armaments Directors. These principles and guidelines, which are gradually being implemented by nations, are expected to provide new incentives for increased standardisation and interoperability of military equipment within the Alliance. The Group is pursuing further work in related areas of study.

Among other guidance papers and studies accomplished by the Group in support of NATO armaments cooperation, the following should be mentioned: "Guidance for NATO procurement authorities" and "Guidance on drafting international cooperative research and development agreements" (both published in booklet form); "National practices regarding proprietary rights in cooperative research and development programmes"; "Military equipment and industrial property legislation" (2 volumes); "Recoupment of research and development costs in NATO countries"; and "Regulations in NATO countries concerning employees' inventions". These have all been published in the form of NATO brochures. A new brochure has been produced by the Group on "Guidance for the drafting of MOUs and International Cooperative Arrangements"

The Group is redirecting its activities to address broader aspects of acquisition management and problems that inhibit industrial cooperation among the member nations and is currently in a transition period. Intellectual property will become an incidental topic within the broader framework of the Group's work.

Problems of standardisation

As is natural in an Alliance, much stress is laid on cooperation, and indeed it is often viewed as a desirable goal in itself, even though there is sometimes no clear idea or consensus as to what types of cooperation would be most advantageous. So it was at first with the CNAD, which was established primarily

with the object of improving the mechanisms for cooperation in research, development and production of military equipment within NATO. In more recent years, prompted not least by the spiralling cost and complexity of modern armaments and by the rapid build-up and increasing sophistication of the equipment of the Warsaw Pact forces, the CNAD has focused increasing attention on defining its objectives in equipment cooperation more precisely. The emphasis on standardisation has been one outcome.

A difficulty here is that standardisation means different things to different people. Its strict meaning is to make or act in conformity with a standard. It is towards this that the early and continuing efforts to have standard procedures or components enshrined in standardisation agreements (STANAGs) are directed. In some circles, the term is only used to signify commonality or identity of equipment, whereas in others it is recognised as including a wide variety of degrees of similarity, including compatibility. Such is the variety of the shades of meaning given to standardisation that its definition is frequently being reviewed and amended, implicitly or explicitly. The definition of standardisation promulgated by the International Organisation for Standardisation (ISO), based on the concept of formulating, issuing and implementing standards, has now been adopted for use throughout NATO. However it is with the meaning of genuine equipment commonality that standardisation has been emphasised by some countries. This is a difficult goal to achieve in an Alliance of sovereign nations. The real benefits to be gained from such commonality stem from the more effective use of economic resources it permits in development, production and support. Interoperability, on the other hand, is the aspect which is really essential to military effectiveness. The need to be able to intercommunicate, for example, is self-evident. Equipment interoperability has figured implicitly in cooperative programmes since the beginning of the Alliance, but only since 1975 has it been singled out as a specific object of cooperation. Particular areas where special efforts have been initiated include the cross-servicing of aircraft, fuels, ammunition and communications equipment. Associated with this has been a drive to improve the efficacy of STANAGs, both in their scope and in their implementation. A fully comprehensive range of STANAGs universally applied would solve almost all the problems of interoperability. Means of activating this are under study. In the meantime, special efforts are being made in certain areas of which the next paragraphs give one important example.

Armaments planning

Although the mandate of the CNAD continues to govern armaments collaboration within the Alliance, the Allies have in recent years been pursuing ways of giving greater coherence and structure to cooperative efforts.

The NATO Armaments Planning Review (NAPR), formally established in October 1979, represents a step in this direction. The NAPR is primarily a review system designed to expose more clearly opportunities for cooperation. It uses at its point of departure equipment replacement schedules provided by the nations. These are collectively examined by the International Staff in the light of

corresponding advice from the NATO Military Authorities on the need for standardisation or interoperability of the equipment items listed in the schedules. Opportunities are then presented to the nations.

A second armaments planning system is known as the "PAPS" – the Periodic Armaments Planning System. This is a far more fundamental and long-term planning system, the principal elements of which have now been implemented by the Conference of National Armaments Directors. A major thrust of PAPS is the initiation of cooperation before national programmes have progressed to the point where national commitments to particular hardware solutions mitigate against cooperation. Its point of departure is a military requirement couched in terms of a "Mission Need" – a statement of a quantitative or qualitative operational deficiency that cannot be solved satisfactorily with existing or planned forces and/or equipment. These mission needs can be submitted either by nations or the Major NATO Commanders, and will then be promulgated to CNAD bodies for detailed examination. In subsequent milestones of the PAPS, these bodies will endeavour to harmonise the military requirement and convert it into a detailed technical requirement that will satisfy the need within the framework of a cooperative venture.

Transatlantic equipment cooperation

A particular aspect of the evolution of NATO cooperation in defence equipment has been the desire to improve the collaboration between the European and North American member countries of the Alliance in the interests of making more cost-effective use of the total resources of the Alliance. This has resulted in:

- General Memoranda of Understanding (MOUs) between many industrialised European nations and the United States on the reciprocal procurement of defence materiel and the removal of trade barriers;
- The Dual Production by interested NATO nations of systems developed by another nation (or group of nations) under fair and equitable conditions;
- a Family of Weapons approach whereby interested nations agree to develop and produce different equipments of a given family under either European or North American leadership, in such a way that duplication of research and development effort in the same equipment is minimised (e.g. in the air-to-air missile family, Europe would take the lead for a new short-range air-to-air missile, while the United States and Canada would take the lead in the new medium-range air-to-air missile).

This "Triad" approach should facilitate wider Alliance co-operation in armaments and contribute significantly to the achievement of NATO rationalisation, standardisation and interoperability (RSI) objectives.

A Transatlantic dialogue between the European and North American nations is conducted on these "Triad" initiatives under the aegis of CNAD and a report is made to it at its bi-annual meetings.

