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The Centre for Naval Analyses is located in Arlington, a short distance across the Potomac River from the centre of US government and a few minutes by road from the Pentagon. It is co-located with other US government departments and agencies which have expanded from the Capitol area itself. To most British readers, and even to many very senior British Naval officers, including some who have served with the US Navy or in NATO appointments, the Centre for Naval Analyses (CNA) is either a totally unknown quantity, or, if it is known, then their contact with it has been slight. Yet within the US Navy the CNA plays an important role in many aspects of its work, from the working operational level to the highest level of long-range strategic planning and warfare studies. CNA should not be of interest to a British audience for this reason alone. It is interesting from the historical viewpoint, but most of all because of its unique position within the US Defence system and indeed by comparison with any other remotely similar organization anywhere else in the world. CNA is so constituted that its independence from bureaucratic and institutional pressures is guaranteed not only so that it can produce timely analyses of immediate value, but so that it may also investigate and recommend policies, equipment, systems, tactics, and strategic plans that may be at variance with existing doctrine. This independence based upon a long record of high quality work, is the hallmark of the CNA. We shall shortly review how this greatly benefits the USN, but before doing so let

us look briefly at CNA's origins so that a clear perspective of its work can be obtained.

#### Historical Origins and Development

CNA in fact owes its origins in part to British inspiration, and especially to the late Lord Blackett, the father of operations research and leader of the scientific approach to solving the problems of the U-boat in World War II. In 1942 the National Defense Research Committee set up in the USA the Anti Submarine Warfare Operations Research Group (ASWORG). By the end of the war this group had 80 scientists on its staff and amongst other things they had helped enormously to crack the U-boat problem. Operating through the auspices of Columbia University in New York under contract to the US government one of the characteristics of the organisation had been its team of analysts sea-riding during the war and feeding back to the analysts ashore all necessary data. ASWORG's professional independence was guaranteed through the Columbia connection and its work enhanced by the practical input from sea. These essential elements remained with the emergent CNA. At the end of the war Fleet Admiral King and Secretary Forrestal were so impressed with the work of ASWORG that the Navy signed a new contract, this time with the Massachusetts Institute of Technology. As Blackett is to the British so the name of Professor Philip Morse is to the US Navy and his alma mater.

the MIT. The unbiased, scientific viewpoint was thus continued without direct control from the Administration.

OEG reported to the VCNO (Vice Chief of Naval Operations) with its main tasks of conducting operations analysis, evaluating new equipment, formulating new requirements, and investigating the technical aspects of strategic planning. During the Korean War OEG worked with the carrier divisions and the First Marine Air Wing. The range of tactical problems covered were: The selection of weapons for naval air attack upon tactical targets, close air support scheduling, air to air combat analysis of jet fighters, and naval gunfire in shore bombardment. At the strategic level OEG's work covered the efficiency of blockade tactics and the interdiction of land transportation.

In August 1953 the Soviets exploded their first thermo-nuclear device. OEG, already working on the naval implications of this, accelerated their interest in this. At the same time the CNO's (Chief of Naval Operations) Long Range Objective Group formed with OEG the Naval Warfare Analysis Group (NavWag). This body began work on a long-range shipbuilding programme, and the Naval ramifications of nuclear war. Another echelon of the emergent CNA had been formed. In 1959 the CNO began the Long Range Studies Project. This became the Institute of Naval Studies (INS), and was initially located in Cambridge, Massachusetts, and came under the auspices of the Institute of Defence Analysis, and was

concerned with the improvement of planning at all levels. Because of the high costs of new weapon systems, INS' economists became increasingly important members of this new team.

In 1962, at a time when Secretary of Defence Robert McNamara was emphasising the need for greater analysis within the defence community, the Secretary of the Navy wished to consolidate all naval analysis, and OEG, NavWag, and INS were amalgamated to form the Centre for Naval Analyses. The Franklin Institute in Philadelphia was selected to succeed the MIT as the overseer of CNA's professional standards, and for the first time Naval officers were seconded to CNA to ensure that studies reflected operational realities. CNA's early customers were mainly the staffs of the Deputy Chiefs of Naval Operations for Operations and Air, studies being managed through the office of the Director of Navy Programme Planning.

In 1965 the Navy perceived a need to examine more closely the relationship between system performance and systems costs. As a result the Systems Evaluation Group (SEG) was formed at CNA, along with another much needed addition which specialised in Marine Corps matters, the Marine Corps Operations Analysis Group (MCOAG).

In 1966, INS moved from Cambridge to Arlington, Virginia so that it became co-located with the other CNA groups, and its emphasis centred on geopolitical and economic studies in support of the other group's studies and in response to Navy requirements. In August 1967 there occurred a major event in CNA's development when the Navy Department negotiated a new contract for the management of CNA. This passed from the Franklin Institute to the University of

Rochester, a prestigious University in New York State. The Rochester contract secured the continuance of CNA's independence and has fashioned its character and development since.

#### The University of Rochester Contract

The new contract improved CNA's operational efficiency and safeguarded its objectivity and intellectual independence from the pressures of the Washington political and defence environment, pressures which at times in any highly sophisticated and well-developed military environment can become totally overwhelming. Both the Navy, CNA professionals, and the new contractor saw the urgent necessity to protect this freedom in the interests of the nation.

Under the new contract CNA was allowed to allocate up to 23 percent of its resources to defence-related projects which it felt were important, irrespective of Department of Defense or other Agency views, and the reports of such work would go to the top in the decision-making tree, again irrespective of Navy views. The important thing here is that the Navy saw that this was essential, and that this was the safeguard against institutional and political decisions and programmes not based upon thorough and sound analyses. Certain unclassified publications which do not deal with policy per se are releasable to the public, though these form a minority of CNA's total output. A Board of Overseers was created from the University of Rochester and from other distinguished professionals

from related fields who review CNA's work three times a year to ensure that the professional standards are maintained.

As a result of the Rochester Contract CNA has had greater contact with the other Services and the Office of the Secretary of Defence. There has been a major shift toward analyses related to strategic decisions, particularly force mix decisions. This was further reflected in the creation of the Plans and Policy Programme, an inter-disciplinary team tasked to, "...examine the Navy's strategic problems 15 to 20 years in the future, protected from the day-to-day pressures of the Washington decision-making environment. CNA and the Navy hope that this team will eventually evolve Naval strategic concepts to further the national interest and suggest technological developments which can translate these concepts into operational reality." At the same time the traditions in OEG had been maintained -- providing at Fleet and squadron level up-to-date operational analyses which were useful to the man on the spot but also of great value to the analysts back in Washington for their long-term studies. The OEG field representatives continued their invaluable work of facilitating the exchange of information between commands and the informal and rapid solution to tactical and operational problems.

At a purely formal and legal level the CNA became one of six Federal Contract Research Centres (FCRCs) but one whose character is unique within that system. Unlike the other FCRCs CNA's contract

provides for continuous research and consulting rather than contracts for individual studies as in fact the Navy does with other non-government organisations. CNA is financed by the Navy with Congressional approval. The crucial section in the contract reads as follows: "The University of Rochester shall conduct a continuing programme of research studies and investigations which will assist the Department of the Navy in making management decisions in the application and development of naval capabilities, and which will assist the operating forces of the Department of the Navy with operational analyses to help improve current operation capabilities and which will provide operational data for other studies and analyses." The original contract was successfully renegotiated with the University of Rochester in 1975, and the original spirit of the wartime ASWORG and the special relationship with the Navy was maintained. The United States Navy has therefore created a mechanism, supported by Congress, whereby a university manages a body deliberately created to provide unbiased and often critical analyses across the whole spectrum of Naval and related fields but over which it has no direct control, save in the composition of most of the programme which is mutually agreed between the Department of Defence and the CNA. Nothing could be more indicative of the American democratic tradition and the desire to maintain an objective and unbiased input into the decision-making process than the contract which sustains the Centre for

Naval Analyses. That its high-quality work and far-reaching influence are the reasons for its continuance there is little doubt.

#### Methods Employed at CNA

With the UK the OEG was the father of operations research as it was applied to World War II ASW tactics, particularly search and screening methods. Since those early days CNA has continued to improve its analytical techniques and develop new methodologies to solve Naval problems. A new method for evaluating the tactical trials of the latest piece of equipment can be as important as the black box and tactical manual itself.

World War II set the trend in methods -- mathematical, geometrical and statistical formulae for solving practical problems. For examples, working along similar lines as the British, it was found that aerial bombs were being set to the wrong depths in relation to U-boats diving speeds, and that the number of ships being sunk by U-boats was independent of the number of ships in a given convoy. The latter led to bigger convoys. Early tactical models were designed, using operations research and systems analysis techniques, to mathematically represent the interaction of friendly and enemy forces. Today CNA uses an advanced high speed computer system.

Probability studies still figure highly in CNA methods. During World War II such methods were used to calculate the search patterns

for LRMP aircraft operating in the South Atlantic to stop German blockade runners. Initially the Navy thought that a vast number of aircraft would be required. OEG soon reduced the problem to an x-shaped search pattern and only four daily patrols were needed to stop completely the German traffic. Game theory, then as now, figures too in methods, particularly in the solution of aerial combat tactics.

At the heart of all CNA methods is a businesslike approach to the creation of the analytical programme. Before any resources are committed some fundamental questions are asked. CNA spend much time just deciding what exactly projects are trying to achieve. This reaps major dividends in the long term. Each project is reviewed carefully in terms of resource allocation -- analyst time, computer usage, review effort, and so on. Nonetheless high risk work is encouraged where the benefits for the Navy could be far-reaching.

CNA's programme is driven to a certain extent by the issues which are coming up for decision. The annual programme avoids over-involvement in short-range projects. It is the long term which is CNA's main concern. The main questions to which CNA addresses itself before a study gets underway are: Does it fit in with the long term research theme? How would the Navy's programme be affected by its resolution? Is the issue readily handled by research techniques? Has the issue been analysed before? Is the necessary information available? Does CNA have the necessary

expertise? Hasty decisions are never made, and in the long run the Navy is much the better for this.

### Personnel

The lifeblood of CNA is its professional analysts. They work in teams rather than individually. They tend to be mathematicians, physicists, chemists, engineers, economists, political and social scientists, and historians. CNA has direct control over their recruitment, salaries, and career planning.

The top management of CNA consists of the President of CNA, a Director of Programme Review, a Director of Finance and Administration, a Senior Scientist, a Director of Planning, a Director for Naval Matters (a senior USN Captain), and a Director of Computer services. Under the President there are five Directors of the groups already mentioned.

OEG field representatives normally do two-year tours in the Fleet, and there are approximately 45 such billets. NavWag's staff consists mainly of physical scientists and engineers who work primarily in the field of ASW and UW and strategic warfare. SEG staff tend to specialise in tactical air warfare, fleet air defence, surface warfare and communications. INS staff look at manpower, personnel problems, and resource analysis. The MCOAG is a microcosm of the other groups' activities. The Plans and Policy staff look at Naval Strategy, particularly of the US and

the Soviets, the peacetime uses of Naval power, trends in Soviet Naval developments and operations, and the law of the sea.

There are normally about 35 Naval officers on the staff of CNA. Although under the military command of a USN Captain they are responsible for their professional work to the President of CNA. Any Naval officer joining CNA must have the same professional credentials as a civilian analyst. The USN does have this capacity to produce officers with outstanding academic records and similar Service records.

In 1975, 88 percent of CNA professionals possessed either Doctors or Masters degrees from the most prestigious US universities. CNA had the highest percentage of such people of any contract research centre, federal research centre, and other similar organisations in the public sector. Salaries reflect the high quality of the staff. Rewards are made on the basis of results, not time in. In 1975 six CNA employees were earning in excess of \$37,800 per annum (~~£~~<sup>£</sup> 23,000 UK). This reward system reflects the importance and the quality of the work. CNA has some of the world's most knowledgeable people within their fields. A long tenure depends both on performance and the replenishment of skills. To help the latter CNA runs an excellent professional development programme.

Once an OEG analyst has acquired experience in Washington he will be sent to the Fleet where considerable initiative is required and he can expect lots of independence. Generally quality

and standards are set by peers, provided the classification rules permit. CNA's review process is rigorous, and the final product is first distributed to the main players in the decision-making process. Since CNA has full access to all aspects of US defence policy, equipment, tactics, and high grade intelligence, as well as contributing to all of these, most of its work is little known except to those with a need to know.

#### CNA's Special Relationship with the US Navy

CNA does not tell the Navy what to do, it advises. Although the servant of the Navy, the Navy is not CNA's master. It does not exist to defend Navy programmes. It often has to be critical of these. Because of the nature of its work it is little known. When its existence has been challenged no viable alternative has been found. The situation was well described by Dr. Robert A. Forsch, the Assistant Secretary of the Navy in 1967: "What we want is some combination of organization that is close enough to the Navy so that it understands what is going on and has access to the information, but is ornery enough that it will answer back, and independent enough that it will give an answer which has nothing to do with what it thinks the Navy might want the answer to be..." To become the intellectual captive of the Navy would destroy CNA's raison d'etre. The Navy cannot suppress CNA's work. It can disagree and put forward counter proposals, but it cannot avoid the responsibility of facing the hard analytic facts. At the same

time CNA has the prime responsibility of ensuring that its work is of the highest order if it is to enjoy this sort of privilege.

#### Results of CNA's Work

It is not possible in an unclassified article to mention the range and nature of the results of CNA's work. However a selection from the unclassified titles will still suffice to give a reliable indication of what the organisation is all about. They cover: The optimisation of air attacks against surface targets, the use of Naval tactical nuclear weapons, law of the sea negotiations, ocean surveillance systems, communications with SSBNs, submarine launched cruise missiles in flexible response missions, over the horizon targeting, acoustic detection, sea control tactics, US force mix for anti-surface warfare, amphibious ships and concepts over the long term, future Naval force structures. At the same time there is continuous work on current operations and exercises.

#### The Value of CNA to the US Navy and Implications for the UK

An official statement of the President of CNA in June 1975 epitomises the role of CNA: "...unbiased, disinterested analyses of competing claims are hard to come by. So a place like CNA -- which has no vested interests, which can help to sort out the existing claims, and is not affected by who wins or who loses -- is extremely valuable." Since it has full access, continuity, independence, and is non-profit making, CNA remains unique. It

has a complete range of skills nowhere else available in the West for this particular task. The US Navy could not revive its long term themes and excellence overnight should it be abolished.

Although the Royal Navy is but a reflection of the size and power of the US Navy (currently with half a million men in uniform) and may not justify an organisation as complex and wide-ranging as CNA, it could do worse than to review some of its existing organisations in the light of the philosophy which drives CNA in its relationship with the US Navy. Entrenched bureaucratic institutions (and this embraces the defence scientific services equally with the uniformed and civil services) do not necessarily always produce the best results in the most economical way. Furthermore, the very nature of career structures, management hierarchies, and fused loyalties may inhibit the very results in mind. Perhaps of most relevance at the present time is that CNA is extremely economical compared with any similar US institution. CNA does its job more cheaply than any other similar body by every performance and cost criteria. At times some have claimed that CNA benefits too much from being nonprofit making whilst receiving large funds from the Navy. It is symptomatic of CNA that its own economists have always been aware of this and have made resource optimisation a main element in study proposals. It has been shown that if the job was given to the full government service the costs would soar. There is, indeed, an important lesson in all this for the United Kingdom.

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