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The Aircraft Carrier Will Remain an Essential Element of 21st Century Sea Power.

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Abstract

There is no more potent and visible symbol of 21st century sea power than an aircraft carrier and it's associated battle group (CVBG). This forceful combination of power projection, presence, and strike ability has been, since 1942, the backbone of the United States Navy (USN). United States military-strategic and maritime strategy has been formulated over the years around the CVBG concept. Over the last 60 years the emphasis has shifted from Cold War containment to exerting global presence and power projection in defence of the homeland and as a means of influencing world opinion. Through all these changes the American military has relied on the aircraft carrier concept and continued to develop its capabilities and applications. A limited number of other navies such as the Royal Navy, France, India and the Soviet Union/Russia have all attempted to maintain or possess these capabilities, with varying degrees of success but none have come close to matching the USN.

Changing strategy begets changing doctrine. Doctrine is now a globally accepted military art-form. All militaries of consequence devise, evolve, copy and study doctrine as the determining factor for military operations and attempt to tailor their capabilities accordingly, although doctrine is easier (and cheaper) to develop than capability. Naval doctrine has evolved to reflect the global, disparate, and assymetric realities of the 21st century but there has been no commensurate shift in the most potent symbol of maritime power, the aircraft carrier. By virtue of its flexibility, strike capability, longevity, high investment requirement and sheer presence the aircraft carrier will remain an essential element of sea power for the foreseeable future.

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"The ultimate aim of sea power is sea control"[1]

Preface - Understanding 'Sea Power'.

The term 'Sea Power' has no single, clear definition. To British Elizabethan privateers such as Drake it meant the power to wreak havoc on foreign shipping in support of their Queen's foreign policy and their own purses. To Alfred Thayer Mahan it meant the massing of decisive force to defeat conclusively the enemy's naval forces.[2] To Sir Julian Corbett, it meant projecting a nation's will through naval power and presence. To the Cold War nuclear warriors, it meant the ability on both sides to destroy, at range, the enemy first. Contemporary writers such as Colin Gray (quoted in current United Kingdom maritime doctrine) argue that sea power "grants the ability to control the geostrategic terms of war…the state which most effectively harnesses sea power wins wars".[3] Norman Friedman maintains that the end of the compartmentalized bi-polar Cold War has created a military environment where uncertainty is the norm and that sea power has become the decisive enabler. Whilst 'Sea Power' has changed in its understandings there is a common thread understood from Drake onwards – sea power is an extension of a nation's political will. Land warfare is fought either to secure territories or to influence other events. The sea can never be permanently secured; therefore, sea power must influence through 'sea control', "when one has freedom of action" or 'sea denial', "when an opponent is prevented from using an area of sea for his purposes".[4]

In 2003, the United States Navy (USN) stands alone in terms of its sea power capabilities

[1] Koburger, Charles W. Sea Power in the Twenty-First Century. Westport, Conn. Praeger. 1997. 92.
[2] Mahan, Alfred T. Capt USN. Naval Strategy. London, UK. Sampson Low, Marston & Company. 1911.
[3] Naval Staff Directorate. British Maritime Doctrine. Editions 1 & 2. London, UK. HMSO. 1995/1999. 180.
[4] Naval Staff Directorate. British Maritime Doctrine. Editions 1 & 2. London, UK. HMSO. 1995/1999. 232.

and resources. Other nations may share the same intent but only the USN can realise that intent on a global scale. As the stand-alone global sea power, it seeks to exert sea power through 'sea control', "the basic principle of sea power (which) has not changed"[5]. Its primary means of achieving this goal is the aircraft carrier.[6] In United States doctrine, and popular imagination, sea power is an aircraft carrier, its battle group and associated capabilities.

Introduction

The aircraft carrier first entered the strategic consciousness in December 1941 following the Imperial Japanese Navy raid on the United States bases in and around Pearl Habour, Hawaii.[7] The intervening 60 years have not dimmed that consciousness. Carriers have grown in dimension - tonnage, range, speed, and capability - to the extent that they are the maritime weapon of choice across the spectrum of maritime operations. While the Dreadnought, battleship and submarine wolfpack have come and gone, the aircraft carrier continues to reign supreme.

Through its power projection capability, the aircraft carrier is an essential element of sea power in the 21st century. Despite a changing strategic environment, ranging from global war to Cold War to the uncertainties of today, it is an element that is destined to remain pre-eminent in the minds of naval strategists. It has not been without its dectractors and a significant and influential faction continues, on both a military and financial basis, to lobby against the carrier's strategic value and future investment.

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[5] Haydon, Peter T. Seapower and Maritime Strategy in the 21st Century. Halifax, N.S. Centre for Foreign Policy Studies, Dalhousie University. 2000. 37.
[6] The nuclear deterrent force of SSBNs is a strategic capability that operates in the maritime environment.
[7] The Royal Navy Fleet Air Arm attack on the Italian naval base of Taranto in November 1940 was the first carrier-launched attack but despite being a cause for RN celebration ever since, its strategic effect was limited.

Despite its critics, the large aircraft carrier is here to stay. The attributes of the aircraft carrier from the perspective of the 21st century maritime strategy make it a strategic asset. Today's American and British maritime doctrine, contends that expeditionary power projection and countering assymetric threats increase rather than decrease the efficacy of the carrier. By necessity, an examination of carrier operations will be dominated by the main proponent of carrier power, the United States Navy. The aircraft carrier appreciations of Great Britain, France, Russia, China and India deserve consideration, but their combined actual and future carrier capability does not (and will never) equal that of the USN. Therefore, the doctrinal position of the USN and United States Marine Corps (USMC) remains the primary yardstick against which the carrier is measured, although United Kingdom maritime doctrine should also be considered. Credible military alternatives such as 'arsenal' ships, land-based air forces, cruise missiles, and uninhabited air vehicles do exist. Supporters of aircraft carriers need to rebut these military, political, doctrinal, and fiscal threats in order to prove the continued efficacy of the modern aircraft carrier concept. If a nation (or nations) can financially afford it, the aircraft carrier and its potent power projection capabilities will continue to dominate maritime warfare for at least another 60 years.

Evolution of the aircraft carrier

In outward appearance the aircraft carrier has changed little since the USN commissioned the world's first purpose-built aircraft carrier, the USS *Ranger* (CV4), in 1933.[8] At 14,500 tons and 29 knots she would be dwarfed by her modern successors but in essence the *Ranger* set the basic level of operations of an aircraft carrier, attributed in 1987 to a CVN commanding officer, that:

[8] CVs 1-3, the USS *Langley, Lexington & Saratoga* respectively, were converted from other hull designs. The Royal Navy had been operating aircraft carrier variants converted from cruiser and merchantmen hulls since 1917.

"The job of this ship is to shoot the airplanes off the pointy end and catch them back on the blunt end. The rest is detail".[9] Detail indeed, but detail that must be exposed and examined in order to chart successfully carrier evolution.

Further purpose-built aircraft carriers, bigger and faster, followed swiftly in USN, British and Japanese naval inventories but this period was still the age of battleship supremacy. The initial role of the carrier (in Western doctrine) was defence of the fleet, allowing the big ships (which were still being constructed by all navies between the two world wars) freedom of manoeuvere in the coming decisive sea-battles. Supporters of naval aviation faced considerable opposition from surface warriors brought up under the teachings of Mahan.[10] It was also the age of the development of land-based bomber air forces, seen by some proponets as the new miltary panacea. In the USA, General Billy Mitchell USAAF, and in Italy, General Giulio Douhet, articulated the argument that land-based air power would reign supreme over maritime assets.[11] They argued that "…no naval units could survive anywhere within range of hostile land-based aircraft" and that technology would produce longer and longer range aircraft until the entire land and sea mass of the earth fell within the radius of action of land-based aircraft.[12]

World War Two realised a major leap in carrier operations and doctrine, proportionate to the decline of the big ship (battleship/cruiser) as the major striking force. Aircraft carriers, in the

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[9] Rochlin, Gene I., La Porte, Todd R. and Roberts, Karlene H. "The Self-Designing High-Reliability Organization. Aircraft Carrier Flight Operations at Sea". Naval War College Review. Summer 1998. Vol LI No 3. 109.

[10] So began the USN 'shoe' division that persists today . Since 1922 naval aviators have worn brown shoes with daily working dress whilst their surface compatriots wear regulation issue black and are often disparagingly referred to as "*shoes"*. Unique to the USN, the regular appointment of *"brown shoes"* as aircraft carrier COs with relatively little surface experience does little to dispel these divisions.

[11] Ironically, Mitchell's successful 1921 bombing demonstrations against battleship hulls, whilst proving that aircraft(land-based or not) could sink ships, "…encouraged the navy to become air-minded. As a result, the air force does not include naval aviation." www.centennialofflight.gov/essay/Air_Power/ mitchell_tests/AP14.htm

striking role, came of age in the Pacific campaigns. During the Mediterranean and Atlantic battles, they were largely confined to escort or defensive duties with the odd strike action such as the Fleet Air Arm's successful 1941 disbaling attack on the German battleship *Bismarck.*[13] Although an isolated action, it serves to illustrate the rise of naval air power over the outmoded battleship. *Bismarck* was finally sunk by naval gunfire from heavy fleet units but the crippling blows were dealt by 90 knot, torpedo-armed carrier launched biplanes, obsolete even by the standards of the day.

In the Pacific, the Imperial Japanese Navy demonstrated the reach of carrier air power by their attack on Pearl Harbour in 1941. There followed the only campaign to date of symmetrical carrier warfare, a series of engagements which took place beyond the visual and radar horizon that enabled US forces to advance to the brink of the Japanese mainland. Successful use of manoeuvere, force of numbers, a successful logistics supply chain, and a vast unthreatened industrial base were all force enablers for victory.[14] By war's end, the USN standard carrier was the *Essex* class of 27,000 tons, 33 knots and an air wing of 80 aircraft. The one hundred plus carrier fleet was supplemented by smaller (but equally fast) light (CVL) and escort (CVE) carriers, all converted to basic 'flat-tops' from cruiser and merchantman builds. The principle of aircraft carriers as both strike and defensive assets was established in this camapaign and the Mitchell/Douhet principle of vulnerability largely disproved but not dispelled. During 1942 to 1946 (in all theatres), only ten US carriers were lost to enemy action, most to submarines not

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[12] Brodie, Bernard. A guide to naval strategy. Princeton, New Jersey. Princeton University Press. 1958. 45.
[13] Kennedy, Ludovic. Pursuit: The Chase and Sinking of the Battleship Bismarck. Annapolis, Maryland. Naval Institute Press. 2000.
[14] However, US numerical supremacy should not be overestimated. At one stage in 1943 the USS *Enterprise* was the only serviceable carrier in the Pacific campaign. Brodie, Bernard. A guide to naval strategy. Princeton, New Jersey. Princeton University Press. 1958. 41.

aircraft. As Brodie states, "…this experience does not argue any undue vulnerability, especially as it cannot be charged the carriers ever kept themselves out of harm's way". He continues, "…one of the strategic surprises of the war was…their ability to exploit the elements of concentration and surprise to overwhelm…land-based air forces".[15] The Japanese carrier force that had started the war in such strength did not have strength in depth to replace the losses of the Battle of Midway; the USN did and its carrier force never looked back.[16]

The theme of competition and potential duplication of missions between naval and land-based air power will probably never reach a satisfactory conclusion. By the end of the war, both the carriers and the USAAF (to become the independent USAF in 1947) could be said to have had a "good war". Naval air power had demonstrated its ability to strike at range whilst defending itself. Land air power (at least the US variant) now encompassed the strategic bomber, underlined by the atomic bomb raids on Japan that closed the war. As their respective answers to the Cold War military challenge (primarily the delivery of nuclear weapons), the Navy favoured building more capable carriers (the 80,000 ton CVB-X design), whilst the Air Force placed its faith in the B-36 intercontinental bomber. Political machinations followed as Navy and Air Force hierarchies sought to deliniate clearly their areas of operation and gain the high ground. At one point in the debate, the Navy succeeded in relegating the Air Force to a primary mission of air defence of the United States, retaining nuclear weapon delivery as for itself. For largely political reasons the B-36 won the day and the CVB-X did not progress beyond the laying of her keel. This precipitated the 'Revolt of the Admirals' led by the resignation of the Navy Secretary and a Congressional inquiry into the performance and

[15] Ibid. 46.
[16] The Battle of Midway, June 1942.

acquisition of the B-36. However, despite all the naval blustering, the end result remained the same and the B-36 entered service. Nevertheless, the B-36 never saw operational service but a large number of the CVB-X's design aspects surfaced during modernisation programmes and follow-on carrier designs, a vindication of the Navy's vision.[17]

Throughout the Cold War years, aircraft carriers responded with speed, flexibility, and capability to unexpected crises as the weapon of first resort, establishing a presence before land-based follow-on forces could be brought to bear. Technological advances, notably nuclear power, jet aircraft, angled flight decks, and the ability to conduct simultaneous launches and recoveries, led to the evolution of the *Forrestal*(1955) *, KittyHawk* (1961), and the nuclear-powered *Enterprise* (1961) and *Nimitz* (1975) classes.[18] Backed by an immensely strong economy, the USN emerged as the outright world leader in carrier operations. Former wartime allies such as Great Britain, Australia, Canada, the Netherlands and France all dabbled with two or three conventionally-powered hulls. Developing nations such as Brazil, India and Argentina attempted to maintain a single hull in their inventory. Unequal in capability and constrained by smaller military budgets, niche options such as VSTOL were pursued in order to maintain at least a semblance of naval air power.[19] Only France pursued the nuclear-powered option with the troubled single build FS *Charles de Gaulle.*[20] Totai5 ouh theem or cofliuc

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1986 bombing of Libya), the carriers responded first as instruments of power projection.[21] Barlow cites that in two-thirds of the 200-plus conflicts the United States were engaged in from 1945, the carriers were their major offensive component.[22] It seemed not to matter that all these conflicts were not what the major NATO fleets had been designed for but they were marks of their inherent flexibility and perhaps exposed flaws in the original operational assumptions.

The Development of United States Maritime Doctrine: "…From the Sea" onwards.

In a perfect military world, doctrine should define capability. Therefore, it is necessary to examine doctrinal development in order to assess the validity of possessing carrier capabilities. Despite a relatively steady tempo of offensive operations in the Cold War, maritime doctrine lay fairly undisturbed. Force structure and capabilities were focussed on containment of the Soviet threat. ICBMs, launched either from land silos or submerged SSBNs, were the weapon of last resort.[23] The 'conventional' surface fleet was based around the Carrier Battle Group (CVBG), designed to storm across the Atlantic or Pacific in opposition to the Soviet fleets. But, as the Soviet threat collapsed in the late 1980s it became clear that a new military paradigm needed to be established to complement the political "…new world order".[24] It was no longer enough to oppose; the new military position must now be creative. In the maritime sphere, the official US reaction was the white paper of September 1992 entitled "…From the Sea".

[21] The air campaign precursor to Operation Desert Storm, the 1991 liberation of Kuwait.
[22] Barlow, Jeffery Dr. "Answering the Call: Carriers in Crises Response Since World War II". Naval Aviation News. Jan-Feb1997. Vol 80 No 1. 13.
[23] Inter Continental Ballistic Missiles.
[24] George Bush snr. Speech to US Congress. 6 March 1991.

"…From the Sea" was a major landmark in the United States definition of it's maritime forces and of the USN and USMC being provided with a clear, unambiguous role. Of singular importance is that the paper itself was signed by both the Chief of Naval Operations **and** the Commandant of the Marine Corps, which indicated a unity of maritime vision (possibly to avoid further scrutiny of their existence) that would not have been apparent during the Cold War. As Rhodes writes: "Virtually overnight, the Navy redefined…its justification for American naval power from a "Maritime Strategy" that emphasized the value of destroying the enemy's fleet and controlling the high seas to a littoral strategy that stressed employing Navy forces to project military power ashore".[25] That they could do this was, in part, due to the inherent maritime options offered by the CVBG. Friedman writes of two aspects of maritime power – sea control and power projection. Smaller warships can achieve one or the other but the aircraft carrier can do both; "the same fleet could be used to project power (and) to deal with Third World crises…the US fleet built during the Cold War was still quite relevant to the new circumstances".[26]

"…From the Sea", not least by dint of its signatories, restated the relevance of the US Navy in operations away from blue water into the brown water of the littoral environment. The elimination of the former Soviet Navy as the only credible blue water threat enabled this refocusing to take place. The document itself is full of reassuring phrases such as: "…unobtrusive presence; strategic deterrence; control of the seas; extended and continuous on-

[25] Rhodes, Edward. "…From the Sea and Back Again". Naval War College Review. Spring 1999. Vol LII No 2. 13.
[26] Friedman, Norman. Seapower as strategy: navies and national interests. Annapolis, Maryland. Naval Institute Press. 2001. 83.

scene crisis response; project precise power from the sea".[27] This remarkably visionary document clearly lays down the new direction for the USN and USMC – *"*Naval Expeditionary Forces - Shaped for Joint Operations Operating Forward From the Sea".[28] The paper talks of a mindset change and does categorically state, *"*The answer to every situation may not be a carrier battle group*"*. However, despite this seemingly new rhetoric, proponents of carrier power could gain satisfaction that the statement of capabilities required to enable this new doctrine was lead by the aircraft carrier and its air wing.[29] "…From the Sea" also listed what the USN/USMC now considered to be the four key operational principles to enable this expeditionary approach, namely, "Command, control and surveillance; Battlespace dominance; Power projection; Force sustainment". All these principles are fulfilled by the composite attributes of a CVBG.[30]

"…From the Sea" was as much about educating politicians of the United States Navy and Marine Corps' role in the world as it was to achieve internal consensus through what Rhodes calls *"*...a broad reeducation process*"* to enable *"*a broadly shared understanding of the new role and missions of the Navy*"*.[31] The process was continued in November 1994 under a new Secretary of the Navy and a new Chief of Naval Operations with the publication of "Forward…from the Sea". Its title is an acknowledgement that this paper is a continuation of the 1994 process rather than a revision. In the main, this paper reaffirmed the doctrinal values of joint operations and the importance of the littoral environment as a battlespace. It explicitly tied maritime interests to national interests and stressed the Navy's ability to represent these interests

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[27] United States of America, Department of the Navy. '...From the Sea'. Preparing the Naval Service for the 21st Century. Washington DC. September 1992. 2.
[28] Ibid. 2.
[29] Ibid. 5.
[30] Ibid. 6.
[31] Rhodes, Edward. "…From the Sea and Back Again". Naval War College Review. Spring 1999. Vol LII No 2. 13.

across the full spectrum of peace and war operations. For the aircraft carrier, it was an explicit reaffirmation of its role as the centre-piece of US naval doctrine with the citation that "…the Aircraft Carrier Battle Group integrates and focuses diverse technologies and combat capabilities to assure the dominance of the air, surface, and sub-surface battle space*"*.[32] The CVBGs' combination of carrier command and control facilities, air group strike power, E2C Hawkeye and *Aegis* cruiser air surveillance, S60B Seahawk and SSN sub-surface assets, surface fire support, and cruise missile shooters form this composite and unified power that is unrivalled in its complexity and capacity to fight. Whilst the Marine Expeditionary Forces are not downplayed, there is a clear implication from the paper that they will play their part only when the CVBG has achieved the aforementioned superiorities and a suitably permissive environment had been created; the D-Day frontal assault had effectively been banished. Thus far, formal 'vision' doctrine within the United States military had only been published on single (counting the USN and USMC as a composite naval service) service terms. If 'jointness' was to be truly embraced then there needed to be collective, 'top down' direction to bind together the single services aspirations for change.

This doctrinal direction was achieved in 1997 when the United States Joint Chiefs of Staff published "Joint Vision 2010" (JV 2010) which encapsulated their views on how United States' forces should operate together across the spectrum of operations.[33] Barnett, despite attributing the document with *"*...conceptual shallowness*",* identifies four concepts in JV 2010 – dominant manoeuvre, full-dimensional protection, precision engagement and focussed logistics.[34]

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[32] United States of America, Department of the Navy. Forward...From the Sea. Washington DC. March 1997. 5.
[33] United States of America, Joint Chiefs of Staff. Joint Vision 2010. Washington DC. 1997.
[34] His primary objection is these attributes are only contributors to warfighting and do not by themselves form a basis for operations. Barnett, Roger W. "Naval Power for a New American Century". Naval War College

Notwithstanding Barnett's objections, JV 2010 falls in line with previous naval theorizing, in that it espouses a joint exploitation of the battlespace in peace and war – "The Imperative of Jointness".[35] Moreover, it cites the technological advances available and how best to exploit them, through "seamless integration of Service capabilities".[36] The United States' naval expansion of JV 2010 was the new Chief of Naval Operations' (Admiral Jay L. Johnson) paper entitled "The Navy Operational Concept" (NOC).[37]

The NOC takes forward into the naval environment the three strands of American military force laid out in JV 2010, namely peacetime engagement, deterrence/conflict prevention, as well as, fight and win. Johnson argues that by having "forward deployed naval forces" the USN/USMC combination can stand ready to carry out all three aspects of the US military spectrum and, most importantly, "do so without infringing on any nation's sovereignty".[38] The CVBG is the prime enabler of this military ability with its manoeuvre, presence, and power projection abilities. An ARG does not have the power-projection capability to achieve this ability on its own. Self-sustaining logistics is envisioned as the key to "keep combat credible forces in the region".[39] The CVBG and Amphibious Ready Group (ARG) are not seen as monolithic, indivisible clusters that can only operate in tight formation. The flexibility of the individual units in the CVBG and ARG allows for formations tailored to specific missions but needful to maintain the security of full-dimensional protection. The NOC also introduced the USMC concept of 'Operational Manoeuvre From the Sea' (OMFTS). The concept of Marines

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Review. Winter 2002. Vol LV No1. 45.
[35] United States of America, Joint Chiefs of Staff. Joint Vision 2010. Washington DC. 1997. 8.
[36] Ibid. 9.
[37] Johnson, Jay L. Adm USN. "The Navy Operational Concept". Washington D.C. 1997.
[38] Ibid. 2.
[39] Ibid. 8.

moving ashore to secure objectives was certainly not new but OMFTS emphasised the sea-basing aspect of such operations with the Marines tactical centre of gravity located not on the beach-head but secure at sea. Its aim was to move away from the 'Sands of Iwo Jima' approach of storming the beach as the norm and focus on deep, over the horizon force projection, if necessary by-passing the beach entirely. The USMC view was that this would transform them from beach-head securers for follow-on conventional land forces into a truly expeditionary force able to sustain and fight at distance with strike assets provided by the CVBG.[40]

In 1998, the USN and USMC published their joint "Posture Statement". This effectively completed the sequence of transformation papers and bore the title "Forward from the Sea: Anytime, Anywhere".[41] It espoused *"*Full Spectrum Capability*"*, in effect a retelling of previous papers but it also paid homage to the concept of *"*a Revolution in Military and Business Affairs*"*. The efficacy of the Revolution in Military Affairs (RMA) will be discussed later in the paper but the Revolution in Business Affairs was a tacit admission of the financial realities of technological advance and recognition that budgetary realities still constrict even in an expeditionary era.

Nevertheless, in terms of published doctrine, the USN/USMC series of papers that commenced with "…From the Sea" in 1992 took the lead among the US military services. The themes exposited in "…From the Sea" were consistently applied and expanded upon in subsequent publications. Rhodes underscores how widespread acceptance of this doctrine had become, both within and without naval circles, that the NOC was published on the internet

[40] A policy that would appear to have been proven in Operation "Iraqi Freedom".

*"*without any fanfare…this low-key approach was meant to underscore the consistency of Naval policy*"*.[42] In addition to this progressive development of expeditionary naval warfare there was the under-stated but immutable assertion that the SSBN fleet would continue to provide an independent sea-borne nuclear deterrent. The NOC continued to champion the CVBG concept of power projection. However, in doctrinal terms, there was opposition from the other services to the expeditionary stance taken by the USN and USMC.

This opposition arose partly due to the 1990-1991 Gulf War. It was this conflict, fought at the very tail-end of the Cold War when the military was seeking new direction, that either redefined or confirmed American military thinking, dependent on the service. Although transposed from the plains of Europe to the sands of Kuwait and Iraq, this conflict was essentially a medium-length air campaign and a very short land campaign fought broadly according to the Cold War doctrine of the AirLand Battle of air power creating a permissive environment for conventional land forces.[43] Despite General Schwarzkopf's acknowledged command and control, it was fought largely along individual service lines, proving especially successful for the US Army and Air Force whose *"*strategies and concepts of operations were largely vindicated*"*.[44] Barry and Blaker continue that for the US Navy the *"*strategic concept it had so carefully developed was essentially irrelevant*"* – the navy had little else to do than launch cruise missiles and supplement land-based air forces with carrier air power.[45] In an analysis of lessons to be learned from the Gulf War, Bruce Watson cites the *"*wasteful, pernicious,

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[41] United States of America, Department of the Navy. Forward...From the Sea: Anytime, Anywhere. Washington DC. 1998.
[42] Rhodes, Edward. "…From the Sea and Back Again". Naval War College Review. Spring 1999. Vol LII No 2. 17.
[43] Barry, John L. MGen USAF and Blaker, James. "After The Storm. The Growing Convergence of the Air Force and Navy". Naval War College Review. Autumn 2001. Vol LIV No 4. 117.
[44] Ibid. 121.

destructive competition …among the U.S. military branches*"* and especially the marginalisation, as he sees it, of the Marines.[46] This 1991 publication predates the "…From the Sea" series but he prophetically writes that *"*preparedness means a balanced military, one that has sufficient land, sea, air, and amphibious power to counter all threats*"*.[47] The experience of the Gulf War was the catalyst for US Navy doctrine but it met with some Army and Air Force resistance.

The US national concept of the need for global reach was not in question but each service responded differently. Whilst naval forces became increasingly deployed (and stretched) in their power projection role, described by Daniel Goure as "the tyranny of forward presence*",* the USAF withdrew to the homeland to produce *"*an expeditionary Air Force that operated globally out of the United States*"*.[48] The apparent dichotomy of such a situation, and the traditional argument over the reach of any land-based aircraft, was exploited by one of the tenets of the 1998 Posture Statement which *"*equated forward presence with naval presence, suggesting that constraints on the deployment or use of American forces…would mean that forward deployments would…necessarily be sea based *"*.[49] Technology was developed as the watchword of USAF operations in its own transformation from an air force to an aerospace force through increased reliance on satellite ISR systems and substantial range advantage rather than *"*forward

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[45] Ibid. 121.
[46] Watson, Bruce W. ed. Military Lessons of the Gulf War. London, UK. Greenhill Books. 1991. 218.
[47] Ibid. 218.
[48] Goure, Daniel. "The Tyranny of Forward Presence". Naval War College Review. Summer 2001. Vol LIV No 3. 1.
Barry, John L. MGen USAF and Blaker, James. "After The Storm. The Growing Convergence of the Air Force and Navy". Naval War College Review. Autumn 2001. Vol LIV No 4. 5.
[49] Rhodes, Edward. "…From the Sea and Back Again". Naval War College Review. Spring 1999. Vol LII No 2. 18.

engagement".[50] This rationale is complete anathema to the concept of forward deployed carrier groups and would only be understood by Douhet, Mitchell, and the proponents of the B-36.

The US Army perspective differed less from their naval counterparts. They saw 'boots on the ground' as important as rapid technological advances (contra to the air force), especially in asymmetric warfare, but they diverged from the navy in where those 'boots' would emanate from. Army and navy agreed on the need for presence in theatre but whilst the USMC were content to be sea-based, the Army favoured being ashore, using the logic: *"*Because deterrence is based on perception and because most potential U.S. adversaries are primarily land powers, a U.S. land power presence may be the most effective deterrent".[51] MGen Garrett's logic is essentially correct but it ignores the sustainment of that presence when the sovereignty of the host nation may chafe at the extended presence of foreign forces whose religion alone may offend domestic sensibilities. The counter side of this argument is that home-based land forces need time to deploy, reconstitute, and train before they can become an effective fighting force. This requires a patient opponent and an accommodating host nation. To restate the NOC, it is far better to achieve presence *"*without infringing on any nation's sovereignty*"* and arrive ready to fight.[52] Only a CVBG can do this.

Inter-service rivalries and doctrinal differences were sufficiently subsumed by 1996 to produce Joint Vision 2010, and it's year 2000 update Joint Vision 2020.[53] The form

but its very publication was a hallmark occasion indicating a synergy of doctrinal development between the services.[54] Joint Vision 2020 placed an emphasis on what it called *"*full-spectrum dominance*"*. That spectrum encompasses "leaders, people, doctrine, organizations, and training that enable us to take advantage of technology to achieve superior warfighting effectiveness*"*.[55] It stresses innovation, information superiority, interoperability, multinational, and joint operations. By the year 2000, with Joint Vision 2020, the U.S. armed forces had *"*established a common framework and language*"* which included as a key integral node the carrier battle group and its contribution to manoeuvre, precision engagement, focused logistics, and full dimensional protection.[56]

A criticism of the Joint Vision papers is that they are overly reliant on technology to the extent that it hinders rather than helps US operations. Gentry sees network-centric warfare, and its intrinsic reliance on information technology, as a millstone that will stifle and institutionalise military operations at the expense of innovation. His opposition and calls for reform extend to the point where he maintains that *"*these reforms are unlikely to occur in the absence of a significant battlefield defeat*"*.[57] However, Gentry (and other critics) miss the point of Joint Vision and the key is in the title of the paper – it is a vision, not a doctrine. The doctrine that flows from these papers goes beyond the narrow confines of information technology and the digital/digitised battlespace, as will become clear in the later examination of the United States Navy's latest doctrine iteration "Sea Power 21".

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[54] Peters, Katherine MacIntire. "Joint Vision 2010 Still Focussing". Government Executive. February 1997. Vol 29 No 2. 46.
[55] United States of America, Joint Chiefs of Staff. Joint Vision 2020. Washington DC. May 2000.
[56] Ibid.
[57] Gentry, John A. "Doomed to Fail: America's Blind Faith in Military Technology". Parameters. Winter 2002/2003. Vol XXXII No 4. 88.

The Development of the United Kingdom's Maritime Doctrine: "From the Fundamentals to FNOC".

The UK Royal Navy (RN) had developed entrenched Cold War views as much as the USN but was subject to much greater financial privations. With no (apparent) global sphere of influence save for a handful of colonies and protectorates, the RN focussed on NATO's northern flank and the containment of the Soviet threat therein. The demise by 1979 of HM Ships *Eagle* and *Ark Royal* marked the conclusion of the RN's 20th century conventional carrier force and it retained only a toehold on embarked fixed-wing naval aviation with the interim use of HMS *Hermes* and the *Invincible* class carriers or CVS.[58] Doctrine was not an understood concept when the enemy was apparent and the tactics and strategy straightforward. However, if the USN had its epiphany in the aftermath of the 1990-91 Gulf War, the RN rediscovered its expeditionary nature in the unforeseen Falklands War of 1982. The latter conflict was, from the British perspective, a masterpiece of ingenuity, luck, and courage achieved only through the limited capabilities of the CVS, but from a doctrinal viewpoint it was a mess. Presence (belated but effective), power projection, and a manoeuverist approach were all applied in this war, contra to the doctrine of the day which emphasised set-piece approaches against Cold War enemies. Doctrine as it is understood today did not exist for the Falklands Task Force and what passed for joint operations was effectively 'made up' by the commanders at sea.[59] It is no coincidence that

[58] Originally termed "through-deck cruisers" for political reasons. CVS has also been defined as standing for "carrier very small".
[59] Woodward, Sandy. Admiral. One Hundred Days. London UK. Harper Collins. 1992.

the architects, supporter, and proponents of RN doctrine in the mid-1990s and beyond were those front-line commanders of 1982, keen to translate their practical experience into capability.[60]

The UK's entire military rationale was brought into question by the end of the Cold War and a public anticipation of the 'peace dividend'. The UK armed services were placed in continual flux by a succession of studies and reviews ('Options for Change' in 1995, the Defence Costs Study in 1996 and 'Front Line First' in 1997) which in turn *"*threw up a plethora of new doctrinal issues*"*.[61] As in the United States, UK military doctrine did not evolve from 'the top down' but rather each service produced its own version of doctrine. The RN's contribution to this debate was the publication in 1995 of BR1806, "The Fundamentals of British Maritime Doctrine".[62] Aimed at the military-strategic level it was intended to be *"*a document that would reconfigure the Navy's role in the post Cold War world*"*.[63] It formalised the commitment to joint operations in the littoral but was not intended to be *"*dogmatic…we must retain our reputation for innovation and for responding to political changes and technological opportunities*"*.[64] Eric Grove (one of the principal authors of BR1806) echoes the educational nature of the publication, claiming that it was *"*intended to provide a common starting point for thinking about future action*"*.[65]

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[60] As an example, the current First Sea Lord, Admiral Sir Alan West, was the commanding officer of HMS *Ardent*, sunk on 21 May 1982.
[61] British Military Doctrine Group. "Conference Report: Doctrine in the 1990s". JSCSC, Shrivenham UK. Dec 2002. 2.
[62] Of interest, BR (Book, Registered) 1806 was the number of the extinct Naval War Manual. Naval Staff Directorate. British Maritime Doctrine. Editions 1 & 2. London, UK. HMSO. 1995/1999.
[63] British Military Doctrine Group. "Conference Report: Doctrine in the 1990s". JSCSC, Shrivenham UK. Dec 2002. 4.
[64] Admiral of the Fleet Sir Jock Slater.. British Maritime Doctrine. Edition 1. Naval Staff Directorate. London, UK. HMSO. 1995. Introduction.
[65] British Military Doctrine Group. "Conference Report: Doctrine in the 1990s". JSCSC, Shrivenham UK. Dec 2002. 4.

For the first time, the application of British maritime power and an explanation of the maritime environment were encapsulated in one publication. Implicit throughout is the recognition that the RN will continue to represent the UK's national and coalition interests on a global scale: *"*For the first time in over 200 years the UK is in a position to think about politico-strategic issues freed from the immediate need to defend its own territory...to take full advantage of the potential of maritime power and deploy it in direct support of UK interests wherever in the world*"*.[66] It also clearly states that joint is far more than single services coming together but that it extends to multinational operations as a matter of course. It is, therefore, natural that there should be a correlation of doctrine with allies and as Steven Haines states, *"*the imprint of American strategic thinking is all over British doctrine in the post Cold War era*"*.[67]

The final and seemingly conclusive 1990s UK defence appraisal was the 'Strategic Defence Review'(SDR) of 1998 which was a *"*foreign policy-led strategic defence review to reassess Britain's security interests and defence needs and consider how the roles, missions and capabilities of our Armed Forces should be adjusted to meet the new strategic realities*"*.[68] SDR encapsulated policy, strategy, diplomacy, operations, technology, logistics, and procurement as integral parts of the defence process in order to *"*provide Britain's Armed Forces with a new sense of clarity, coherence and consensus*"*.[69] The "New Chapter", published in 2002 as part of the United Kingdom's response to the attacks of 11 September 2001, added to rather than amended the content and intent of SDR by stressing the asymmetric and global threat.[70] The

[66] BR 1806 Naval Staff Directorate. British Maritime Doctrine. Edition 2. London, UK. HMSO. 1999. 161.
[67] British Military Doctrine Group. "Conference Report: Doctrine in the 1990s". JSCSC, Shrivenham UK. Dec 2002. 6.
[68] United Kingdom, Ministry of Defence. Strategic Defence Review. London. HMSO. July 1998. Introduction.
[69] Ibid. George Robertson, Minister of Defence. Foreward.
[70] United Kingdom, Ministry of Defence. Strategic Defence Review – The New Chapter. London. HMSO. July 2002.

SDR confirmed the UK's commitment to joint operations and established the primacy of the Permanent Joint Headquarters (PJHQ) as the prime command authority for UK operations, joint and single-service. As "...From the Sea" may have been a catalyst for JV 2010, the publication of BR1806 (plus contemporary Army and Royal Air Force doctrine works) proved to be so for joint UK doctrine. 'British Defence Doctrine' (BDD) defines joint doctrine at the military strategic level and is accompanied by the 'United Kingdom Doctrine for Joint and Multinational Operations' (UKOPSDOC) which is aimed at the operational level.[71] These two documents encapsulated much of the *"*policy and conceptual content*"* of the previously published single service publications and edition 2 of BR1806 was published in 1999 to reflect this.[72]

There was no change to its essential tone but it reflected a continued commitment to joint operations through the concept of the 'Maritime Contribution to Joint Operations' (MCJO). MCJO is a formalised commitment to the doctrine of maritime manoeuvre to *"*influence events ashore*"* either directly or indirectly.[73] In his foreword, Admiral Boyce, Chief of the Naval Staff, states that MCJO *"*signals the full extent of the shift away from anti-submarine operations in the Eastern Atlantic to towards littoral operations almost anywhere in the world*"*.[74] MCJO now underpins all UK maritime development and activities. The Future Navy Concept (FNOC) takes MCJO into 2015 and beyond and identifies the four Core Maritime Capabilities that will guide the RN's "efficiency and effectiveness (in) joint and multi-national warfighting in the maritime

[71] United Kingdom Joint Doctrine and Concepts Centre. British Defence Doctrine. Shrivenham, UK. DSDC(L). 2001.
United Kingdom Joint Doctrine and Concepts Centre. UK Doctrine for Joint and Multinational Operations. Shrivenham, UK. DSDC(L). 2002.
[72] Naval Staff Directorate. British Maritime Doctrine. Edition 2. London, UK. HMSO. 1999. Editor's Introduction.
[73] Ibid. 3.
[74] Ibid. Foreword.

and littoral environments".[75] These capabilities echo USN/USMC doctrine in their approach. They are 'power projection', 'flexible global reach', 'optimised access' (for a joint force from the sea) and 'superior command, control, computers, communications, intelligence, surveillance, and reconnaissance (C4ISR)'. All lead to the flexibility, size, scale and effect that an aircraft carrier and its attendant battle group can offer. In a purist world, strategy should define doctrine, which in turn should define the capability, structure and acquisition of a maritime force. For the UK to realise the ambitions laid down in the SDR onwards, it must enable its expeditionary maritime force beyond that of 2003. That process has already begun.

"Sea Power 21" - The Final Chapter?

"…From the Sea" and the subsequent variations on that theme succeeded in shaping the mindset of United States Navy thinking about its role and the required capabilities. What none of the papers did is address specifically the subsequent capability structure of the fleet to enable this doctrine. The publication in late 2002 of "Sea Power 21", under the hand of the latest Chief of Naval Operations, Admiral Vern Clark, remedies this omission whilst extolling the momentum of institutional change started by his predecessors.[76] It is a clear attempt to benchmark the United States Navy (possibly as an antidote to the seemingly bi-annual CNO sponsored papers) and create something tangible in terms of a fleet. It is a maxim of major warship development that nothing can happen overnight, or even within five years, but Admiral Clark's doctrine seeks to directly influence that development process: *"*we must have a clear vision of how our Navy will organize, integrate, and transform. (Sea Power21) will align our

[75] Director of Naval Staff Duties. "Rolling Brief - FNOC". MOD(N), London UK. Nov 2002.
[76] Clark, Vern. Adm. USN. "Sea Power 21. Projecting Decisive Joint Capabilities". Proceedings. October 2002. Vol128/10/1,196. 32.

efforts, accelerate our progress, and realize the potential of our people*"*.[77] His last comment gives lie to the type of criticism voiced by Gentry that United States' doctrine is flawed because of over-reliance on technology at the expense of the human factor.[78] "Sea Power 21" unambiguously supports the importance of trained and focussed personnel in the system, *"*...the extraordinary capabilities of our people…give us our greatest competitive advantage*"*.[79] It is something far more tangible than a continuation of "…From the Sea", in that it adds human and professional substance to enable doctrine. It also underpins the requirement for an aircraft carrier force.

Doctrine fulfils two major roles. It must satisfy external academic, professional, and national rigour and scrutiny but it must also inform internally. This latter aspect has been fully embraced by USN doctrine writers and is exemplified in the accessibility and clarity of thought and phrase of "Sea Power 21". This latest fleet concept comprises three simple concepts bound together by overarching technology, namely "Sea Strike", "Sea Shield", "Sea Basing" and the information based "ForceNet". The use of such clear and precise titles directs the readers' thoughts even before they begin the text. The applicability of these concepts across the spectrum of war and across the worldwide environment is labelled as a "Global Concept of Operations".[80] Admiral Clark's vision makes strong mention of asymmetric warfare but "Sea Power 21" puts a different spin on that aspect of war. He writes that *"*we often cite asymmetric challenges when referring to enemy threats, virtually assuming such advantages belong only to our adversaries*"*.[81]

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[77] Ibid. 2.
[78] Gentry, John A. "Doomed to Fail: America's Blind Faith in Military Technology". Parameters. Winter 2002/2003. Vol XXXII No 4. 88-103.
[79] Clark, Vern. Adm. USN. "Sea Power 21. Projecting Decisive Joint Capabilities". Proceedings. October 2002. Vol128/10/1,196. 3.
[80] Ibid. 3.
[81] Ibid. 3.

The asymmetric argument in "Sea Power 21" is that major conventional powers are also capable of waging asymmetric warfare through innovation and diverse tactics. Asymmetric warfare is not per se large versus small; successful asymmetric warfare is utilisation of all (including alternative) capabilities to achieve decisive military advantage. It is technology that facilitates this, the same technology that enables a single carrier-borne F/A 18 aircraft of 2003 to deliver precise firepower that would have taken a multiple aircraft strike in the Vietnam War.

Is "Sea Power 21" the United States Navy's panacea or is it merely a restatement of the broad ideals first posited in "…From the Sea"? By defining the four underpinning concepts, it gives substance and titles to those ideals. But can it change the structure of the fleet to provide the required capability? The ship acquisition process is leaden and extremely resistant to change. The next addition to the United States carrier fleet, the USS *Ronald Reagan* (CVN 76), was off the drawing board before "…From the Sea" was published in 1992 but it will not commission until late 2003 and not be operationally ready until 2006 at the earliest. Is it the case that while doctrine writers and Chiefs of Naval Operations theorise, warship designs, and therefore fleet capabilities, lag so far behind as to make any new doctrine unworkable in the short-term unless that doctrine takes into account existing and emerging technology? Or is it the case that as doctrine alters so the fleet flexes its approach and redirects its assets? The argument is the perennial naval debate over which has primacy – strategy or technology. An examination of the concepts of "Sea Power 21" will add to this discussion and in particular its potential impact on the aircraft carrier. The issue of the "Revolution in Military Affairs" (RMA) will follow.

"Proceedings", a publication of the United States Naval Institute published a series of articles in 2002/2003 written by senior serving naval officers championing the four concepts of "Sea Power 21". These articles make tangible the concepts aired in the main paper. "Sea Shield" is subtitled "projecting global defensive assurance" by which it means creating a permissive environment for naval operations.[82] The 'shield' applies not only to the naval task force but forward to the joint battlespace. The concept is a defensive 'ring of steel' that blurs into what would traditionally be called offensive, "...projecting defense deep inland against cruise and ballistic missiles".[83] Apart from the semantics of offence and defence it is as much a reflection of the United States military mindset that operations thousand of miles from American soil can be termed defensive. American foreign policy is not expansionist in the imperial sense but it is designed to protect, preserve and enforce the White House's view of democracy in order to maintain the 'American way of life' and protect America and Americans. It is not an idealistic policy, it is a realistic policy based on self-interest. For the maritime environment, "Sea Shield" is broken down into three capabilities (of which only two are relevant to this paper) and a summary of the fleet required (or acquired) to enable them. First, "Theatre Air and Missile Defence" will be achieved through improved sensors on *Aegis* class cruisers, the carriers' E2C Hawkeye, F/A 18 and F35 aircraft, and the integration of the advanced data link system known as 'cooperative engagement capability' (CEC) which will be fitted to all air, surface, and subsurface units.[84] CEC is more than the sharing of tactical data through a link architecture in that it encompasses remote operation of the sensors. The carrier group is an essential node of CEC because it will act as "integrated and distributed combat systems in countering ballistic

[82] Bucchi, Mike Adm USN and Mullen, Mike Adm USN. "Sea shield: Projecting global defensive assurance". Proceedings. November 2002. Vol 128/11/1,197. 56-61.
[83] Ibid. 56.
[84] F35 – the Joint Strike Fighter (JSF).

missiles, cruise missiles, and stealthy aircraft. It also enables smaller ships…to share the sensing capacity of an entire group*"*.[85] The carrier group, and particularly its *Aegis* ships, have both the bandwith and the command and control facilities to enable this.

The second aspect of "Sea Shield" is "Sea and Littoral Control". Sea control in the littoral is notoriously difficult because the environment gives the advantage to small, fast surface vessels and quiet diesel submarines, all of which are difficult to locate and track, and land-based missiles which are difficult to counter in large numbers. The littoral has never been an environment suited to an aircraft carrier which would find itself vulnerable to the previous threats. To counter these threats the USN is relying on improved sensors such as Underwater Unmanned Vehicles (UUVs) and advanced low frequency sonars which are networked to reduce detection and reaction time. The authors recognise that in the littoral *"*numbers matter*"*.[86] The spectre of the October 2000 single boat attack on the USS *Cole* in Yemen haunts naval planners who imagine the effects of 'swarms' of small craft. The counter to such craft is to be the 'Littoral Combat Ship' (LCS). The LCS will be fast, shallow draft and stealthy with mission-tailored armament and defences, and networked into the CEC. The concept is for it to be plentiful, credible and cheap with the aim of delivery of the first LCS by 2007. The LCS is designed to exercise sea control of the littoral and fulfil the USN's requirement *"*to maintain an Aircraft Carrier Operating Area clear of submarine-delivered and floating mines…to destroy or evade large numbers of submarines operating in littoral areas…to destroy large numbers of small anti-ship cruise missile-armed combatants, or armed merchant vessels in littoral areas, without

[85]Bucchi, Mike Adm USN and Mullen, Mike Adm USN. "Sea shield: Projecting global defensive assurance". Proceedings. November 2002. Vol 128/11/1,197. 57.
[86] Ibid. 58.

relying on carrier-based air."[87] In essence, the LCS is designed to swing the asymmetric pendulum away from the enemy in the littoral and enable the carrier to fulfil its strike and power projection roles.

If 'Sea Shield' is the extended layered defence of the fleet, then 'Sea Strike' is the offence. The networks previously described will produce what the USN refers to as *"*true time-sensitive strike—i.e., sensor to shooter closure…in seconds, instead of hours or minutes*"* and introduces a new acronym of C5ISR (vice C4ISR-the addition is combat systems).[88] With superior situational awareness and response time the strike assets will have extended range and lethality. The technological advances and proliferation of precision guided munitions (PGMs) and conventionally armed tactical 'Tomahawk' missiles are well documented. The latter will become even more potent with the development of the cruise missile submarine (SSGN) as four to six 'Ohio' class SSBNs are converted as a result of nuclear arms reduction agreements. The revolutionary aspect of 'Sea Strike' is not the technological advances that it will harness but in the formation of the assets with the capability to deliver.

The carrier battle group (CVBG) remains the bastion of USN sea power. The carrier and its combination of command and control, strike, and defensive power is the centre around which the A*egis* cruisers, the destroyers, frigates and submarines revolve. The CVBG creates the conditions for the amphibious group (ARG) to operate in the littoral. This concept of operations, although successful, is sequential in nature and runs counter to the holistic theme that runs

[87] Littoral Combat Ship. Concept of Operations. Naval Warfare Development Command. www.nwdc.navy.mil/Concepts

[88] Dawson, Cutler VAdm USN and Nathman, John VAdm USN. "Sea strike: Projecting persistent, responsive, and precise power". Proceedings. December 2002. Vol 128/12/1,198. 54-58.

through 'Sea Power 21'. The USN solution, heretical to some 'brown shoes', is the creation of the 'Expeditionary Strike Force' by harnessing CVBGs with augmented capability ARGs known as 'Expeditionary Strike Groups'. This augmentation is the addition of *Aegis* and submarine assets (from the CVBGs) to the ARGs giving them elements of organic projection and strike. This is the first time that elements have been removed from the composition of a CVBG since they were constructed in World War II but it is not the death knell of the CVBG as a concept or the carrier as a platform. It is, in some ways, the realisation, ten years on, of the implications of "…From the Sea" being co-signed by the heads of both the USN and the USMC. In the words of the sponsor of this concept, Commander Second US Fleet, Vice Admiral Dawson, the new groupings will *"*capitalize on the synergies generated by their complementary capabilities*"*.[89] However, central to this fleet composition is flexibility with capabilities being incorporated according to the demands of the mission. By attempting to remove the barriers created by independent CVBGs and ARGs, this new doctrine seeks to attempt a synergy of thought, action and support. The incorporation of the USS *Kitty Hawk* USMC-tailored CVBG into the ARG positioned south of Pakistan for strikes on Afghanistan in late 2001 predated the publication of 'Sea Power 21' but it nevertheless successfully proved the concept and did not go unnoticed in other CVBGs and no doubt the Department of the Navy.[90]

'Sea Shield' and 'Sea Strike' envisage a maritime force deployed worldwide, at near-immediate notice to exercise the range of military functions that the new doctrine demands of it. Sustainment of this force will not be possible without the third strand, defined as 'Sea Basing'.

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[89] Ibid. 58.

[90] Based on the author's experiences in Operation Enduring Freedom 2001-2002. On a smaller scale, the UK CVSs, HM Ships *Illustrious* and *Ark Royal,* operated as amphibious carriers for operations in Afghanistan (2001-02) and Iraq (2003).

Rather than being the traditional 'stepping-stone' from the sea to forces established ashore, 'Sea Basing' seeks to become the hub of operations. It sees the sea as *"*the most independent and secure manoeuvre space for joint military forces*"* through the extended range precise firepower possessed by the USN and the traditional benefits that manoeuvre at sea allows.[91] In essence, it allows strikes to be mounted at range with the security of sea control. Vital to this concept is the logistical support required to sustain credible forces at extreme ranges from the United States. Pre-positioning of equipment carrying ships has been in the USN/USMC inventory for a while and the intention is to augment that capability with a fast, high-capacity fleet from the Military Sealift Command (MSC). The operational vision is to create the logistics and support base of any littoral endeavour not on a beach-head or captured port/airfield but at sea, namely to *"*sustain the force and allow the joint force commander to rapidly reposition and retask*"*.[92] Critics of 'Sea Power 21' usually focus on its reliance on advanced and unproven technologies but a significant flaw of the 'Sea Basing' aspect remains the reliance on some form of 'other nation' support for global operations. Admiral Moore, the designated 'champion' of 'Sea Basing', admits that the United States cannot sea base directly from its own continent.[93] 'Sea Basing' can work as a theatre-level concept but it *"*relies on the strategic basing support of overseas friends and allies outside the joint operations area*"*.[94] In essence, the aim is to be self-sustaining within the area of operations but it remains imperative that secure facilities such as Diego Garcia and Guam remain available to facilitate 'Sea Basing'. The first three aspects of 'Sea Power 21' address the defence, offence, and logistics paradigm required by the USN. The key to making this system

[91] Moore, Charles W. VAdm. USN and Hanlon, Edward LtGen USMC. "Sea Basing". Proceedings. January 2003. Vol 129/1/1,199. 80.
[92] Ibid. 84.
[93] Of interest, Vice-Admiral Moore, the Deputy CNO (N4) and former Commander Fifth Fleet, is a naval aviator rather than a logistics specialist.
[94] Moore, Charles W. VAdm. USN and Hanlon, Edward LtGen USMC. "Sea Basing". Proceedings. January 2003. Vol 129/1/1,199. 85.

work is effective and timely exchange of information in order to achieve the required synchronicity of operations.

'Sea Power 21' envisages this construct being provided by an overarching information-based concept designated 'ForceNet'. 'ForceNet' is the proposed realisation of 'network-centric warfare'. Its goal is *"*to arm our forces with superior knowledge, leading to increased combat power*"*.[95] Of all the concepts associated with 'Sea Power 21', this concept is the most ethereal. Computers and communications have advanced rapidly in the past ten years, but even the advanced concept of CEC would be recognisable to the 1950s architects of NATO Link 1.[96] 'ForceNet' seeks to make best use of that information; it is *"*not about providing more information; it is about providing the right information at the proper time to aid decision making*"*.[97] The actuality of providing this service to the decision makers is not laid out except for some general platitudes about it being *"*challenging*"* and offering *"*decisive advantage*"*.[98] There is a suspicion that 'ForceNet' may be a concept that looks good on paper but in reality will be an impossible task to achieve given the multiplicity of C5ISR systems prevalent in not just naval forces but the other national and international agencies with which US forces must operate and the speed at which information systems develop, making a benchmark too challenging.

New doctrine and concepts underscore the continued relevance of the aircraft carrier. 'Sea Power 21' goes beyond concepts and doctrine into the realms of specific capabilities

[95] Mayo, Richard VAdm. USN and Nathman, John VAdm. USN. "Force Net. Turning Information into Power". Proceedings. February 2003. Vol 129/2/1,200 . 43.
[96] NATO Link 1 was used for point to point data communication, primarily in the air environment.
[97] Mayo, Richard VAdm. USN and Nathman, John VAdm. USN. "Force Net. Turning Information into Power". Proceedings. February 2003. Vol 129/2/1,200 . 45.
[98] Ibid. 46.

required to enable that doctrine. It endorses much of the USN's current capability programme and offers up some new directions such as the LCS and the more unproven promise of 'ForceNet'. The major proposed impact on the aircraft carrier is the development of the Expeditionary Strike Force concept. The extra assets to augment the amphibious Expeditionary Strike Group (ESG) will come from the CVBG and no doubt the 'black shoes' are relishing the command and control opportunities that an ESG will create. However, it is clear that former President Clinton's often repeated mantra of *"*Where's the nearest carrier?*"* still remains relevant under the global projection basis of 'Sea Power 21'.[99]

The Pretenders – "Other Members of the Carrier Club"

Although the United States Navy is by far the world leader in operating aircraft carriers, other navies see value in aircraft carriers. Almost a dozen nations either have or wish to have aircraft carriers in their naval capability. These nations can be divided into two groups; those with serious power projection policies (albeit on a lesser scale than the United States) and those for whom vanity is a military capability. As examples, Great Britain and France fall into the former category and Thailand firmly in the latter, with others such as India, Spain and Italy somewhere in between. It would be too dismissive, however, to leave analysis there. The capability offered by an aircraft carrier does not come cheaply and there is no real carrier export industry. Versions of United States military hardware and software are exported worldwide with the exception of nuclear aircraft carrier technology which forces the majority of nations to develop their own capabilities. Such projects consume a high percentage of the defence budget and as costs inevitably rise so other capabilities are cut. As the 2002 RAND Corporation report

[99] Clinton, William Jefferson President. "Where are the carriers?". USS *Theodore Roosevelt*. Norfolk, Virginia. 12 March 1993.

into funding of aircraft carriers points out: *"*appropriating money for a carrier usually means reducing appropriations for something else…other shipbuilding projects, other Navy programs".[100] The British Royal Navy plans for two new carriers (see below) due in service in 2012-2015 and has already commenced budget trimming. The early and unexpected retirement of the frigate HMS *Sheffield* in November 2002, at a saving of "around £20 million each year*",* is the first but not the last sacrifice that the RN will have to make in order for these ships to enter service.[101]

Great Britain and France lead the alternate carrier nations. Both have a history of carrier operations as part of their naval capability to support presence and power projection on a global scale. Both have scaled back their capabilities, in varying degrees, over the past 40 years but both have now renewed their energies in this area. As David Jordan writes: *"*Britain's experience of carrier aviation since the mid-1960s has not been altogether happy*"*.[102] The withdrawal from 'east of Suez' in the early 1960s led directly to a battle of wills between the UK naval and air staffs similar to that experienced by the USN and USAF over the CVB-X and B 36 bomber in the late 1940s. The government of the day needed to make swingeing cuts in defence spending and the focus fell on which service would provide the UK's power projection and nuclear capabilities; the RN, through a new carrier design known as CVA-01, or the RAF, with proposed land-based long-range strike aircraft. The military and political in-fighting was fierce and a number of reputations suffered and resignations offered.[103] A series of potential conflict scenarios were studied to judge both options. Machiavellian tendencies emerged from the air

[100] Birkler, John et al. "Options for Funding Aircraft Carriers". RAND Institute. 2002. iii.
[101] Navy News. www.navynews.co.uk/articles/2002/0210/0002101701.asp
[102] Jordan, David J. "Future Carrier Aviation Options. A British Perspective". Naval War College Review. Summer 2001. Vol LIV No 3. 63.
[103] Grove, Eric J. Vanguard to Trident: British Naval Policy since World War II. Annapolis, Maryland. Naval Institute Press. 1987. 268-277.

staff when , "in order to improve the F-111's combat radius, Australia was 'moved' 600 miles in the required direction!".[104] After protracted debate at cabinet level the CVA-01 project was cancelled and the assumption made that maritime "aviation assets required would come from the US Navy's carriers (or)…the RAF would defend the fleet from land bases".[105] However, as Eric Grove points out, despite any 'continental shifting', "The real point was…finance".[106] Land-based aircraft, accurately or not, were deemed to be more affordable than aircraft carriers.

'Whitehall warriors' is an often derogatory term given by those at sea to serving officers in the UK Ministry of Defence. However, the UK naval staff of the late 1960s and early 1970s earned positive accolades in their dogged adherence to some form of fixed-wing naval aviation capability. By emphasising flexibility and keeping cost (and size) down, an escort cruiser design metamorphosised into a 'through-deck cruiser', albeit with an ASW emphasis, but with an obvious capability to support VSTOL aircraft.[107] The procurement, in the face of air staff indifference, of a navalised version of the Harrier VSTOL aircraft kept the RN in carrier operations. The re-conversion of the commando carrier HMS *Hermes* back to a fixed-wing (VSTOL) carrier ensured continuity of fixed-wing operations until the three 'through-deck cruisers' were commissioned. The apparent loss of fixed-wing naval aviation in 1965 had been reversed within ten years. However, although the 1982 Falklands War 'blooded' the Harrier variants it also clearly revealed the RN's power projection and fleet defence shortcomings. The reorientation of UK force capabilities required by the 1998 Strategic Defence Review endorsed

[104] Ibid. 272
[105] Jordan, David J. "Future Carrier Aviation Options. A British Perspective". Naval War College Review. Summer 2001. Vol LIV No 3. 64.
[106] Grove, Eric J. Vanguard to Trident: British Naval Policy since World War II. Annapolis, Maryland. Naval Institute Press. 1987. 272.
[107] Ibid. 318-323.

the need for 'large' aircraft carriers to enable government military policy of "force-projection and littoral operations (and) versatility and deployability".[108]

The tangible result of this policy was the 'UK Future Aircraft Carrier' (CVF) project which aims to deliver two 60,000 tonnes plus vessels in 2012 and 2015. Carriers of this size do not register with the USN as 'large'; the comparable USS *Midway* (CV41) is described as "mid-size*"* despite displacing over 70, 000 tonnes – but in the scale and budget envisaged by the UK (and France) they fulfil the criteria.[109] CVF is a model of British compromise, dictated by economics and government policy. Despite having operated nuclear-powered submarines since 1963 there is national antipathy in Great Britain to nuclear power and CVF's propulsion system was mandated as non-nuclear which immediately placed limitations of scale.[110] Research by BAE Systems, one of the bidding contractors for CVF, revealed that the optimum size for a non-nuclear aircraft carrier, with a requirement to accomodate an effective (classified) number of strike sorties, is in the order of 60-70,000 tonnes.[111] David Perin's analysis of 'large' and 'mid-size' carriers lends weight to the 'biggest possible is better' school of thought.[112] He compared platform sizes and numbers of operable aircraft with deliverable strike power and whilst larger vessels and their air wing are some 13% more expensive to build and deploy the number of strike sorties increases by 100%; in other words, *"*modest increases in cost lead to large gains in effectiveness*"*.[113] Given its power-plant mandate CVF is at the maximum achievable tonnage.

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[108] Jordan, David J. "Future Carrier Aviation Options. A British Perspective". Naval War College Review. Summer 2001. Vol LIV No 3. 66.
[109] Perin, David A. "Are Big Decks Still the Answer?". Proceedings. June 2001. Vol 127/6/1,180. 30.
[110] A succession of relatively minor but well-publicised nuclear accidents at Windscale, Cumbria, the downwind effects of the Chernobyl accident and an apparent abundance of cheap North Sea natural gas have created a public, and hence political, opposition to nuclear power.
[111] Captain RN (rtd) Peter Fish. Director CVF Air Systems, BAE Systems. Presentation Portsmouth Naval Base, UK. 14 May 2002.
[112] Ibid. 30.
[113] Ibid. 31.

However, CVF is probably the first aircraft carrier in the world (unlike other warships) to be designed around a specific weapons systems, in this case the F-35 Joint Strike Fighter.

In order to maximise interoperability amongst users, JSF can be developed in conventional or STOVL variants. In Perin's analysis, *"*STOVL and small carriers are different issues…STOVL aircraft are not needed for an efficient 40-plane carrier design".[114] The UK has taken an opposing view based on it's *"*unique and valuable knowledge of STOVL aircraft*",* as it announced in September 2002 that the UK's JSF fleet will be STOVL.[115] However, factors other than capability were at work here. Economically STOVL variants of JSF have a high level of British industry participation but the RN First Sea Lord, Admiral Sir Alan West, revealed a more pragmatic reason: *"*Timing…All the indications were that if we went for the (conventional) option we would have incurred a delay of about two years*".*[116] Jordan identifies other considerations for CVF and its aircraft based on the limitations of a smaller navy. He cites the material and personnel inefficiencies of steam catapaults and the developmental lag of the alternative electromagnetic launch system. The end result is an aircraft carrier that will be *"*future proof…built for but not with catapaults and arrestor gear so as to maintain maximum flexibility to adapt…through a service life spanning up to 50 years*".*[117] These are technical arguments, however, that should not detract form the strategic intent that CVF embodies, at an entire through-life cost of about US$9 billion per ship.[118] By comparison, the 'next-generation United States carrier (CVN-21) has a projected acquistion cost alone of US$4.5 billion with

[114] Ibid. 32.
[115] Lord Bach, Under-Secretary of State for Defence (Procurement). Scott, Richard. "UK sticks with STOVL but plans 'future proof' carrier". Jane's Navy International. November 2002. Vol 107 No 9. 3.
[116] Ibid. 3.
[117] Ibid. 3.
[118] Ibid. 3.

operating costs in the region of US$2 billion per annum.[119] UK government policy "demands flexibility and deployability…heavily dependent on naval airpower" and consequently, "carrier-based air power…is a necessity".[120] The UK carriers will not be able to challenge the USN fleet, but then they are not designed to. Their purpose will be to allow the United Kingdom to continue to project independently its national policy through the capabilities of sea power albeit on a more modest scale.

France takes a similar viewpoint. Independent power projection is one of the three designated roles for the French Navy and the "main priority of conventional forces".[121] The French Navy has also undergone a shift of emphasis towards littoral and joint/combined operations. Within this shift, French doctrine poetically portrays the carrier as "an actor that comes on stage in the first act…sometimes during the prologue…makes an early appearance, generally alone, and takes rapid action once the second act begins".[122] There are other, if less lyrical, similarities between the aircraft carrier policies of France and Great Britain. Carrier strike power was retained during the Cold War with the FS *Clemenceau* and *Foch,* both of which entered service in the early 1960s. A "long series of of design studies intended to replace or supplement the Clemenceaus" finally resulted in the nuclear powered, single build FS *Charles de Gaulle*, a 'medium size' carrier of 50,000 tonnes with an embarked air group of 40 including the *Super Etendard* and the new *Rafaele* multi-purpose aircraft to rival the JSF.[123] This ship has had a painful gestation but sailed on its first operational deployment in 2002 for operations in support of Operation "Enduring Freedom" in Afghanistan.

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[119] Benbow, Tim Dr. "Carriers carry on". www.global-defence.com/2001/SeaSpart1.html
[120] Jordan, David J. "Future Carrier Aviation Options. A British Perspective". Naval War College Review. Summer 2001. Vol LIV No 3. 73.
[121] Operational Functions. Marine nationale de France. www.defense.gouv.fr/marine/anglais/present/dim/d_missions.html
[122] Ibid

Nevertheless, the expensive design and acquistion of the *Charles de Gaulle* has influenced French naval thinking. The planned second ship was cancelled and there is speculation that the design for the UK's CVF design will be used by France as the model for its second carrier with an in-service date of 2014.[124] Both governments realise that given maintenance cycle considerations, two carriers cannot maintain a constant presence and have signed a draft proposal to to pool military resources and to ensure that there is "one battle-ready aircraft carrier group at sea at all times" to fulfil international commitments.[125] Presumably the intention is that the principal tenet of an individual nation's independent power projection will be enhanced and not degraded by this alliance.

Power projection, global or more localised, has driven a small number of other navies to seek seriously the capabilities offered by carrier air power. It is something of an enigma that the only navy to rival the United States Navy in the last 50 years did little more than tinker with aircraft carriers relative to their other naval strengths. Robin Lee charts the evolution of Soviet carrier doctrine and its slow advance in the face of a doctrine based on nuclear weapon capabilities.[126] His premise is that whilst the USN won the argument to have both SSBNs and a large carrier force, the "Soviet Navy was forced to accept a series of design compromises consistently falling short of (Soviet) Navy goals".[127] The result was a series of aircraft carriers that promised much in design and innovation, but ultimately delivered little. The Soviets had no history of carrier design and building and their homeland defence was based on submarines and surface-missile armed warships. Due to the primacy of the submarine force there also was never

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[123] French Aircraft Carriers. www.hazegray.org/navhist/carriers/france.htm#ph75
[124] Future Aircraft Carrier. www.mod.uk/dpa/projects/cvf.htm
[125] "UK and France boost defence ties". www.news.bbc.co.uk/1/hi/world/europe/2726111.stm
[126] Lee, Robin. "A Brief Look at Russian Aircraft Carrier Development". www.webcom.com/amraaam/rcar.html
[127] Ibid.

the national political will in the Soviet Union for aircraft carriers that existed in the United States.

Nevertheless, the four *Kiev* class (40,500 tonnes) carriers were commissioned between 1975 and 1987. They tended to the Soviet trend of organic heavy armament and with an air group similar in numbers, but not capability, to an RN CVS. However, whilst the CVS was seen as a step backwards in the Royal Navy's capabilities, for the Soviet Navy, "the Kievs for the first time provided the Soviet Fleet with organic fighter cover".[128] The *Kiev* class were not the full extent of the Soviet's carrier aspirations and designs for CVNs surfaced and were squashed at regular intervals although *Baku* (later *Gorshkov* – see India), the last of the *Kiev* class was developed essentially as a technology demonstrator for the next class of carrier. The closest that the Soviet Navy came to realising these ambitions was the *Kuznetsov* class (67,000 tonnes). Although non-nuclear powered, they were designed to operate conventional aircraft albeit with a CVS-style 'ski ramp' to assist take-off. In common with the *Kievs,* this class carried substantial anti-shipping and surface-to-air armament. Only two hulls were completed and the first did not commission until 1991 at a time when the Soviet empire was collapsing and global power projection no longer featured as a priority. The second hull (the *Varyag)* was not completed as an operational warship and now resides in Macao, China. The sole aircraft carrier left in Russian Navy service is the *Admiral Kuznetsov* but in common with much of the Russian Fleet it suffers from chronic under-funding and its operational capability must be near zero. The failure of the Soviet/Russian aircraft carrier programme could be taken to disprove the thesis that modern sea power can only be achieved by a nation possessing the capabilities of a carrier. However, their programme was attempting to develop against a unique ideological backdrop that equated sea

[128] Ibid.

power with 'sea denial' as part of the defence of the homeland and strike carriers did not fill that construct. From a practical military perspective, the impact of the end of the Cold War had a far greater effect on Russian naval strategy (and spending) than in the United States. Their aircraft carrier programme went from being mildly undesirable to wholly unaffordable. As Lee writes, "It is difficult to argue for buying a new class of capital ship when there are not enough boots to go around".[129]

Russia's erstwhile Communist ally and adversary provides a different perspective on the nature of sea power. China is clearly in the political, economic, and military ascendancy but its naval policy is not at the forefront. There is considerable debate and unclarity concerning China's naval ambitions. In a 2002 review essay, Bruce Elleman highlighted the divisions of opinion held by those who study Sino naval policy over whether China seeks to be a coastal force or has serious aspirations as a regional 'sea denial' power or even as a 'blue water' navy.[130] His conclusion is that China's regional ambitions centre on relations with their 'traditional' adversaries Russia and Japan and that any maritime strategy should be "put in its proper geopolitical context".[131] He does not make clear whether this context should include carrier power but if, at the very least, Russia and Japan are in China's sphere of interest then the capabilities of an aircraft carrier would be an advantage in terms of presence and potential power projection, 'blue-water' or not However, the Chinese 'People's Daily' reported on a 'debate' on China's naval strategy at the 2002 16th Party Congress. The conclusion was that "it is chiefly because of political reasons that China chooses not to build an aircraft carrier".[132] The logic reported was that China's paramount interest is its economy and that not building a carrier fleet

[129] Ibid.
[130] Elleman, Bruce. "China's New "Imperial" Navy". Naval War College Review. Summer 2002. Vol LV No 3.
[131] Ibid. 154.
[132] Heng, Li. "Why China Chooses Not to Build Aircraft Carrier?". www.english.peopledaily.com.cn/200212/06/eng20021206_108061.shtn

"is a correct decision for China at the current stage".[133] Without traditional Chinese obfuscation, the report also pointed out the technological and financial implications of such a programme, as being beyond China at present.

This unequivocal, and presumably officially endorsed, statement should quash any future discussion of a Chinese carrier force. However, as the pre-eminent regional power with economic and political aspirations beyond the China Sea to the Indian Ocean (vis the PLA(N) basing rights in Myanmar), it seems inconceivable that China's long term naval strategy does not include a power projection capability. Central to the 'carrier conspiracy' theories that dog China are its tendency to acquire obsolete and unwanted aircraft carriers allegedly to break up for scrap. HMAS *Melbourne,* the Russian carrier *Minsk* and the (now) Ukranian carrier *Varyag* have all ended up in Chinese breakers yards or as 'amusment centres'. None of these hulls could be made seaworthy and it may be that the rewards of breaking are the sole reason for these hulls presence in China, a major ship-breaker, but there are a number of pointers that aircraft carriers may feature in the Chinese Navy of 2025 if not 2015.

In the West, one of the traditional indications of progressive military thinking is lively public and professional discourse and exchange of ideas. Whether discourse on naval strategy in general, and aircraft carriers in particular, is as encouraged in China as it is in the West, the publication is certainly not as prolific. However, it is claimed that there is what has been referred to as the "the basic mutual understanding of the young and vigorous naval officials" towards the efficacy of aircraft carrier procurement.[134] Nevertheless, a number of papers by

[133] Ibid.
[134] "Chinese Aircraft Carrier Ideas, Projects and Proposals". www.warships1.com/Chinese_carriers.htm

Chinese naval professionals have been published or cited in the West. It is impossible to tell whether these papers form an influential body of naval opinion but they are at least evidence of some level of strategic thought. Papers by two Chinese destroyer captains both support the concept of an aircraft carrier's capabilities as part of the "battlefield on the sea…for the defence of Chinese territory in the South China Sea".[135] Vijay Sakhuja's article adds to the conspiracy by citing the training, for the first time, of naval aviators to command warships in comparison with US carrier commanding officers, of a "simulated flying deck at an airport in northern China" and that the "PLA Navy has even experimented with F-8II in catapault launch mode".[136] Whether the conspiracy theorists or the 16th Party Congress are correct, in the long term it does seem inevitable, from a western perspective, that China will eventually (economy permitting) embrace the power projection, presence, and regional prestige associated with a carrier force. However, western thinking has not always found itself aligned to, or understanding of, the Chinese viewpoint.

The final carrier operator with serious, if limited, power projection aspirations is India. It has maintained a narrow capability since 1961 by commissioning two former British carriers INS *Vikrant* (1961) and INS *Viraat* (1989), both of World War II origin. Only the *Viraat* remains in service operating the aging VSTOL *Harrier* FRS1. Whilst it would be easy to dismiss this capability, India, in the face of a much worse economic sitiuation than many of its carrier competitors, has persevered with this force while other, more prosperous, nations such as Australia, Argentina, Canada and the Netherlands have removed the carrier from their inventory. India sees itself as the dominant nation in the region and has a long naval tradition that it proudly

[135] Sakhuja, Vijay. "Dragon's Dragonfly: The Chinese Aircraft Carrier". Strategic Analysis. www.ciaonet.org/olj/sa/sa.html. October 2000.

maintains. An aircraft carrier gives India capability but it also fulfils the vanity clause. India is also the only nation east of Suez to have this operational capability and given its geographic location and regional tensions, it is a capability it will continue to develop.[137] In a deal signed with Russia in January 2003 involving the 'lease' of four Tu 22 *Backfire* bombers and two *Akula* SSNs, it would appear that the *Kiev* class carrier *Gorshkov* (ex-*Baku*) is to be included.[138] Although in need of a complete refit and 'Indianisation' package, this agreement includes an air wing of MiG 29 *Fulcrum* aircraft. This a long way from delivering an operational capability but the *Gorshkov* deal is a sign of intent that India sees at least part of its regional hegemony being created by aircraft carrier power although the acquisition of the *Akula* SSNs is evidence that they are seeking to achieve a balance of capabilities.

Whilst an SSBN may deliver more striking power than an aircraft carrier, the latter can still convey more of an image of naval power, satisfying vanities more than serious power projection requirements. The height of maritime vanity is the anomaly of the Thai navy's VSTOL carrier *Chakri Nareubet* (11,500 tonnes). Built in Spain and with a fixed wing capacity for only six aircraft (and four helicopters), it is the only carrier that has accomodation for a royal family. Although commissioned in 1997, it has seen little service and is not considered as a threat to regional stability. The same Spanish shipyard built the forerunner design which became the SNS *Principe de Asturias*, commissioned in 1988. Spain maintains its naval capability and is a regular contributor to NATO forces at unit and headquarters level. It has a steady naval ship-building programme and is the first European navy to operate the *Aegis* system. However, although the *Principe de Asturias* is relatively capable, with capacity for twelve AV 8-B *Harrier*

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[136] Ibid

[137] The Thai carrier cannot be deemed 'operational'. See page 44.

II Plus aircraft and *Harpoon* SSM, there is not the apparent political will to commit this CVS to operations outside of the Iberian peninsula, an area where Spain cannot possibly feel threatened. The *Principe de Asturias* regularly appears in NATO exercises but never in operational theatres. Although the *Principe de Asturias* made a rare foray to the Adriatic in the mid 1990s it did not contribute to combat operations in the Balkans. Spain is a miltary enigma. Politically, it overtly supported recent US actions in Iraq but achieved this whilst declining to contribute any military forces. To place the Spanish carrier so close to the Thai version may be unfair but there has been no evidence in the last 15 years that the Spanish wish to commit this asset to anything approaching operations.

Italy's sole CVS, the IN *Giuseppe Garibaldi* is of similar design to the *Principe de Asturias* although Italy did, for the first time, deploy this warship out of area on a three month deployment to the Indian Ocean in 2002 in support of air operations over Afghanistan. Due to their range, the AV-8B *Harriers* were limited in their contribution but there is no doubting the boost to the pride and prestige of the Italian fleet that this brief operational experience gave them. Italy may be moving into serious consideration of carrier power as it is currently building a 26,000 tonne aircraft carrier (*Andrea Doria*) which will embark the JSF VSTOL variant. It originally had high aspirations as both an aircraft carrier and a transport vessel for tracked and wheeled vehicles albeit not amphibious. As a cost saving measure, this option has been removed.[139] This vessel should become operational around 2010 which gives scope for further role and capability changes.[140]

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[138] Harding, Luke. "Russia leases nuclear bombers to India". The Guardian. 20 January 2003. 7.

[139] Andrea Doria Aircraft Carrier, Italy. www.naval-technology.com/projects/num

The final operator of an aircraft carrier, in the face of enormous economic pressures, is Brazil. Whilst its rival for South American sea power, Argentina, has given up the race due to its faltering economy, Brazil struggles on with the ex-British World War II carrier *Minas Gerais.* Although laid up in 1987, it was resurrected in 1993 and has operated with both Brazilian and Argentian aircraft albeit for limited periods. This aging vessel will be paid off when the former French carrier *Sao Paulo* (ex-*Foch*) enters service having been transferred in November 2001.[141] If the Thai carrier is testament to the riches of that country, then the Brazilian persistence in maintaining a form of carrier capability is testament to their ingenuity. However, neither have any strategic value and are sufficient to add only to their respective nations' maritime conceit and not practical power projection ideals.

Of all the carrier nations, India, Italy, and Spain are hardest to define in their intent. None of them, especially India, have the defence budget or fleet size normally associated with such capital projects yet, they persevere with the capabilty. Italy and Spain have elected to operate the absolutely smallest (and cheapest) design whilst India has mastered the art of acquiring through the 'second-hand market' and then using its considerable ingenuity to 'Indianise' and maintain what would otherwise be consigned to a breaker's yard. The conclusion is that all three nations are partly seduced by the vanity aspect of a carrier as fleet flagship but, they all have serious, if unexploited, power projection aspirations which they seek to achieve through a balanced rather than niche fleet.

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[140] Ibid

[141] World Aircraft Carriers List: Brazil. www.hazegray.org/navhist/carriers/brazil.htm

The Case Against - "Too Big, Too Expensive, and the Alternatives"

The last aircraft carrier to be rendered mission incapable by enemy action was the Japanese escort carrier *Kaiyo* on 24 July 1945, sunk in Beppu Bay.[142] In the intervening 58 years the full range of subsurface and surface warships have been destroyed or rendered inoperable by enemy action with the exception of an aircraft carrier. Failure to have been engaged by the enemy does not make the aircraft carrier inviolable though. Whilst the air wing may go 'in harm's way', the carrier itself sits cocooned within its CVBG. The Argentinian forces came closest to inflicting damage on the British carriers *Invincible* and *Hermes* in the 1982 Falklands War, but the incoming missile struck the merchant ship *Atlantic Conveyor* instead. Rear Admiral's Woodward's reaction was to remove his vital carriers further upthreat, a tactic that any CVBG commander would endorse.[143] Aircraft carriers clearly do have vulnerabilities to attack but the emphasis is on prevention rather than cure.

Opponents of aircraft carriers primarily attack their cost but their apparent vulnerability due to sheer size is also a target and combined with their longevity this bears comparison in some critics' eyes with the dinosaur. Loren Thompson cites the opposition of the United States Office of Net Assessment as proponents of 'transformation' who see carriers as "sitting ducks…part of the folklore of military reformers".[144] Rear Admiral Rutherford USN identified five potential vulnerabilities of an aircraft carrier; cruise missiles, 'low slow flyers', small boats (swarms or otherwise), mines and submarines.[145] Thompson adds ballistic missiles to this list.[146]

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[142] Japanese Carriers of World War 2. www.ww2pacific.com/japcv.html
[143] Brown, David. The Royal Navy and the Falklands War. London, UK. Leo Cooper. 1987. 142.
[144] Thompson, Loren B. "What it takes to kill an aircraft carrier". Defense Week. June 11 2001. Vol 22 No 24. 17.
[145] Rutherford RAdm USN. COMCARGRU 4. "The USN Carrier Battle Group". Canadian Forces Command and Staff Course. Toronto, Canada. 4 December 2002.
[146] Thompson, Loren B. "What it takes to kill an aircraft carrier". Defense Week. June 11 2001. Vol 22 No 24. 17.

Without doubt all the above would cause significant if not fatal damage to a carrier, but to assume survivability is the only factor is to miss the point. The carrier does not operate alone. It has an integrated and sophisticated network of units to ensure that its capability remains intact. It is not a passive 'queen bee'; it is the major power, strike, and force projection element of the group.

In her assessment of the United States armed forces progress to transformation, Sloan writes (without amplification) that aircraft carriers are "increasingly at risk from land-based cruise and ballistic missiles".[147] However, CVBGs operate most efficiently in open seas where they have freedom of manoeuvere but can still project their strike power ashore. This will typically be up to 200 nautical miles offshore (less than 25 minutes flying time for a F/A 18 with a combat radius of 600 nautical miles without aerial refuelling) where location itself is not easy. Carrier operations are not particularly stealthy, but with 'nuclear knots' available, a CVN at 40 knots can relocate in one hour anywhere within over 5,000 square miles. Even a conventionally powered carrier can disappear into 2,800 square miles in that hour. Admiral Fallon succintly states: "…although many nations have…missiles that could strike a carrier, finding and targeting ships at sea is a daunting task…we still have difficulty in hitting targets that won't cooperate, stand still, or provide us with a permanent GPS address".[148] Satellite capability is the key to locate, track, and vector weapons onto a major warship, a capability that few nations have. Even locating a CVBG is no guarantee of successful targetting as the CEC-enabled battle group should counter any cruise or ballistic missile threat.

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[147] Sloan, Elinor. "Revolution in Military Affairs? An Assessment of US Force Transformation". Project Report No. 2001/05. Directorate of Strategic Analysis Policy Planning Division. Department of National Defence Canada. May 2001. 1.

The same applies to the 'low slow flyer', a Cessna type aircraft that approachs the CVBG. The argument returns to the issue of locating the carrier and then pentrating its CVBG defensive ring. In the open ocean, the most credible threat is a submarine. The best ASW weapon is another submarine and it is for this reason that all major carrier operators include at least one SSN hunter-killer in their CVBGs. The most realistic threat to a carrier is when it is forced towards or into the littoral, either through a navigational choke-point or for extreme operational reasons. However, unless there is an overriding strategic reason, a CVBG will not operate in confined littoral waters where there is a threat from mines, small boats or submarines without the assets in place to sanitise that area. Opponents of large aircraft carriers argue that a reluctance to operate in the littoral environment is their Achilles heel but the CVBG does not need to enter the littoral in order to carry out its strike and power projection roles. At greater risk are the amphibious ships with limited force projection capabilities (not the high-speed LCACs or heavy lift helicopters) who require a higher level of area sanitisation in order to fulfil their mission. The USS *Kitty Hawk,* HMS *Illustrious* & *Ark Royal* experiences of amphibious operations were either conducted at range from the coast or in highly sanitised littoral operating areas. Put simply, there are areas where a carrier will not go unless it's safety can be guaranteed; risk is acceptable, foolhardiness is not.

Possibly the greater threat to a carrier comes from its cost. As Friedman states, "Navies are…highly capital and technology intensive, and are expensive to replace" and by far the most

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[148] Fallon, William J. Adm. USN. "Over the Next Hill: A Sailor's Perspective of Maritime Air Power and the Legacy of Lord Trenchard". Royal United Services Institute. April 2002. Vol 147 No2. 20.

expensive item is the carrier.[149] The final build cost for a single *Nimitz* class carrier is US$4 billion and the successor CVN-21 will be in the order of US$12 billion for the first hull and US$7 billion thereafter.[150] In the United States Department of Defence proposed budget for fiscal year 2004, the USN should receive US$1.5 billion (out of a total of US$114.7 billion – 1.3%) just for research and development of the first CVN-21 carrier, which will not commission until 2007. This figure compares with US$1.2billion for the conversion of the *Ohio* class SSBNs to SSGNs, US$1.1 billion for research and development of the DD(X) surface combatant family, and US$1.2 billion for all unmanned vehicle (air and undersea) development.[151] The belief in the USN carrier community is that they are actually under-funded and consequently under-resourced. The Quadrennial Defence Review (QDR) process lays down anticipated missions, force levels, and budgetary constraints. Under the 2001 QDR the USN is funded for 11 active carriers, and one in extended refit, but to achieve the QDR missions of continuous carrier presence in the Mediteranean Sea, Indian Ocean, Arabian Gulf and the Western Pacific requires 15 carriers to be in commission. The basic conclusion is that modern, large, technologically advanced aircraft carriers are so expe 0 0 12 284 be the pr ser 179 179 of only the one nation with the economy and national will to fund such grandiose projects. For all the doctrinal posturing of limited power projection navies such as Great Britain and France, the reality is that they cannot (and never will) financially afford the fleet levels, and with it the naval capability, of the United States.

[149] Friedman, Norman. Seapower as strategy: navies and national interests. Annapolis, Maryland. Naval Institute Press. 2001. 42.
[150] Eisman, Dale. "Next carrier to focus on cutting costs in operations". The Virginian-Pilot. 20 March 2003. A13.
[151] Burger, Kim and Sirak, Michael. "US Budget boost-with more to come". Jane's Defence Weekly. 5 February 2003. Vol 39 Iss5. 8.

However, even in the United States, there are military alternatives to the aircraft carrier that have some credence and viability. As previously mentioned, the development of the 'Expeditionary Strike Groups' based on the ARGs has given fresh impetus to those who doubt the flexibility and viability of the CVBG. The marked increase in carrier strike capability due to precision guided munitions ("In Desert Storm we were putting four to six aircraft on a target. In Afghanistan its one aircraft hitting four to six targets") has also enabled other forms of precise weapon delivery.[152] The same GPS-based technology that can transform a 'dumb' bomb into a 'smart' one has also transformed the precision and performance of cruise missiles. TLAM is now a standard weapon fit on all large USN surface units and USN/RN SSNs and in recent conflicts have provided the opening salvoes prior to air superiority being established. The conversion of *Ohio* class SSBNs to SSGNs by inserting 154 TLAM capsules into the existing Trident ballistic missile tubes will add to this capability. The USN's SSGN programme manager describes the SSGN as becoming the "quintessential transformational platforms that support our 'Sea Power 21' strategic concepts…all in one ship".[153] His claim that the SSGN will have "more Tomahawks than an entire carrier strike group" cannot be disputed but it is not in the spirit of 'Sea Power 21' to concentrate capabilities in a single platform.[154] The likelihood is that SSGNs would operate as part of CVBG rather than in isolation. In an era of effects-based warfare, numbers are not as important as capability. TLAM may have range-advantage but the advance in PGMs means that, according to Perin, "a single carrier air wing can deliver the strike potential of 4,000-5,000 Tomahawks over a 30-day campaign".[155] The carrier air wing also holds the

[152] RAdm R Knapp USN Naval Sea Systems Command quoted by Siekman, Philip. "Build To Order: One Aircraft Carrier". Fortune. July 2002.

[153] Truver, Dr Scott. "Capt Brian Wenger USN. Striker beneath the sea". Jane's Navy International. April 2003. Vol 108 No 3. 18.

[154] Ibid. 19.

[155] Perin Perin, David A. "Are Big Decks Still the Answer?". Proceedings. June 2001. Vol 127/6/1,180. 32.

advantage of sustainment as it can be replenished in theatre whilst the SSGN cannot and the cost of maintaining equivalent TLAM-capable units would be prohibitive.

Related to TLAM technology and the delivery of force by unmanned means, is the rapid growth of Unmanned Combat Aerial Vehicles (UCAVs). UCAVs can operate as recconaissance, surveillance or weapon delivery vehicles and are a natural progression in combat air power development, especially in terms of cost but also stealth and risk-reduction. The widely reported November 2002 *Predator* UCAV missile attack in Yemen is only a snapshot of UCAV capabilities. In February 2003, the *Pegasus* UCAV, specifically designed for the USN, flew a series of trials to a simulated aircraft carrier deck at Naval Air Warfare Center *China Lake.*[156] The role of this UCAV will be more than reconnaisance and surveillance but also "to take on penetrative strike and suppression of enemy air defences".[157] The USN Vice Chief of Naval Operations, Admiral William Fallon, has acknowledged that UCAVs will become an integral part of naval operations but in platform terms, they still require a large deck from which to come and go if power projection and strike capability is to be maintained or advanced. His concept is of "a mix of manned and unmanned aircraft flying from carriers…UAVs will eventually shoulder more direct combat responsibility and fly complex missions". However, he warns against veering solely to umanned or manned aircraft, preferring to envisage "tailored air wings suitable to evolving missions and threat environments".[158] Admiral Fallon's comments could be taken as an 'old school brown shoe' grudgingly accepting new technology but taken in the

[156] Brown, Nick. "Northrop Grumman's X-47A Pegasus makes first flight". Jane's Navy International. April 2003. Vol 108 No 3. 9.
[157] Ibid. 9.
[158] Fallon, William J. Adm. USN. "Over the Next Hill: A Sailor's Perspective of Maritime Air Power and the Legacy of Lord Trenchard". Royal United Services Institute. April 2002. Vol 147 No2. 21.

context of 'Sea Power 21' they are entirely consistent with the maintenance and advancement of capability that, in this case, is best served from an aircraft carrier.

The Future – "Revolution or Transformation?"

The aircraft carrier's basic capability to produce combat aircraft without the need for land-basing has not, and will not change. However, doctrine, weapon systems, and communications have all changed radically since Squadron Commander EH Dunning RNAS made the first carrier landing in 1916. Technology has immesurably changed warfare and in the early 21st century we are apparently witnessing another core change in military thinking. But, as Haydon, in his analysis of 21st century sea power, correctly states "Technology is no stranger to navies".[159] There has been constant change in ways to apply naval force and singular technological advances, such as radar have altered naval warfare. The moot question is how radical are these technological changes and do they affect the effects of naval power in general and carriers in particular. Work cites the first appearance of technological advances being allied to 'revolutionary' change to Soviet military theorists in the 1980s whose defining characteristic was the magnitude of change in relation to pre-existing military capabilities.[160] He charts its progress to popular acceptance via the United States Office of Net Assessment who made the link between technological, doctrinal and organisational change in order for something to be considered 'revolutionary'.[161] Work sums up the widespread use and in his opinion, misue, of the term 'Revolution in Military Affairs' (RMA): "it seems that every new technological advance or

[159] Haydon, Peter T. Seapower and Maritime Strategy in the 21st Century. Halifax, N.S. Centre for Foreign Policy Studies, Dalhousie University. 2000. 101.
[160] Work, Robert O., Lt Col USMC (ret). The Challenge of Maritime Transformation: Is Bigger Better? Washington, DC. Center for Strategic and Budgetary Assessments. 2002. 7.
[161] Ibid. 8.

system and …operational concept is considered to be 'revolutionary'".[162] In a more conciliatory vein, Vice-Admiral Sir Jeremy Blackham describes it as conveying "different things to different people".[163] In his analysis, RMA is the result of rapid and concurrent advances in communications, digitisation and information technology that will create "a substantially new battlespace…in which individual service expertise and equipment must be matched and integrated. There may have to be significant changes in force structures".[164] Admiral Blackham is clearly more of a 'believer' in the revolutionary label than Work but they are essentially saying the same thing; technology will produce change but the utility of that change must be measured not by the immediate introduction of new and attractive technologies but by their improvement to capability, i.e. substance over style.

The official USN and RN response to the RMA has been to detune the apparent initial impact and adopt a creed of 'transformation'. By definition more neutral than the term 'revolution', it is also a realistic assessment of the pace of change endemic to major naval forces. For a capability as heavily capital investment as an aircraft carrier it is even more applicable. Critics such as Tom Donnelly may, with some truth, state that "A Navy that buys Joint Strike Fighters and aircraft carriers will find itself operating in 50 years in fundamentally the same manner as it does today", misunderstand the fundamentals of naval platform and capability acquisition, namely cost and time.[165] Military publications regularly fill their pages with 'artists impressions' of stealth ships or 'low cost-high tech' multi-missile-firers but few even get to the technology demonstration phase.

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[162] Ibid. 8.
[163] Blackham, VAdm Sir Jeremy. "Welcome to the revolution". Jane's Navy International. April 2003. Vol 108 No3. 25.
[164] Ibid. 26/30.

As an example, the USN 'arsenal ship' was to have been the embodiment of RMA in a single platform. Its capabilities were to be to conduct "long-range strike missions, provide fire support, defend against theater ballistic missiles, and maintain air superiority"; essentially the capabilities of a CVBG.[166] It was to be 'netcentric' to the extent that "all the command and decision functions would be made offboard…the ship would serve as a magazine for a distributed sensor network".[167] Underlying this project was that it had to be low cost. The 'Arsenal' ship never made it to production. The 1998 RAND Corporation report into the cancelled projectconcluded that it essentially failed due to a combination of an immature streamlined acquisition process (designed at saving money) and USN intransigence.[168] The latter factor was attributed partly to institutional factors but mainly that despite its being "deemed a very promising weapon system by many in the Navy…its intended mission was currently covered".[169] RMA converts could cite this project as a failure of the military to grasp opportunities offered by technology, but the reality is that doctrinally, financially and institutionally it is easier to adapt or transform the existing paradigm than abandon it in favour of an untested, radical, technology-based doctrine.

It is this approach that has led the RN to its CVF concept and the USN to the newly designated CVN-21 project. The USS *George H. W. Bush* (CVN 77) will be the last of the *Nimitz* class that commenced with the USS *Enterprise* (CVN 64) in 1961. The capability gap between these two ships in their intial construction is huge and its is not always immediately

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[165] Donnelly, Tom. "Revolution? What Revolution?" Jane's Defence Weekly . 7 June 2000. Vol 33 Iss 23. 23.
[166] Arsenal Ship. www.fas.org/man/dod-101/sys/ship/arsenal_ship.htm
[167] Ibid
[168] Arsenal Ship Case Study. www.rand.org/publications/MR/MR1372/MR1372.appb.pdf

apparent, as identified by Admiral Fallon's comment that "An aircraft carrier on the horizon doesn't look much different from one at Midway in 1942. That similarity sometimes draws criticism".[170] The next generation of USN carriers will share this basic similarity but it was not a construct arrived at blindly. In 1996 a mission needs statement for a 'New Tactical Aviation Sea-Based Platform for the 21st Century' was launched with a remit to examine all options.[171] The aforementioned 'Arsenal' ship formed part of this study as did the concept of Mobile Offshore Bases. Large (80 aircraft), medium (60) and small (40) ship designs were considered. The project was designated CV(X) with no 'N' designation so as not to proscribe nuclear propulsion. Small carriers were discounted as two small variants do not equal the capability of one large carrier. The conclusion was that medium size aircraft carriers "are a little cheaper but provide a lot less combat power" and that although "nuclear power adds roughly 10% to the life-cycle cost", its power generation capabilities were "well worth the additional cost".[172] The project became CVN(X) with a design mandate to encompass emergent technology in a phased but expeditious manner. Consequently CVN-77, last of the *Nimitz* class, will be the "transition ship to the next generation" primarily in C4ISR systems.[173] The cost of the CVN-21 carriers is enormous and in an effort to mitigate that cost the decision was taken not to build CVN(X)-1 as a first of class technology leader to support fuller implementation into CVN(X)-2 but combine available technologies into one hull and adopt the widely-used 'fitted for but not with' approach in anticipation of future developments. These are planned to include electromagnetic launch and arrestor systems, a nuclear power plant able to "generate three times the electricity provided

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[169] Ibid
[170] Fallon, William J. Adm. USN. "Over the Next Hill: A Sailor's Perspective of Maritime Air Power and the Legacy of Lord Trenchard". Royal United Services Institute. April 2002. Vol 147 No2. 19.
[171] CVNX. www.globalsecurity.org/military/systems/ship/cvx.htm
[172] Perin, David A. "Are Big Decks Still the Answer?". Proceedings. June 2001. Vol 127/6/1,180. 30.
[173] Allen, Richard C. "Next-Generation Carrier Will Have Several 'Leap-Ahead Technologies". www.nationaldefensemagazine.org/article.cfm.

by a Nimitz class reactor", fixed vice rotating surveillance systems and a 25% reduction in crew numbers.[174] The first CVN-21 carrier (CVN-78) is scheduled to enter service in 2013.[175] In recognition of the enormity of the CVN-21 programme in terms of capability, and influence upon future doctrine, the then Program Executive Officer for Aircraft Carriers in the USN Naval Sea Systems Command underlined the transformational essential that the new class must possess: "these ships have to be capable of absorbing the changes…over the 50 year lifetime of the ship…What we aim to have is an infrastructure for growth. What we are defining today will form the basis for our carrier force for the next 100 years".[176] This admission of longevity would be heresy to serious RMA advocates but, it is less an admission of inertia and more a recognition that the fundamental capabilities (and potential capabilities) of presence and power projection offered by an aircraft carrier can serve as a basis for transformation.

Conclusion

Sea power continues to be a relevant concept in military doctrine and the most expeditious way of achieving sea power is through 'sea control'. By definition, 'sea control' requires a greater capability than more limited forms of maritime influence. The scale of operation is also a factor. Whilst smaller nations seek only to influence their immediate waters, other nations, as part of their national policy, wish for regional or even world-wide 'sea control'. The naval force that possesses the greatest power projection capability will be the one most able to achieve its desired sea power end-state. That accolade resides with the United States Navy, which has based the majority of its fleet power around the aircraft carrier battle group. The

[174] Eisman, Dale. "Next carrier to focus on cutting costs in operations". The Virginian-Pilot. 20 March 2003. A13.
[175] CVNX. www.globalsecurity.org/military/systems/ship/cvx.htm
[176] Scott, Richard. "RAdm Knapp-Charting a course to CVNX". Jane's Navy International. March 2001. Vol 106 No 2. 19.

carrier battle group has developed from the strike/escort carriers of World War II, through the Cold War phase of planning to force past the Soviets, to being the core of globally-deployable, flexible, networked, coherent, power projection naval forces. Technology has greatly enhanced their strike abilities, system integration, sustainment and response abilities but the basic construct remains that of an independent, strike force that can fulfil and support all warfighting requirements on the spectrum from presence to theatre-level warfare. The other nations who make significant material and financial investment in more limited carrier forces seek to achieve maritime capabilities commensurate with their investment. Whatever the level of a nation's commitment, excluding the 'carrier vanity nations', a carrier force provides an enviable range of capabilities.

Parallel to aircraft carrier development has been, in the United States and United Kingdom in particular, a maturing of maritime doctrine. Navies have always operated under broadly understood principles of war at sea; as privateers to combat trade and enhance personal and national wealth, the protection of commerce, as a counter to rival fleets, or in support of a land campaign. The Cold War provided a doctrinal 'comfort zone' where naval strategists did not have to look beyond the technological advances of the opposition. The end of the Cold War led to serious US and UK military evaluation of their reason for being. In the naval case, justification had to be made for fleets designed for Cold War operations that now had to fit the new expeditionary concept espoused by their respective governments. The USN and the RN successfully achieved this by reverting to the first principles of doctrine. This served both as a means of educating those outside (and inside) the naval services of their navies *raison d'etre*, and to develop force levels based on capability requirements. The USN series of papers that began

with "…From the Sea", in 1992, and concluded (to date) in 2002 with "Sea Power 21" is a masterpiece of doctrinal vision. There is a consistent theme throughout the five iterations that stress joint, flexible, expeditionary, technologically-empowered, and powerful balanced forces that can transform to meet national security and policy demands. Although later in developing, the UK's unambiguous "Fundamentals of Maritime Doctrine", in 1995 and 1999, has fundamentally shaped and clarified RN strategic thought and direction. Both USN and RN single-service doctrine has been subsumed into joint national doctrine that carries the same expeditionary message.

What underscores this doctrine is the continued relevance of the aircraft carrier. Its capabilities have been questioned from many angles. Advocates of littoral warfare see the carrier as a 'sitting duck' that gets in the way of amphibious expeditionary forces. Supporters of RMA maintain that the carrier has been superseded by cruise missiles, UCAVs and 'netcentric' solutions. They posit that it is vulnerable to modern weapons, satellite detection and outdated by information superiority. These arguments miss the point; the carrier battle group comprises all of those capabilities and by virtue of its sheer size, bandwith and growth potential it can defeat and encompass these attributes. The biggest threat to carrier capability is far more prosaic-cost. To design, build, operate, maintain, and develop even a single modern aircraft carrier costs billions of dollars, pounds, or euros. To add the requisite air and battle group adds exponentially to the price. Acquisition, transformation, or even revolution, of military capability comes at such a cost to make a modern aircraft carrier fleet the preserve of only one nation, the United States. Nations such as the United Kingdom and France have the aspiration and doctrine to support multiple aircraft carriers but not the respective pounds or euros. Even Indian technical ingenuity

in ‘recycling’ unwanted carriers cannot overcome the fiscal hurdle. However, the high cost of aircraft carriers begets a prolonged existence as a nation requires return on its investment. The US CV-21 and UK CVF classes both have a projected life of 50 years from commissioning and it is likely that this will be extended as technology improves maintenance and life-cycles. This places an inevitability on continued carrier operations and questions the purity of the strategy, doctrine and capability cycle.

The key tenet of modern sea power is one of an effective, trained, and ready naval force able to project power, in a relatively short time, to any theatre of operations. The most potent capability to achieve this is through the composite elements that form aircraft carrier battle group. There is no other credible capability that can encompass and sustain power projection. The aircraft carrier has not changed, and will not change, in its basic function and appearance for the foreseeable future. This is in small part a feature of prestige and presence, in larger part a matter of cost and resultant longevity but primarily because it comprehensively provides an unrivalled span of maritime capabilities to enable dominant sea power to be established. There is no credible alternative on the horizon; the aircraft carrier will remain an essential element of 21st century sea power.

Glossary

ARG	Amphibious Ready Group
C4ISR	Command, control, communications, computers, intelligence, surveillance & reconnaissance
C5ISR	Command, control, communications, computers, combat systems, intelligence, surveillance & reconnaissance
CEC	Cooperative Engagement Capability
CNO	Chief of Naval Operations
CV-21	United States Future Aircraft Carrier
CVF	United Kingdom Future Aircraft Carrier
CVS	Conventional Powered Carrier
CVN	Nuclear Powered Aircraft Carrier
CVBG	Carrier Battle Group
DD(X)	Future Surface Combatant Project (USN)
ESG	Expeditionary Strike Group
FNOC	Future Naval Operational Concept (RN)
FS	French Ship
HMAS	Her/His Majesty's Australian Ship
HMS	Her/His Majesty's Ship
ICBM	Inter Continental Ballistic Missiles
INS	Indian Naval Ship
JSF	Joint Strike Fighter
LCAC	Landing Craft Air Cushion
LCS	Littoral Combat Ship
MCJO	Maritime Contribution to Joint Operations
MSC	Military Sealift Command
NATO	North Atlantic Treaty Organisation
NOC	Naval Operational Concept (USN)
PGM	Precision Guided Munitions
PJHQ	Permanent Joint Headquarters (UK)
PLA(N)	Chinese Peoples Liberation Army (Navy)
QDR	Quadrennial Defence Review
RAF	Royal Air Force
RM	Royal Marines
RMA	Revolution in Military Affairs
RN	Royal Navy
RNAS	Royal Naval Air Service
SDR	Strategic Defence Review
SNS	Spanish Navy Ship
STOVL	Short Take Off Vertical Landing
SSBN	Nuclear Submarine, Ballistic Missile armed
SSGN	Nuclear Submarine, Cruise Missile armed
SSM	Surface to Surface Missile
SSN	Nuclear Submarine, Attack

TLAM	Tomahawk Land Attack Missile
UAV	Unmanned Aerial Vehicle
UCAV	Unmanned Combat Aerial Vehicle
USAAF	United States Army Air Force
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy
USS	United States Ship

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