NAVY

Australian Government
Department of Defence
Defence Science and Technology Group

Shaping Defence Science and Technology in the Maritime Domain

2016 – 2026

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Shaping Defence Science and Technology in the Maritime Domain: 2016 — 2026 is the inaugural Defence maritime science and technology strategy. It outlines future areas of focus for Defence capability and objectives, and identifies which areas of science and technology have the potential to support their development. To achieve this, consideration has been given to strategic guidance, changes in the maritime operational environment, and current maritime science and technology support to Defence. This document should be used to inform and shape future science and technology capabilities.

This document represents long-term guidance. Guidance to prioritise and shape the in-year program is delivered through the individual domain Science and Technology Requirements and Priorities documents and the DST Group Domain Planning Guidance documents.

Shaping Defence Science and Technology in the Maritime Domain: 2016 — 2026 was endorsed by the Navy Capability Committee on 22 September 2015.

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Introduction

Defence Science has been conducted in Australia since 1907 and has led to the development of a number of indigenous maritime capabilities including a sonobuoy system for deployment from aircraft and helicopters, a high frequency over-the-horizon radar, and a laser airborne depth sounder (LADS) for aircraft–based hydrographic surveying.

Scientific and technical support is applied to current Defence operations, investigates future technologies for Defence application, and ensures Australia is a smart buyer and user of Defence equipment. In addition, it develops new Defence capabilities and enhances existing capabilities by increasing performance and safety, and reducing the cost of ownership of Defence assets.

In the development of this strategy, consideration has been given to strategic guidance, changes in the maritime operational environment, and current maritime science and technology support to Defence. Five focus areas for science and technology support have been identified that cover the breadth of support required in the maritime domain.

- Decision Superiority
- Mission Survivability in a High Threat Environment
- Joint and Combined Operations
- Creating and Shaping the Future Force
- Seaworthy and Airworthy Fleet

Whilst these focus areas require enduring support, a number of priority areas within them have been identified to address current and future maritime challenges. These priority areas are intended to inform and shape science and technology capabilities.

- *Information Integration and Interoperability:* a priority in support of the Defence White Paper 2016 (DWP 16), which places an emphasis on the joint force, bringing together different land, air, sea, intelligence, electronic warfare, cyber and space capabilities so the ADF can apply more force more rapidly and more effectively, when called on to do so.
- *Robust and Protected Networks and Infrastructure*: a priority in support of the Plan Pelorus objective to contribute to a Defence cyber capability that ensures robust and protected networks and infrastructure. It also supports DWP 16, which aims to strengthen Defence's cyber capabilities to protect itself and other critical Australian government systems from malicious cyber intrusion and disruptions.
- *Task Group Operations*: a priority in support of the Plan Pelorus objective to generate and deploy self-supported and sustainable maritime task groups capable of accomplishing the full spectrum of maritime security operations.
- *Theatre Anti–Submarine Warfare (TASW)*: a priority in support of the need to meet the demand for greater contributions to TASW operatons in our region inline with the 2016 Integrated Investment Program.
- *Integrated Air and Missile Defence*: a priority to support Australia's commitment to working with the United States to counter the ballistic missile threat (DWP 16).
- *Enhanced Current Capability*: a priority in support of the Plan Pelorus objective to manage and sustain platforms and mission systems, and to keep some of the older fleet units operational and seaworthy during the transition period.

ADF Maritime Capability – Direction

Over the coming decade, changes to ADF maritime capability and how Australia operates in the maritime domain will impact the types of scientific and technical support required, and when it is required.

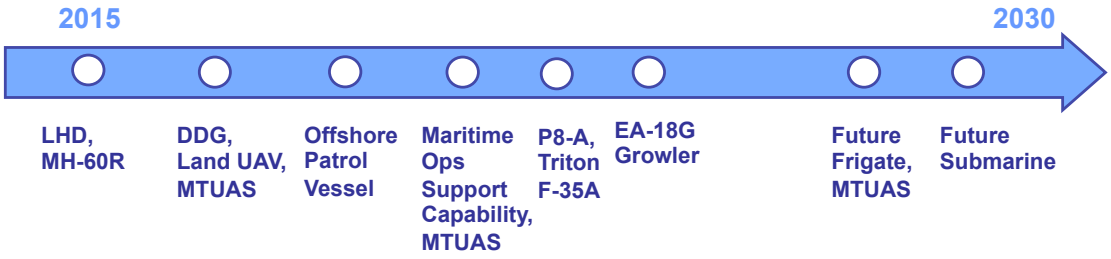
Defence White Paper 2016

DWP 16 provides for a more capable, agile and potent future force to protect Australia's security and prosperity over the coming decades. It signals a future ADF that is more capable of operations to deter and defeat threats to Australia, operate over long distances to conduct independent combat operations in our region, and make more effective contributions to international coalitions that support our interests in a rules-based global order. The increased capabilities of the ADF will also enhance the ability to operate with the United States. To achieve these, major investment will be made in modernising and enhancing the potency, range and capability of the ADF's maritime capabilities. This includes strengthening the intelligence, surveillance, reconnaissance, space, electronic warfare and cyber capabilities that ensure ADF forces have superior situational awareness.

A Changing Force Structure and Significant New Capabilities

Maritime investment will see a number of significant capabilities being developed and introduced into service, among them the Guided Missile Destroyers (DDG), P-8A Poseidon, Joint Strike Fighter, Future Frigate, Offshore Patrol Vessel, MQ-4C Triton, Future Submarine, and new surveillance and space systems. The following (indicative) diagram shows consistent delivery into service throughout the next fifteen years.

Conduct of Maritime Operations



Plan Pelorus, the Navy's strategy to 2018, signals an evolution in how the RAN conducts operations. Plan Pelorus points out the importance of the maritime domain to Australia's economy and the need for shipping to and from major trading partners to pass through several strategic choke points to reach its destination. To address this Navy will become a task group oriented Navy and will plan for a Fleet able to establish sea control in two geographical locations, and after an initial surge, to maintain one location of local sea control. New operating and warfighting concepts will bring together the current and future capabilities to achieve this.

Science and Technology Focus Areas

A number of science and technology focus areas have been determined to align with strategic guidance and to address current and future maritime challenges.

Decision Superiority

Decision superiority is the ability to make and implement more informed and more accurate decisions at a rate faster than the adversary. Whilst information has always been a significant enabler to maritime warfare, the increasing lethality and sophistication of modern weapons and information systems, and the shortened decision cycle required to successfully defend against them, means that decision superiority is now a more decisive element. It enables the Commander to determine if, when, where and how engagements occur. Achieving such decision superiority is predicated on information dominance, which is achieved by both denying or manipulating an adversary's information and assuring the availability and security of our own.

Decision superiority will be achieved through the synchronisation and integration of operations, intelligence and communications capabilities to generate information effects. It draws upon the ability to collect, process, and disseminate intelligence and mission data from a wide range of sources (including whole-of-government and non-government agencies), and resilience in this ability through advanced cyber capabilities. It requires integrated air and sea platforms, full spectrum electronic warfare (EW) capabilities, assured space access, advanced maritime Command and Control concepts and capabilities, and enhanced situational awareness through persistent, pervasive and timely ISR capabilities.

Priority: Information Integration and Interoperability at the Task Group and Joint Task Force level, and with allies, to support current and future operating concepts. Getting the right information to the right person in the required timeframe.

Priority: Cyber capabilities that ensure robust and protected networks and infrastructure. This is to be achieved through cyber security, cyber defence and Defence cyber effects.

Science and Technology Support

Enhanced situational awareness is required to achieve decision superiority. Support includes ISREW architectures that ensure the best situational awareness over various levels of, potentially, contested connectivity in joint/coalition environments, novel sensor systems, improved correlation and fusion of data, integration of multi–level data, automated reasoning and decision support, automated prioritisation and tasking of onboard/offboard ISREW systems, and real time environment modeling and prediction.

Support will be needed to help develop, acquire and implement effective command and control in the cyber and electromagnetic domains. Capabilities will be needed to sense, visualise and understand these environments across the area of operations and the networked force, and tools will be needed that enable commanders to determine best courses of action that maximise mission outcomes in these domains, integrated and synchronised with the physical domain. Research and development is required in the folowing areas:

- New electronic warfare sensors and effectors.
- Electronic warfare tactics, techniques and procedures.
- Full spectrum mission survivability.
- System level optimisation for current and future capabilities.
- Convergence of electronic warfare, communications, electronic intelligence, and cyber capabilities.
- Protected satellite and radio communications networks for surface ships and submarines.
- Electromagnetic (EM) interference suppression and avoidance and EM vulnerability assessment.
- Cyber vulnerability analysis and mitigation.
- Decision support tools.
- Environmental assessment and exploitation.

Decision Superiority

Military Objective/Capability	Research Areas
• Information Warfare • Electronic Warfare • Process, exploit and disseminate intelligence and mission data • Advanced cyber capabilities • Integrated air and sea platforms • Situational awareness • Command and Control in a Denied or Degraded Environment (C2D2E) • Consistent, timely and accurate all source intelligence product and Common Operating Picture • Maritime Operations in a degraded, interrupted or limited environment • Persistent and timely ISR	**Electronic warfare techniques & systems** • Adaptive and cognitive electronic warfare • Advanced persistent off–board EW • Advanced onboard EW • Multi-function apertures and architectures • Multi-channel broadband sensors and effectors • Precision geolocation • Quantum technologies for position, navigation, timing, magnetic and RF sensing
	System level optimisation • Automated reasoning and decision support • Coordinated hardkill/softkill • Onboard/off–board EW integration • Technologies enabling improved command and control in cyber and electromagnetic domains including denied/degraded GNSS environments
	Convergence of EW, communications, ELINT and cyber • Multi–role systems • Data correlation and fusion methodologies • Information integration and display
	Protected satellite and radio communications networks • Dynamic networking, optimisation & compression • Protected satellite communications • High data rate line–of–sight radio systems • Low probability of intercept/detection comms
	EM interference suppression and avoidance • TDMA timing methods, frequency filtering • Active signal cancellation
	Cyber vulnerability analysis and mitigation • Multi-level security systems, cryptographic tools
	ISR • ISR architectures and systems • Novel sensor systems, e.g. passive coherent location • Data collection analysis and fusion • Automated reasoning and decision support
	Marine Science • Environmental effects, marine acoustics
	Command Team Performance • Fatigue management • Decision making support, automation

Science and Technology Focus Areas

Mission Survivability in a High Threat Environment

The survivability of a maritime asset is a combination of the asset's susceptibility (the likelihood of being detected and engaged by threat sensors, platforms, and weapons), vulnerability (the ability to withstand damage) and recoverability (the ability to control damage and recover all or part of its capabilities).

The concept of survivability in the maritime domain is broadening to address evolving threats. Continued advancement in weapons technology is driving a need for improved countermeasure systems, and advanced ballistic, shock and blast protection for ADF vessels. The capability to maximise the survivability of platforms, systems and people by the use of layered defence in a high threat environment is vital. Understanding both offensive and defensive systems provides opportunities to develop systems and tactics to enhance survivability.

Mission survivability is also relevant to non-combat operations where a mission could be rendered unachievable through, for example, counter-detection of a submarine or accidental loads on a platform from a collision or grounding.

Science and Technology Support

Science and technology supports all elements of survivability through the provision of advice on susceptibility, vulnerability and recoverability and how to improve it. Research into elements of survivability will enable enhanced mission effectiveness by increasing abilities to anticipate, respond, avoid, withstand, and recover from actions by threat systems. This allows solutions to be fitted during asset/system acquisition and upgrades, and supports evolution of tactics, doctrine, and concepts of employment.

Research and development is grouped into the following topics:

- The whole spectrum of threat systems, including electronic warfare, cyber, chemical biological, radiological, nuclear, and more conventional threats such as collision, grounding, gun fire, sea mines, missiles, and torpedoes.
- Stealth, signature management and minimisation.
- Advanced platform, sensor, decoy, and countermeasure technologies and techniques of employment.
- ISREW systems and weapon technologies, systems and employment.
- Understanding of kinetic and non-kinetic effects and of the ability of platforms and systems to withstand and recover from them.
- Modelling, simulation and analysis of the whole survivability process, including layered defence, to support effective employment of maritime assets.

Mission Survivability in a High Threat Environment

Military Objective/Capability	Research Areas
• Freedom of manoeuvre without being detected (submarines) • Acquire enemy before detection (see first) • Defeat enemy before detection (kill first) • Avoid detection • Avoid weapon acquisition • Avoid being hit • Minimise capability loss (don't be killed) • Enhanced recovery	**Signature measurement, management and control** • Acoustic signatures • Radar signatures • Infra-red signatures • Magnetic signatures • Visible signatures • Exotic signatures **Sensor systems** • CBRN sensing • Integrated signature modelling • Sonar • Radio frequency and cyber • Electro–optical sensing including hyperspectral • Unmanned sensing platforms and systems **Self-protection systems** • Countermeasure development and validation • Onboard/off-board EW integration • Advanced persistent off-board EW **Weapon systems, effects and damage incidences** • Seekers, propulsion and control • Shock, ballistic, blast, fragmentation, fire and flooding protection, assessment and assurance • Vulnerability reduction measures • Advanced materials and fabrication technology **Recovery systems** • Damage control, modelling and technologies • Fire modelling, and suppression technology • Cyber vulnerability analysis and mitigation • Autonomous damage detection and recovery systems • Atmosphere habitability and platform endurance • Human performance **Mission Modelling, Simulation and Analysis** • System, tactical and operational • Integrated full spectrum survivability modelling **Communications** • Assured LPI communications

Science and Technology Focus Areas

Joint and Combined Maritime Operations

By 2018 Navy's objective is to generate and deploy flexible, scalable, self-supported and sustainable maritime task groups capable of accomplishing the full spectrum of maritime operations: from diplomacy and international engagement through humanitarian assistance and disaster relief, to constabulary operations, peacekeeping operations and warfighting against an adaptive peer adversary. This requires Fleet Command to transition from a fleet optimised for single-ship operations to one capable of Task Group level joint, expeditionary operations. In particular, in 2017 Australia will generate and certifiy its first Amphibious Task Group capability. This will drive the need for:

- Re-invigoration of warfighting capability following a substantial period of peacetime operations;
- A workforce that has the skills and competencies to deliver Navy's warfighting effects;
- An enhanced ability to operate in the littoral;
- Integration of task force elements within a task group, and the task group within Joint and Combined forces;

Priority: Task Group Operations – Continued advancement of operating and warfighting concepts, command and control concepts and capabilities, and tactics, techniques and procedures, to bring together current and future capabilities to achieve operational effectiveness as a task group oriented Navy.

Priority: Theatre Anti-Submarine Warfare – Development of the ability to conduct wide area Anti–Submarine Warfare outside the operating area of a supported maritime task force or task group, including surveillance, detection, localisation, tracking, reporting and, if required, prosecution of an adversary submarine using intelligence and long range sensors.

Priority: Integrated Air and Missile Defence – Development of the information integration and interoperability, tactics, techniques, procedures and training to enable the holistic, temporal, application of capabilities contained in the service's force-in-being, joint capabilities and other government agencies across a range of domains to remove or mitigate potential adversary air and missile threats.

Science and Technology Support

As the ADF steps up to task group operations, operations research and analysis support will need to step up too. Analysis of individual platforms and systems will be required to extend to task groups operations. Modelling and analysis will be needed to support the development of tactics, techniques and procedures, and will enable assessment of the capability of the current force. Exercise analysis will be needed to further support improvements to warfighting. Likewise, modelling and analysis will be needed to support the development of future concepts and evaluation of future capability gaps in a task group context. Scientific and technical support will be required to develop an understanding of the contribution of a task group to the joint force and will support development of the concepts and capabilities that will enable fully integrated and networked capabilities, such as Integrated Air and Missile Defence.

Joint and Combined Maritime Operations	
Military Objective/Capability	**Research Areas**
Strategic/Theatre Level Operations • Sea Denial and Sea Control • Decision superiority • Theatre Anti-Submarine Warfare • Strategic communications resilience and redundancy • Wide area, persistent and timely ISR	• Command and Control concepts and capabilities • Environmental assessment and exploitation • Concept exploration and evaluation through experimentation and wargaming • Communications and Information Assurance • Unmanned and autonomous platforms and systems • Wide area persistent surveillance and response
Operational/Force Level Operations • C2 structures and enablers to support force level Task Group constructs • Task Group Operations • Integration with combined task forces • Force level Anti-Submarine Warfare • Amphibious Warfare • Integrated Air and Missile Defence • Maritime Strike and Interdiction • Mine Warfare • Information Warfare • Electronic Warfare	• C2, planning, situational awareness and decision support tools and techniques • Environmental assessment and exploitation • Unmanned and autonomous platforms and systems • Wide area persistent surveillance and response • Baseline operational effectiveness through campaign assessment and force evaluation frameworks • Increased understanding of capability, effectiveness and operational manoeuvre through modelling, simulation and wargaming of operations
Tactical/System Level Operations • Local Anti-Submarine Warfare • Torpedo Defence • Littoral operations against a cluttered urban background • Amphibious Operations • Naval Joint Fires • Missile Defence • Tactical information management and networking • Force Protection	• Sensor technologies – radar, acoustic, IR, etc • Combat and mission systems • Weapons performance analysis • Aerospace systems effectiveness • Systems for data collection, analysis and fusion • Exercise analysis, operations analysis, modelling, simulation and wargaming to improve tactics, techniques and procedures • Advice on system performance, operational effectiveness and potential improvements • Air/surface interoperability • Information flow modelling and analysis

Science and Technology Focus Areas

Creating and Shaping the Future Force

The ADF will continue to develop future capabilities to achieve the operational outcomes directed by government. As a forward looking organisation in a rapidly evolving technological environment it will seek to stay ahead of potential adversaries through the identification, exploitation, and assessment of emerging/disruptive technologies.

As a result of the First Principles Review, the Department of Defence is restructuring to create a single end–to–end capability development function. Navy is determining a strategic cycle to align with the Defence Force Design and Force Structure Review processes, that ensures the Future Navy is equipped, supported and enabled to fight and win at sea in the Future Operating Environment. Navy will generate input and advice that effectively shapes and influences these processes to transform Tomorrow's Navy (Plan PELORUS) into the Future Navy. Chief of Navy's guidance for the force structure and capability planning necessary to achieve this transformation will be delivered in Plan Mercator, previously known as Plan Blue, and currently under development. Plan Mercator will have at least a 20 year horizon.

Science and Technology Support

Operations research and analysis will support the determination of future needs through capability assessments and gap analysis, to provide objective evidence for capability decisions and to maximise the operational effectiveness of future maritime capabilities.

Science and technology will shape Defence's strategic planning, and safeguard Australia against the strategic shock of emerging and disruptive technologies, through the delivery of high–quality, science–based technology foresight, forecasting and futures.

Strategic research will be conducted in key areas that are likely to provide a game–changing capability for Defence in the longer term, such as cyber warfare, future electronic warfare, future undersea warfare, hypersonics, integrated Intelligence Surveillance and Reconnaissance, autonomous systems, space systems, and signatures, materials and energy.

Creating and Shaping the Future Force

Military Objective/Capability	Research Areas
• Development of a future force to meet operational outcomes directed by Government • Capability decisions based on objective evidence • Future focused concepts and capability	• Force design and capability needs analysis • Horizon scanning • Technology foresighting • Big picture analysis • Capability gap analysis
	Strategic research in key science and technology areas: • Cyber warfare • Future electronic warfare • Future undersea warfare • Hypersonics • Integrated Intelligence, surveillance and reconnaissance • Signatures, materials and energy • Autonomous systems • Space systems

Science and Technology Focus Areas

Seaworthy and Airworthy Fleet

Plan Pelorus states that in 2018 the Navy will have a seaworthy fleet of ships and submarines, and an airworthy fleet of helicopters. This is critically important to ensure maritime capability that delivers Government–directed operational outcomes, be it security through sea control and force projection, community aide, humanitarian relief or demonstrable warfighting expertise[1].

Defence seaworthiness and airworthiness management systems address maritime mission systems and their enabling support systems at all stages of the Capability System Life Cycle[2] and take into consideration all Fundamental Inputs to Capability (FIC)[3].

- The seaworthiness management system focuses on assuring three outcomes: operational effectiveness, safety and environmental protection. Operational Effectiveness is the ability of a Mission System (or multiple Mission Systems within a Task Group) to safely and sustainably do what it is meant to do, when and where it is needed, with qualified and competent people and enabling support systems[4].
- Airworthiness addresses the suitability for flight of an aircraft from two perspectives: technical airworthiness which considers all aspects of the design, manufacture and maintenance of an aviation system; and operational airworthiness which ensures the safe operation of Defence aircraft[5].

Priority: Enhanced Current Capability – Enhancement of current platforms and mission systems to ensure maximum performance and operational effectiveness.

Science and Technology Support

Science and technology support is required at all stages of the capability life cycle to provide assurance that the current and future fleet is fit for purpose and sustainable for all future missions. At the early stages tools and assessment methods are required to ensure future maritime assets meet the ADF's needs without any capability gaps. This ranges from asset design through to overall performance analysis. Once in service it is critical that the fleet is operating effectively in a safe and efficient manner for the duration of the missions. Science and technology support is required to provide confidence in the ability of the assets and associated systems to sustain the warfighting mission with minimal risk to the environment and crew.

Throughout the life of a platform it is likely that upgrades or refits are proposed which enhance the ADF's capabilities to provide them with a capability edge. The integration of new proposed technologies onto the current assets requires understanding of both asset performance and operational effectiveness.

Research and development in this focus area encompasses the following topics: Structural integrity (including material selection, failure analysis, structural fatigue, corrosion and corrosion prevention); seakeeping and manoeuvrability for both individual vessels and vessel to vessel interaction, launch and recovery of off–board systems; power and energy systems and performance; platform performance; environmental compliance and standards; human fatigue and safety; and reliability, availability and maintainability of systems as well as data collection and analysis of performance data.

1. Fleet Seaworthiness Strategy 2015 – 2018, RAN
2. Capability Life Cycle includes Needs, Requirements, Acquisition, In–Service, and Disposal
3. FIC – personnel; organisation; collec1ve training; major systems; supplies; facilities and training areas; support; and command & management.
4. Defence Seaworthiness Management System, DI(G) ADMIN 10–10
5. Defence Aviation Safety Program, DI(G) OPS 02–2

Seaworthy and Airworthy Fleet

Military Objective/Capability	S&T Research Areas
• Seaworthy fleet of ships and submarines • Airworthy aircraft • Operational effectiveness • Environment protection • Safety • Sustainable operations	**Structural Integrity** • Ultimate strength of intact and damaged structures • Through life structural assessments • Failure mechanisms and analysis • Corrosion mechanisms and protective systems
	Seakeeping and Manoeuvrability • Environmental loads analysis • Vessel to vessel interactions • Modelling and simulation of launch and recovery systems
	Power and Energy • Power system optimisation • Battery performance and safety • Electric ship systems • Power and energy system reliability
	Environmental Compliance • Nitrogen and sulphur oxides • Biofouling coatings • Sonar impact on marine animals
	Human performance and safety • Human Machine Interface • Work systems and routines • Ergonomics • Physical employment standards
	Reliability, Availability, and Maintainability • Failure predictions • Data analysis • Sensor systems • Explosive Ordinance lifing and failure mechanisms

Delivering the Science and Technology

DST Group is a national leader in safeguarding Australia by delivering valued scientific advice and innovative technology solutions for Defence and national security. Its core roles are centred around providing expert and impartial advice and support for the conduct of operations, for the current force, and for acquisition of future Defence capabilities. *See diagram below.*

DST Group focuses its research on areas where it has extensive, unique domain knowledge and science and technology excellence, and where Defence must retain a sovereign capability. Its core strategy emphasises the essential role of external partnering to strengthen its ability to integrate knowledge and innovation for Defence and national security capability.

DST Group accesses and leverages world–leading science, technology, knowledge and innovation, through collaboration with industry, academia and international agencies. DST Group works closely with these partners in order to provide quality advice and innovative solutions for Defence and national security.

DST Group Roles

Defence Innovation

The DWP 16 heralds a new approach to Defence innovation, focused on promoting the strong partnerships and collaboration necessary to maximise the benefit for Australia's capability. A new virtual Defence Innovation Hub will replace existing separate programs to help deliver a capability edge to Defence through innovative technologies. The Hub will be managed by Defence to focus innovation activities on priority capability development requirements. In addition, there will be further investment through a New Generation Technologies Fund to respond to strategic challenges and develop the next generation of game–changing capabilities. The DST Group will lead this research in collaboration with academia, publicly funded research agencies, Australian defence industry, and its international counterparts.

Definitions and Acronyms

ADF	Australian Defence Force
Airworthiness	is a concept, the application of which defines the condition of an aircraft and supplies the basis for judgement of the suitability for flight of that aircraft in that it has been designed, constructed, maintained and operated to approved standards and limitations, by competent and authorised individuals, who are acting as members of an approved organisation and whose work is both certified as correct and accepted on behalf of Defence. DI(G) OPS 02–2
ASW	Anti Submarine Warfare
C2	Command and Control
Combined	Forces of two or more allied nations, acting together for the accomplishment of a single mission.
Comms	Communications
Decision Superiority	The ability to make and implement more informed and more accurate decisions at a rate faster than the adversary.
ELINT	Electronic Intelligence
EM	Electromagnetic
EW	Electronic Warfare
GNSS	Global Navigation Satellite System
EA-18G Growler	electronic warfare attack aircraft
ISR	Intelligence, surveillance and reconnaissance
Joint	Activi1es, operations and organisations in which elements of at least two Services par1cipate.
LHD	Landing Helicopter Dock amphibious ship
LPI	Low Probability of Intercept
Maritime Operations Support Capability	Auxiliary Oiler Replenishment (AOR) – provides afloat logistics support to Fleet units to extend their endurance and operational range
MH-60R	Seahawk 'Romeo' helicopters
MTUAS	Maritme Tactical Unmanned Air System
S&T	Science and Technology
Seaworthy	A mission system is seaworthy if its operation in accordance with its statement of operating intent: a. maximises the likelihood of achieving the specified operational effect for the defined tasking where b. efforts have been made to eliminate/minimise the hazards/risks to personnel, the general public, and the environment so far as is reasonably practicable. A judgement as to whether the state of the materiel, personnel, logistical, organisational, and informational requirements of a unit are sufficient to achieve specified mission outcome(s). Defence. DI(G) ADMIN 10-10
Survivability(system)	The capability of a system to avoid or withstand a hostile environment without suffering an abortive impairment of its ability to accomplish its designated mission.
TDMA	Time Division Multiple Access
MQ-4C Triton	Unmanned Aerial Vehicle (UAV)
UAV	Unmanned Aerial Vehicle

For further information
please contact the
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