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MARITIME MULTI-MISSION AIRCRAFT (M3A) STATEMENT OF OPERATIONAL REQUIREMENTS (SOR)

Edition A Version 1

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NATO LETTER OF PROMULGATION

2 June 2020

1. The enclosed Allied Naval Engineering Publication ANEP-4840, Edition A, Version 1, MARITIME MULTI-MISSION AIRCRAFT (M3A) STATEMENT OF OPERATIONAL REQUIREMENTS (SOR), which has been approved by the nations in the NATO Naval Armament Group (NNAG), is promulgated herewith. The recommendation of nations to use this publication is recorded in STANREC 4840.

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RECORD OF SPECIFIC RESERVATIONS

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C. SH/PLANS/JCAP/ FCP/16-311533 and 5000/FPR-0460/TTE151451/ NU00083, Bi-SC Capability Codes and Capability Statements, 28 January 2016

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1 Introduction

1.1 Aim

The aim of this document is to provide the Statement of Operational Requirement (SOR) for NATO Maritime Multi-Mission Aircraft (M3A) capabilities (M3A SOR).

1.2 Current Situation

NATO's Maritime air forces have gone almost two decades without encountering a significant submarine threat. However in light of emerging technologies and recent trends in non-NATO submarine operations in the European theatre and around the world the requirement for a proficient NATO' M3A force is becoming more clear. Unless NATO retains an Anti-Submarine Warfare (ASW) competency, there is growing risk the Alliance will find itself unprepared to capably respond to a potential increase in non-NATO submarine operations. It is in this context that ASW was identified as one of the critical capability shortfalls at the 2014 Wales Summit and reaffirmed at 2016 Warsaw Summit. One of the key components of NATO's ASW competency is the M3A force which provides fixed-wing, long range, ASW and Intelligence, Surveillance and Reconnaissance (ISR) capabilities.[1]

Traditionally the M3A force was primarily employed in the maritime context, however, as ISR capabilities have evolved and submarine threats have increased their capability to operate in littoral regions, M3A forces have increasingly seen employment in non-traditional roles, often operating overland. Moreover, as technologies have evolved there has been increased development of maritime surveillance capabilities, both manned and unmanned, that complement ASW capabilities.[2]

M3A capabilities include those that primarily contribute to maritime surface and air domain situational awareness. These platforms provide range of maritime-related ISR capabilities to develop a comprehensive surface and air picture. Sensor capabilities typically include visual, electro-optical, infrared, radar (regardless of whether the radar has an imaging capability), and potentially including an electromagnetic detection sensors to aid in correlating ISR data to identify targets of interest. M3A also include ASW capabilities such as acoustic and magnetic anomaly detection and track capabilities, and have the ability to engage and

[1] Alliance Airborne Anti-Submarine Warfare: A Forecast for Maritime Air ASW in the Future Environment, Joint Air Power Competence Centre Report, June 2016 (JAPCC Report, Maritime Air ASW).

[2] JAPCC Report, Maritime Air ASW.

destroy subsurface targets with bombs, mines, depth charges or torpedoes. M3A platform can optionally be fitted with air-to-surface weapons such as missiles or bombs that may be used in maritime, littoral or overland contexts.[3]

1.3 Forecast Deficiency

NATO's M3A force will have a significant capacity challenge in the near term. Unless a solution is formulated, the Alliance runs the risk of being unable to maintain the required levels of maritime situational awareness (MSA) of submarine activity. The Defence Investments Division of the International Military Staff, working in conjunction with ACO and ACT, is developing a roadmap to identify areas that may be addressed by each nation to mitigate capability shortfall challenges identified at recent NATO Summits. A significant amount of work has been put into developing the ASW roadmap. The current version of the roadmap further divides ASW into three mission areas: M3A (aka MPA in the roadmap), Submarine, and Surface Ships. The roadmap identifies the NATO ASW community is experiencing challenges resulting from a reduced M3A inventory. A NATO Industrial Advisory Group (NIAG) study group report completed in June 2012 (SG-166) similarly highlights that many NATO nations current M3A platforms will reach the end of their service life in the mid to late 2020s which will exacerbate the challenge if left unresolved. Each nation is faced in internal budgetary challenges to be balanced against the perceived threat to the nation and their ability to provide collective security to the Alliance. Consequently, multi-national cooperation in M3A capabilities is considered an enabler towards fulfillment of NATO capability obligations more efficiently[4,5]

Recognizing that NATO identified a requirement for M3A capabilities with corresponding NATO Defence Planning Process (NDPP) for many Allies and acknowledging that the associated capability areas of ASW and Joint ISR (JISR) constitute two complementary and important NATO priorities six member nations signed a Letter of Intent (LoI) expressing their intent to investigate options for cooperation on multinational M3A capabilities.[6] These nations committed to

[3] JAPCC Report, Maritime Air ASW.

[4] JAPCC Report, Maritime Air ASW

[5] NIAG SG-166

[6] Letter of Intent Concerning Cooperation on M3A Capabilities, 29 June 2017 (M3A LoI)

multinational cooperation over a broad spectrum of work strands across the entire DOTMLPFI spectrum.[7] The Signatories intended to:[8]

a. Share their national planning assumptions with regard to future operational requirements and the development and fielding or replacement capabilities;

b. Initiate, on the basis of this information sharing, a comprehensive evaluation of the full spectrum of opportunities for cooperation in provision of current and future M3A capabilities with a primary focus on ASW requirements;

c. Leverage ongoing work pursued by existing multinational cooperation efforts (e.g. under Smart Defence or the Framework Nation Concept) in this domain;

d. Leverage existing cooperation frameworks, in particular for involving the Science and Technology community and engaging industry;

e. Ensure alignment with NATO's JISR architecture and in particular coordination with NATO's Alliance Future Surveillance and Control effort; and

f. Ensure coordination and seek synergy with related work strands conducted by the European Defence Agency.

1.4 Missions and Roles

For the purposes of the M3A SOR and consistent Allied doctrine M3A capability will be defined as that which enables long-duration operations, primarily over-water in a maritime context, to meet a number of core and collateral missions. [9] M3A are capable of conducting overland operations, and often do so in littoral environments in support of maritime forces. They fulfill these missions employing dual purpose capabilities associated with the core and collateral missions. Consequently, while M3A are capable of overland missions the M3A SOR is focused on the maritime domain and does not outline specific capabilities for the overland domain.

Table 1 outlines the missions and roles. The associated capability codes for M3A capabilities are found at Annex B and C. The core missions reflect those

[7] Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities, Interoperability

[8] M3A LoI

[9] NATO Industrial Advisory Group Study Group 166 (SG-166),Workshop/Study on Maritime Patrol Aircraft, 30 June 2013 (NIAG SG-166).

traditionally assigned to MPA. The collateral missions reflect missions that M3A are able to conduct by virtue their inherent capabilities for the core mission and which often occur in the maritime or littoral domain. M3A may receive additional training and mission specific equipage to conduct these collateral missions. Both the core and collateral missions are based on an amalgam of the Bi-SC Agreed Capability Codes and Capability Statements (CC&CS) [10] and M3A roles as defined in NIAG SG-166[11] and are not intended to change or conflict with NATO Publication ATP-1 for the definition of M3A.[12]

Table 1 M3A Roles

Mission	Roles
Find, Fix, Finish ASW (Core)	• Anti-Submarine Warfare • Underwater Surveillance and Reporting • Environmental Characterization[13] • Marine Mammal Monitoring[14]
Find, Fix, Finish AsuW (Core)	• Surface Surveillance and Reporting • Over the Horizon Targeting (OTH-T) • Anti-Piracy (at sea) • Fisheries Patrol • Anti-Shipping • Anti-illegal Activity (smuggling, poaching, migration)

[10] Bi-SC Capability Codes and Capability Statements (CC&CS), 26 January 2016 (Bi-SC CC&CS).

[11] NIAG SG-166.

[12] Note: ATP-1 uses the term Maritime Patrol Aircraft (MPA), however, the broader term M3A is used here to reflect the increasingly wider mission set taken on by traditional MPA platforms.

[13] As required to enable sensor employment.

[14] As required to enable use of active sonars.

Mission	Roles
Maritime ISR (Core)	• Surface Surveillance and Reporting • Image collection • Electronic Warfare
Joint Personnel and Recovery (JPR) (Collateral)	• Search and Rescue (SAR) Operations*
Support to Special Operations[15] (Collateral)	• Support to Special Operations Forces • Other specialized, mission tailored capabilities • Transport and para-drop of cargo and personnel
Airborne Mine Warfare[16] (Collateral)	• Naval Mine Laying Covert • Naval Mine Laying Overt • Harbour Protection Module

1.5 Range, Endurance and Speed

The classification of M3A as either Long Range or Tactical Range is based on the Naval Operations Air Delivery codes and associated Principal Capability Statements for Naval Long Range Air Delivery (NLRAD) and Naval Tactical Range Air Delivery (NTRAD).[17] Long Range M3A correspond to capabilities that remain on station a minimum of 6 hours when operating at a range of 500 NM from the Main Operating Base (MOB) or Forward Operating Base (FOB) with a minimum transit speed of 250 knots with a minimum sustained speed of 200 knots.[18] Tactical Range M3A corresponds to capabilities that remain on station a minimum of 3 hours when operating at a range of 120 NM MOB/FOB with a minimum transit

[15] M3A capabilities are not specifically targeted for support to Special Operations Forces, however, their inherent JISR capabilities, payload capacity, modularity and re-configurability provide the basis for a collateral support capability. These codes are included as they are informative of the capabilities required to support Special Operations.

[16] Airborne mine laying is a traditional role for M3A capabilities. While these codes are not specifically targeted at M3A they are informative regarding the capabilities NATO requires to effectively conduct mine laying, whether covert or overt.

[17] Bi-SC CC&CS

[18] Naval Long Range Air Delivery (NLRAD) as defined in Bi-SC CC&CS

speed of 120 knots.[19] For operation in close proximity to a MOB/FOB Tactical Range M3A can complete the same missions as Long Range M3A albeit with less efficiency (i.e. more aircraft to maintain the same coverage). However, as the range to the operations area increases the transit time of Tactical Range M3A becomes a high proportion of sortie duration, rendering these capabilities less efficient.

M3A capabilities may be fielded in a variety of forms including, but not exclusively, manned aircraft. While an individual M3A can be called upon to conduct many of the above roles within a single mission, not all M3A will be capable of all these roles at all times. Rather some M3A will be based on the concepts of modularity and re-configurability to enable an aircraft to be re-roled between missions for specific roles.

1.6 Scope

This NATO M3A SOR is the key component in a systemic, full-spectrum approach to addressing the NATO M3A shortfall. The M3A SOR identifies the full range of requirements to towards fielding an effective M3A capability. These capabilities should be viewed as one critical component of a multi-layered system of systems approach to resolving NATO's ASW/ISR challenge. This future systems-of-systems will include, M3A platforms, satellites, UAVs, UUVs, and other sensor systems that will contribute to maritime situational awareness in order for NATO Commanders to make timely and effective decisions within a NATO defined area of operations.

The M3A SOR addresses the LoI objectives by leveraging previous and ongoing multinational cooperation efforts with regard to sharing of planning assumptions and future operational requirements. The SOR is aligned with the NDPP, the JISR architecture and the Alliance Future Surveillance and Control effort.

1.7 Constraints

Due to the vast scope of M3A capability it is difficult to embody all the capabilities into a single platform.

[19] Naval Tactical Range Air Delivery (NTRAD) as defined in Bi-SC CC&CS

2 Design Concept and Guidance

Conceptually M3A capabilities are composed of four segments: air, ground, network and support. This conceptual framework provides a basis for understanding the High Level Operational Requirements, which relate to more than just the physical air platform. In some instances, some of the segments, such as the ground and network segments, will be delivered by joint or combined means.

2.1 Air Segment

The air segment entities provide an aircraft equipped with a variety of systems to enable execution of the mission. The M3A air segment will be a rugged, maritime-oriented vehicle capable of operations from MOBs and FOBs. The M3A will provide the necessary equipment and facilities to allow the crew to perform long endurance missions (toilets, galley, etc.). The M3A will be enabled with a variety of sensors. Sensor systems constantly evolve with technology as noted in Annex A. Some examples of sensors include radar, radio direction finding, EO/IR, night vision goggles (NVG), visual observation using gyro-stabilized binoculars, digital photography, laser illumination/imaging/ designation, UAS control, acoustics, electronic warfare (anti-radar, anti-radio, intelligence gathering and direction finding) , communications intelligence and magnetic anomaly detection. Radar capabilities can include air-air and/or air-surface, as well as synthetic aperture and ground-moving target indication. The M3A will be capable of carrying an appropriate combination of bombs, torpedoes, sonobuoys, missiles, depth charges and other ordinance carried in either internal storage bays, external hard points or a combination of both. It may also be capable of carrying external sensor pods. This segment includes, but is not limited to:

a. Aircraft (Platform);

b. Communication, Navigation, Surveillance and Air Traffic Management Systems;

c. Mission Data Management Systems;

d. Sensor Systems;

e. Ordnance Systems;

f. Weapon Systems;

g. Data Links;

h. Identification Systems; and

i. Self Defence Systems.

2.2 Ground Segment

The ground segment includes NATO Maritime Multi-Mission Aircraft Support Centres (MMSC),[20] national Mission Support Centres (MSC) and Processing, Exploitation and Dissemination (PED) entities that have capabilities appropriate to the supported command and/or operation. It also includes Aircraft Operational Mission Support (AOMS) systems that provide the interface between aircraft systems and the MMSC/MSC. This segment includes:

a. National fixed Mission Support Centres;

b. National deployable Mission Support Centres or Aircraft Operational Mission Support (AOMS);

c. NATO Maritime Multi-Mission Aircraft Support Centres (MMSC);

d. National Processing, Exploitation and Dissemination (PED) entities; and

e. NATO Processing, Exploitation and Dissemination (PED) entities.

The inter-relation of the various entities of the ground segment is further described in the Concept of Support (CONSUP) in a subsequent section.

2.3 Network Segment

The network segment systems external to the air vehicle, ground and support segments provide the overall connectivity in a systems of systems approach. This includes:

a. Beyond Line of Sight (BLOS) communication links;

b. Line of Sight (LOS) communication links; and

c. Network infrastructure to connect from the BLOS and LOS ground entry stations to the Ground and Support Segments.

2.4 Support Segment

The support segment entities will consist of facilities, installations, equipment and personnel needed to support the air, ground and network entities, including training of operators, maintenance, and other necessary personnel. This segment includes:

a. Training Systems;

[20] Being developed under Smart Defence Initiative 1.43.

b. Maintenance Data Management Systems;

c. Maintenance personnel and facilities;

d. Transportable Ground Auxiliary Equipment; and

e. Logistic support and supply chains.

2.5 Concept of Operations

A typical M3A mission will begin with pre-flight maintenance action to prepare the capability for flight. The aircrew will be briefed by the maintenance crew on any malfunctions and the crew will assess the impact to the mission. The aircrew will attend a pre-mission briefing based on Tasking Authorities' orders and prepared and given by mission support personnel. After the briefing, the aircrew will proceed to the aircraft taking mission documentation and necessary equipment. The aircrew will conduct a pre-flight inspections, loading the mission systems and verify mission parameters and weapons stores. Once the appropriate clearances are obtained the aircrew will transit to the assigned area of operations and safely and effectively employ the aircraft, sensors, communications, navigation, and data management equipment to satisfy the mission requirements. Within a single sortie an M3A may conduct one or all of the missions as dictated by the situation. During the sortie data may be exchanged between assets as necessary to build a common operating picture. In case of system malfunctions while airborne, the M3A crew may conduct minor troubleshooting procedures as detailed within the aircraft operating instructions. Upon mission completion, the M3A will return to base where the aircrew will report any anomalies and malfunctions to the maintenance personnel if not already reported in flight. Selected mission data will be sent when required to the MSC. Recorded mission data from the various sub-systems will be removed and delivered to mission support personnel for extraction and analysis. The aircrew will debrief mission support personnel of any significant events and complete the required post-mission report. The mission support personnel will then ensure the processing, exploitation and dissemination of the collected mission data.

2.6 Concept of Support

The ground segment entities support M3A operations through the Concept of Support (CONSUP). The CONSUP outlines the inter-relation of the MMSC/MSC, PED entities, and AOMS is detailed in Figure 1.

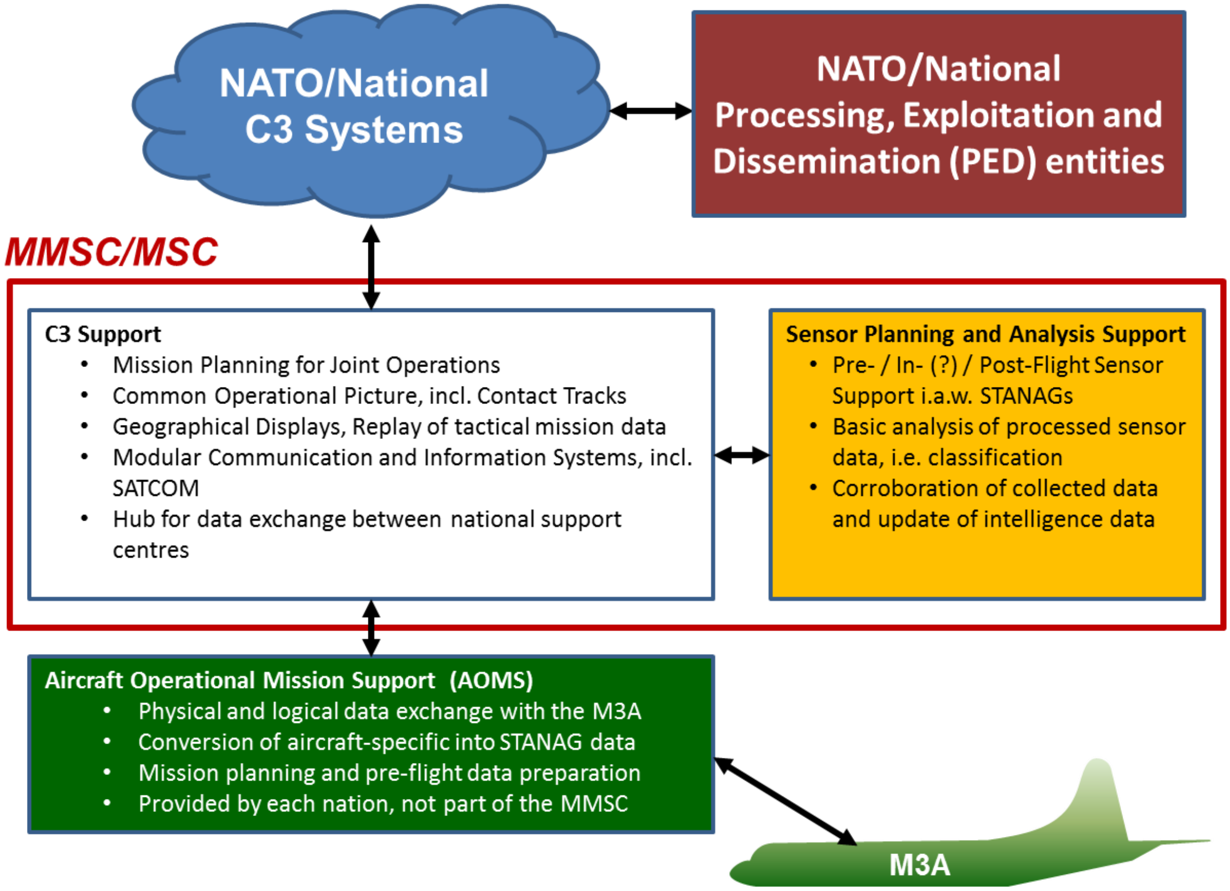

Figure 1. Ground Segment Concept of Operations.

The MMSC/MSC will provide mission planning, mission support, and post-mission analysis capabilities. The MSC will include fixed and deployable configurations. Each MMSC/MSC entity will have the capability to support additional M3A capabilities. Processing, Exploitation and Dissemination (PED) entities will support users from strategic to tactical echelons with data from the M3A capability. Each PED and MMSC/MSC entity will have the capability to request, receive, process, store, correlate, display, analyse, and exploit mission and sensor data, exploited products, and will support dissemination of data and information into connected interoperable NATO and/or National systems. The AOMS provides the interface between aircraft systems and the MMSC and is a national responsibility. These systems provide contributing nations the ability to triage, format and share data with the MMSC using STANAG compliant and/or commercial standard interfaces.

2.7 Interoperability

A key requirement for the M3A capability, and all its segments, is interoperability with various NATO and national systems to support exchange and collaborative use of surveillance data and information. The M3A will enable interoperability by building on NATO Standardisation efforts, incorporating appropriate STANAGs to which all interoperable systems must adhere. The M3A will also be interoperable with a variety of NATO C2 and ISR systems. These interoperability requirements of the M3A will inherently enable the capability to support the emerging NATO Network Enabled Capabilities (NNEC) as a major provider of data and information.

2.8 Avionics, Mission and Sensor Systems

In order to conduct its missions M3A platforms will be fitted with avionics (communication, navigation), mission and sensor systems that will enable the M3A capability. Annex A provides an overview of extant avionics, mission and sensor systems, as well as ground support systems, and provides an assessment of current trends in technology. This annex is not meant to be prescriptive but rather simply outlines a range of options to provide M3A capability.

In general, sensors can be broadly classified as passive or active. Passive sensors detect emissions from a target or its influence on the environment without the emission of energy from the sensor and consequently are normally considered covert sensors. Conversely, active sensors employ emissions to detect a target or its influence on the environment and are typically overt sensors. Active sensors can be further classified as monostatic, bi-static or multi-static. Monostatic active sensors have the source and receiver collocated in a single location. Bi-static active sensors have a source and receiver pair in two separate locations. Multi-static active sensors may have multiple sources and receivers, all of which may be deployed in separate locations or in some cases collocated. Multi-static sensors are by their active nature overt sensors but due to the number and separation of source and receiver pairs, often provide a measure of confusion to targets and can therefore conceal the intentions of the sensor employer.

Traditional and current passive sensors include visual, electro-optical, infrared, electronic support measures, magnetic anomaly detectors, and passive acoustic systems. Active sensors include active sonar, identification friend or foe and radar systems (regardless of whether the radar has an imaging capability). At present, multi-static technologies are largely focused on acoustic capabilities, however, bi-static and multi-static radars and other active systems are currently under development.

Identification systems (IFF interrogator, AIS…) also play a major part in building the RMP.

2.9 Modularity and Re-Configurability

M3A mission and sensor system characteristics can be considered generically so that they can be modular, re-configurable, platform agnostic, and amenable to compliance with an Open Architecture. This approach will allow nations to harmonize mission system requirements where different platforms are selected to meet national objectives, but where common systems are desired for interoperability and logistical considerations. It will also allow individual platforms to be re-configured in-flight or quickly before flight to meet changing mission needs. A modular and re-configurable approach will also allow for the integration of new capabilities on shorter timescales. Annex A provides additional details on this trend in system design.

2.10 Future Growth

In view of the fact that warfare will continue to morph or refocus in response to evolving technologies or emerging threats, the M3A must have capacity to grow its capability, sensors and means over time. Some perceivable future capabilities applicable to the M3A could include:

a. directed energy weapons;

b. LIDAR imaging;

c. anti-shipping mine detection/destruction systems;

d. Enhanced Synthetic Vision System (ESVS);

e. quantum technologies;

f. Radar imaging of airborne targets; and

g. others.

It is desirable that the M3A accommodates a payload growth over the life of the aircraft (with all consequences on power and real estate to be considered). It is essential that the avionics systems have the capacity for growth in terms of power, air conditioning, networking, Central Processing Unit (CPU) utilization, memory space, bus utilization and input/output (I/O) controlling.

3 High Level Capability Requirements

3.1 Foreword

3.1.1 Levels of Requirement.

There are two levels of requirement for this SOR:

Mandatory Requirements.

Capability elements without which overall operational capability is unacceptably diminished. Operational mitigation is not possible and/or operational risk is unacceptably high. The term “shall” identifies these requirements.

Rated Requirement.

Capability element which is not part of the core (mandatory) capability list but is highly desirable to some Nations and without which, overall operational capability is diminished. Operational mitigation is required and/or these Nations must accept a level of operational risk. The term “should” identifies these requirements.

3.1.2 NATO requirements vs National requirements

The mandatory capability requirements listed in this document represent the minimal core of capabilities defining a NATO Maritime Multi-Mission Aircraft. Some nations may want to add extra capabilities (e.g. those listed as rated) or extend those listed as mandatory to meet their national requirements (e.g. extended range requirement to match their domestic Area Of Interest).

3.1.3 Use of NATO capability codes

The NATO Bi-SC Agreed Capability Codes are provided for reference only. The desired capability may be an extension or contraction of the referenced capability and its description may therefore differ from the one provided in the Bi-SC document.

3.2 General

The principle objective of the M3A capability is to be an integrated and interoperable contributor within a system-of-systems approach providing maritime domain awareness. To achieve this objective an M3A must comply with a number of High Level Capability Requirements each of which as derived from capstone capability, common principal and common enabling statements from the Bi-SC Agreed Capability Codes and Capability Statements.[21] These requirements can be viewed in terms of four generic capabilities and six mission specific capabilities.

- Generic M3A Capabilities
  - Operate;
  - Communications, Command and Control;
  - Interoperability; and
  - Plan, Collect, Process and Store Data.
- Mission Specific Capabilities
  - Find, Fix and Finish ASW;
  - Find, Fix and Finish ASuW;
  - Maritime ISR;
  - Joint Personnel Recovery;
  - Support to Special Operations; and
  - Airborne Mine Warfare.

3.3 Generic M3A Capabilities

The generic M3A capabilities describe the common capabilities required regardless of the assigned mission and include Operate, Communicate Interoperate, and Collect, Process and Store data as described below.

3.3.1 Operate

M3A shall be capable of deploying worldwide to conduct persistent maritime airborne operations, day and night, and in all weather and climatic conditions. The M3A shall conduct missions in both permissive and contested environments and including CBRN conditions.

3.3.2 Communications, Command and Control

M3A shall be capable of receiving and disseminating information and intelligence to military and civilian organisations, platforms, systems and applications in a manner necessary to carry out the M3A function. The M3A shall be capable of line

[21] CC&CS.

of sight and beyond line of sight communications, through secure (national and NATO) and non-secure means in order to network within a system-of-systems.

3.3.3 Interoperability

M3A shall be capable of interoperating with organizations, platforms, systems and applications necessary to conduct an M3A mission. While related to the ability to communicate, the ability to interoperate goes beyond just communications and information sharing. It includes all aspects of being able to work with Allies and other partners in a robust, secure and sustainable manner.

3.3.4 Plan, Collect, Process and Store Data

M3A air and ground segments shall be capable of planning, collecting and processing mission data in order to exploit it in near real-time for mission execution. It shall also be capable of fusing the data with other externally collected data, conducting detailed post-mission exploitation, and storing and archiving data for future use.

3.4 Mission Specific Capabilities

The six mission specific capabilities describe those capabilities that are derived from the intended mission of the M3A platform.

3.4.1 Find, Fix, Finish ASW

M3A shall be capable of executing operations denying the enemy the effective use of their submarines in any maritime environment.

3.4.2 Find, Fix, Finish ASuW

M3A shall be capable of executing operations in any maritime environment to detect, identify and counter an adversary’s naval surface capability.

3.4.3 Maritime ISR

M3A shall be capable of conducting intelligence, surveillance and reconnaissance operations in order to detect, classify, identify, track, and collect on targets in all weather conditions, day and night, in a maritime environment using passive and active sensors.

3.4.4 Joint Personnel Recovery

M3A shall be able to support the recovery of personnel in the maritime and/or overland environment, to include the ability to deploy survival equipment and/or effectively assist located survivors until recovered.[22](

3.4.5 Support to Special Operations

M3A shall be able to support Special Operations with specific and/or residual capabilities which should include C2 capability, the transport and para-drop of cargo and personnel, support to Special Operations Forces and other specialized, mission tailored capabilities.[23]

3.4.6 Airborne Mine Warfare

M3A should be capable of laying mines.

4 Detailed Capability Requirements

The High Level Capability Requirements can be further decomposed into Detailed Capability Requirements. This decomposition serves as a means to describe the M3A capability in further detail. In the sections that follow the detailed requirements have been drawn from previous work of the M3A Specialist Team, NATO Industrial Advisory Group Study 166 and the Bi-SC Capability Codes and Capability Statements. Cross-references are provided where available.

4.1 Operate

4.1.1 General.

M3A shall be capable of:

4.1.1.1 Deploying worldwide executing long range maritime airborne operations, including civilian airfield and military airbases.

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[22] M3A are not specifically targeted within the NDPP for Joint Personnel Recovery operations, however, as an C2 and ISR platform M3A can be expected to contribute to these operations using its collateral ISR capability.

[23] M3A are not specifically targeted within the NDPP for Support to Special Operations, however, as an C2 and ISR platform M3A can be expected to contribute to these operations using its collateral ISR capability.

4.1.1.2 Executing ASW, ASuW and Maritime ISR as core mission.

4.1.1.3 Operating day and night, and in all weather and climatic conditions.

4.1.1.4 Conducting missions in both permissive and contested environments.

4.1.1.5 Operating in a hostile and/or dense electromagnetic (EM) environment.

4.1.1.6 Capable of safe and expeditious access to segregated and non-segregated airspace based on operational and technical requirements (with appropriate avionics).

4.1.1.7 Capable of surviving and operate in CBRN environments (.

4.1.1.8 Capable of secure automatic query of and response to external electronic interrogation by military and civilian ground, shipborne and airborne interrogators (such as AIS). (

4.1.2 Range/Endurance/Speed.

4.1.2.1 An individual M3A capability shall have sufficient range, endurance, and speed to provide the necessary coverage in a joint operations area (JOA) with a suitable weapons and ordinance load (torpedoes, sonobuoys, markers, flares….). Ideally, an M3A shall have long range, long endurance and be capable of high speeds to rapidly transit to the JOA, as defined below. However, it shall also be capable of slower on station speeds, as required by operations.

4.1.2.2 Long Range. Long range M3A shall be capable of a minimum of 6 hours time–on-station when operating 500 NM from any base of operations. They shall also be capable of maintaining a transit true air speed of at least 250 knots and of sustaining a speed of at least 200 knots while on station with full manoeuvrability. Long range M3A should be capable of loiter speeds of lower than 200 knots for the conduct of operations.

4.1.2.3 Tactical Range. Tactical range M3A shall be capable of a minimum of 3 hours time-on-station when operating 120 NM from any base of operations. They shall also be capable of maintaining a transit speed of 120 knots with full manoeuvrability. Tactical range M3A should be capable of loiter speeds of lower than 120 knots for the conduct of operations.

4.1.2.4 Altitude. The M3A is expected to operate from sea level to high altitudes over the range of environmental conditions as required to maximize its capabilities in the execution of the mission.

4.1.2.5 The flight envelop shall meet the weapon / mission system requirements and allow the weapon / sensors / mission system to be operated at their maximum efficiency parameters.

4.1.2.6 Crew Accommodation. The aircraft must provide the highest possible degree of comfort, to lessen the crew's fatigue, and thus enhance their efficiency on the long patrols which are envisaged. Good lookout facilities and well-planned tactical stations are essential. Adequate rest arrangements for off-watch crew-members, and efficient soundproofing are necessary.

4.1.3 Environmental

4.1.3.1 General. The M3A shall be capable of operating day and night in environments ranging from desert to littoral to continental and arctic climates. Within these climates it must be able to cope with high winds, snow, sea states and a wide range of both weather and temperature. As a primarily maritime capability, the M3A will be optimized for the maritime environment which by its nature is harsh and subject to extremes of temperature, wind, humidity, icing, salt spray, and turbulence.

4.1.3.2 There may be limits to the weather conditions in which an M3A (aircraft) can conduct operations. However, the M3A capability air, ground, network and support segments shall be capable of surviving on the ground in all-weather environments.

4.1.3.3 While the entirety of the NATO M3A capability shall be able to respond to the entire range of environments, individual nations may choose certain characteristics of aircraft to match specific environmental conditions of national interest.

4.1.4 Deployable

4.1.4.1 The M3A shall be capable of rapid and easy deployment with minimal logistics or tactical support. M3A will operate from Main Operating Bases (MOBs), but shall also be capable of deploying to established airfields which will serve as Forward Operating Bases (FOBs). M3A shall be able to conduct the initial deployment to the FOB on short notice and shall be able to conduct limited, unsupported operations from the FOB for a short period. However, long-term and full-scale operations from a FOB will normally require airlift to bring forward elements of the ground, support and network segments.

4.1.4.2 M3A should be also capable of deploying to and operating from more austere airfields. The extent to which operations can be sustained from an austere location will greatly depend on the specific form of the M3A capability.

4.1.5 Survivability

4.1.5.1 The M3A shall be capable of employing Aircraft Survivability Equipment for operations in permissive and/or contested environments.

4.1.5.2 The M3A shall be fitted with Aircraft Survivability Equipment (ASE) to reduce aircraft vulnerability to hostile threats, allowing aircrews to accomplish their immediate mission and survive.

4.1.5.3 The M3A shall be capable of securely identifying friendly contacts with appropriate system (such as IFF).

4.1.5.4 The M3A shall be capable of operating in a hostile and/or dense EM (Electromagnetic) environment

4.1.6 Threats

4.1.6.1 The M3A shall be able to detect, localize, track and classify threats. It shall have the capability to minimize its detection against representative threats and when necessary to engage threats with decoys, chaff, flares, directed counter-measures or other means for self-protection.

4.1.6.2 The M3A shall be capable of employing Electronic Protection Measures to enhance the survivability and effectiveness of Electronic Warfare Systems and forces in general.

4.1.7 Chemical, Biological, Radiological, and Nuclear Conditions

4.1.7.1 The M3A shall be capable of operating in chemical, biological, radiological and nuclear (CBRN) environments.

4.1.8 Aircrew Survivability

4.1.8.1 The M3A shall be capable of enabling the survivability of the aircrew in case of incidents or accidents (emergency).

4.1.9 Redundancy

4.1.9.1 The M3A shall have sufficient redundancy and reliability in systems to enable continued operation during degraded conditions (e.g. stand-alone modes for sensors, power failures, etc.).

4.1.9.2 The M3A shall have sufficient redundancy in Position, Navigation and Timing (PNT) systems to enable continued operation in Global Navigation Satellite System (GNSS) denied environment.

4.2 Communications, Command and Control

4.2.1 General.

4.2.1.1 The M3A shall be able to receive and disseminate information and intelligence to military and civilian organisations, platforms, systems and applications in a manner necessary to carry out the M3A function.

4.2.1.2 Voice. The M3A shall be capable of voice communications.

4.2.1.3 Data. The M3A shall be capable of data communications with sufficient data rates to support the distribution of data to other M3A capabilities and end users (.

4.2.1.4 Secure and Non-Secure. The M3A shall be capable of communicating with other air, naval, ground and command units by secure and non-secure means of voice and data communications.

4.2.1.5 The M3A shall be capable of cooperating and coordinating with other manned platforms/capabilities to exercise command and control functions.

4.2.1.6 The M3A shall be capable of controlling and/or directing manned systems specialised in Anti-Submarine Warfare and Anti-Surface Warfare.

4.2.1.7 The M3A should be capable of controlling and/or directing unmanned systems specialised in Anti-Submarine Warfare and Anti-Surface Warfare.

4.2.1.8 The M3A shall be capable of assuming the duties of Search and Attack Unit Commander (SAUC).

4.2.1.9 The M3A shall be capable of underwater communication by some means, i.e. ESUS, slot buoys, telephony.

4.2.1.10 The M3A shall be capable of satisfying the CIS requirements stated in MC 195 for a M3A.

4.2.2 Line of Sight (LOS)

4.2.2.1 The M3A shall be capable of Line of Sight (LOS) communications, whether voice or data.

4.2.2.2 The M3A shall be capable of secure, robust, reliable Line of Sight communications and imagery transmission to appropriate receiving stations (scheduled or on demand), in Near Real Time.

4.2.2.3 The M3A shall be capable of transmitting collected signals data (scheduled or on demand) to appropriate receiving stations, in Near Real Time when required employing secure, robust, reliable line of sight communications.

4.2.3 Beyond Line of Sight (BLOS)

4.2.3.1 The M3A shall be capable of Beyond Line of Sight (BLOS) communications, whether voice or data.

4.2.3.2 The M3A shall be capable of secure, robust, reliable Beyond Line of Sight communications and imagery transmission to appropriate receiving stations (scheduled or on demand), in Near Real Time when required via appropriate relay e.g. via wide-band SATCOM.

4.2.3.3 The M3A shall be capable of transmitting collected signals data (scheduled or on demand) to appropriate receiving stations, in Near Real Time when required employing secure, robust, reliable Beyond Line of Sight communications.

4.2.4 Networking

4.2.4.1 The M3A shall be capable of networking its communications with other platforms and end users at the tactical, operational and strategic levels, as required to conduct operations.

4.2.5 Interoperate

4.2.5.1 The M3A shall be able to integrate with organisations, platforms, systems and applications necessary to conduct an M3A mission. While related to the ability to communicate, the ability to interoperate goes beyond just communications and information sharing. It includes all aspects of being able to work with Allies and other partners in a robust, secure and sustainable manner.

4.2.5.2 The M3A shall be capable of contributing to the Common Operational Picture, to the Recognised Maritime Picture (RMP) and Alliance Maritime Situational Awareness (MSA) through the dissemination of appropriate sensor data and generated information and intelligence.

4.2.5.3 The M3A shall be capable of exchanging MSA-related information (including merchant shipping information) in a timely manner and appropriate form with the Maritime Component Commander (MCC).

4.2.5.4 The M3A shall be capable of receiving and exploiting AIS/SAIS information.

4.2.5.5 The M3A shall be capable of integration within a naval task force using secure, robust (electronic warfare resistant) and timely line-of sight and Beyond Line Of Sight communication with national, multinational and assigned forces, and with commanders (HQs) ashore and afloat (including subordinate, adjacent and superior levels of command), authorised national military and civilian agencies and international organisations (IOs/NGOs) for coordination of activity, disseminating and exchanging of information and intelligence.

4.2.5.6 The M3A shall be capable of integrating the theatre JISR capability to permit effective collection tasking, cross-cueing of other collection capabilities and dissemination of collected information to users.

4.2.6 NATO Interoperability

4.2.6.1 The M3A shall enable interoperability by building on NATO Standardisation efforts, incorporating appropriate STANAGs to which all interoperable systems must adhere. The M3A will be interoperable with NATO systems and platforms as required by operations, in particular:

4.2.6.1.1 NATO and National ISTAR systems

4.2.6.1.2 NATO and National Command, Control, Communications, and Information (C3I) systems, such as:

4.2.6.1.3 Bi-Strategic Command (SC) Automated Information System (AIS) (Bi-SC AIS),

4.2.6.1.4 NATO Air Command And Control System (ACCS) ,

4.2.6.1.5 Battlefield Information Collection and Exploitation Systems (BICES),

4.2.6.1.6 Maritime Command and Control Information System (MCCIS), and

4.2.6.1.7 Land Command & Control Information System (LC2IS).

4.2.6.1.8 Tactical assets and weapon systems such as fighters, naval vessels, and air defence systems.

4.2.6.2 The M3A shall be capable of contributing to the Joint Targeting Process and identifying indications and warnings.

4.2.6.3 The M3A shall be capable of conducting coordinated ASW, ASuW and Maritime ISR operations with surface, air, and sub-surface forces.

4.2.6.4 The M3A shall be capable of interoperating with platforms in the Intelligence Support Activity(ISA) role.

4.2.7 National Interoperability.

4.2.7.1 The M3A shall be interoperable with national military and non-military systems and platforms as required to meet national objectives.

4.2.8 Other Coalition/Partner Interoperability.

4.2.8.1 The M3A shall be interoperable with other coalitions and partners as required by operations and national objectives. These coalitions/partners may reflect established transnational organizations such as the European Union or ad hoc coalitions formed when and as required to conduct operations in an international context.

4.3 Collect, Process and Store Data

4.3.1 General.

4.3.1.1 The M3A shall be able to collect and process data in order to exploit it in near real-time for mission execution. It shall also be able to fuse the data with other externally collected data, conduct detailed post-mission exploitation, and store and archive data for future use and evidentiary purposes.

4.3.2 Collect and Process Own Data.

4.3.2.1 The M3A shall be able to collect and process its own mission data in order to exploit it in real-time for mission execution (Phase 1 analysis).

4.3.3 Fuse External Data.

4.3.3.1 The M3A shall be able to process externally collected data and fuse it with its own in order to exploit it in real or near-real time for mission execution (Phase 1 analysis). (

4.3.4 Store Mission Data

4.3.4.1 The M3A shall be able to store its own mission data for post-mission processing, exploitation and dissemination (PED).

4.3.4.2 The M3A shall be capable of recording and storing collected imagery.

4.3.4.3 The M3A shall be capable of recording and storing collected signals.

4.3.5 Post-Mission PED.

4.3.5.1 The M3A shall be able to process its own mission data in order to exploit it post-mission processing, exploitation and dissemination (Phase 2 analysis).

4.3.6 Store Post-Mission Data.

4.3.6.1 The M3A shall be able to store validated mission data in order to make it available for future processing, exploitation and dissemination (Phase 3 and 4 analysis).

4.4 Find, Fix and Finish ASW

4.4.1 General

4.4.1.1 M3A shall be capable of executing airborne operations denying the enemy the effective use of their submarines and other underwater threats (UUV) in any maritime environment and engaging sub-surface targets.

4.4.1.2 The M3A shall be capable of determining oceanographic conditions required to support the assessment of the environment for AntiSubmarine Warfare operations.

4.4.1.3 The M3A shall be capable of conducting coordinated ASW operations with surface, air, and sub-surface forces..

4.4.2 Detect Sub-Surface

4.4.2.1 The M3A shall be to detect sub-surface contacts in favourable/ adverse ambient conditions, through the use of specialised, passive and/or active acoustic devices, in all water depths at sufficient range to allow engagement.

4.4.2.2 The M3A shall be capable of planning, establishing, maintaining and monitoring sonobuoy patterns and fields

4.4.2.3 The M3A shall be capable of gathering acoustic Measurement and Signature Intelligence (MASINT) / Acoustic Intelligence (ACINT)

4.4.3 Localize Sub-Surface

4.4.3.1 The M3A shall be able to localize sub-surface contacts in favourable/adverse ambient conditions, through the use of specialised, passive and/or active acoustic devices, in all water depths at sufficient range to allow engagement.

4.4.4 Track Sub-Surface

4.4.4.1 The M3A shall be able to track sub-surface contacts in favourable/adverse ambient conditions, through the use of specialised, passive and/or active acoustic devices, in all water depths at sufficient range to allow engagement.

4.4.5 Classify Sub-Surface

4.4.5.1 The M3A shall be able to classify sub-surface contacts in favourable/adverse ambient conditions, through the use of specialised, passive and/or active acoustic devices, in all water depths at sufficient range to allow engagement.

4.4.6 Engage Sub-Surface

4.4.6.1 The M3A shall be capable of engaging sub-surface contacts in order to warn, deter and destroy in favourable/adverse ambient conditions, with appropriate means (such as ESUS, anti-submarine torpedoes, depth charges) in all water depths.

4.4.7 Sub-Surface Battle Damage Assessment

4.4.7.1 The M3A shall be able to assess battle damage. This task should not request specific sensors.

4.5 Find, Fix and Finish ASuW

4.5.1 General

4.5.1.1 M3A shall be capable of executing operations in any maritime environment to detect, identify and counter an adversary's naval surface capability.

4.5.1.2 M3A shall be capable of conducting coordinated ASUW operations with surface, air, and sub-surface forces.

4.5.1.3 M3A shall be capable of assuming the duties of Aircraft Control Unit (ACU) and directing FBA aircraft to conduct Direct Support (DS) operations and engage surface targets.

4.5.1.4 M3A shall be capable of determining atmospheric and oceanographic conditions required to support the assessment of the environment for Anti-Surface Warfare operations.

4.5.2 Detect Surface

4.5.2.1 The M3A shall be able to detect surface contacts by day/night and clear/adverse weather at sufficient range to allow engagement.

4.5.3 Localize Surface

4.5.3.1 The M3A shall be able to localize surface contacts by day/night and clear/adverse weather and at a sufficient range to allow engagement.

4.5.4 Track Surface

4.5.4.1 The M3A shall be able to track surface contacts by day/night and clear/adverse weather and at a sufficient range to allow engagement.

4.5.4.2 The M3A shall be capable of conducting Over The Horizon Targeting (OTHT) and/or 3rd party OTHT

4.5.5 Classify Surface

4.5.5.1 The M3A shall be to able classify surface contacts by day/night and clear/adverse weather and at a sufficient range to allow engagement.

4.5.6 Deter/Destroy Surface

4.5.6.1 The M3A shall be capable of simultaneously engaging multiple surface targets by day/night and in clear/adverse weather with appropriate means (such as medium/large calibre gun armament, anti-ship missiles (OTH), anti-ship torpedoes, non-kinetic weapons).

4.5.7 Surface Battle Damage Assessment

4.5.7.1 The M3A shall be able to assess battle damage. This task should not request specific sensors.

4.6 Maritime ISR

4.6.1 General

4.6.1.1 The M3A shall be capable of conducting intelligence, surveillance and reconnaissance operations in order to detect, classify, identify, and track, and collect on targets in all weather conditions, day and night, in a maritime environment using passive and active sensors.

4.6.1.2 The M3A shall be capable of providing intelligence, surveillance and reconnaissance, with appropriate onboard sensors during day/night and clear/adverse weather, in order to contribute to JISR in support of air, land and maritime operations.

4.6.1.3 The M3A shall be capable of pre-planned imagery collection with in-flight mission update/re-tasking capability .

4.6.1.4 The M3A shall be capable of providing persistent surveillance and reconnaissance coverage beyond the horizon of a naval task group.

4.6.1.5 The M3A shall be capable of collecting information on landing areas and surrounding environment in support of planning for amphibious operations. This includes information on characteristics of defences including beach minefields and obstacles.

4.6.1.6 The M3A shall be capable of route and area reconnaissance to provide information on opponent deployment and activity along the route or in the specified area, and other relevant factors. This includes the nature and state of the route, location of obstacles and minefields, the nature of the terrain, habitation etc.

4.6.1.7 The M3A shall be capable of calling and directing fires on targets in the reconnaissance area

4.6.1.8 The M3A shall be capable of providing ISR in support of the protection for units, facilities and infrastructure located in port/harbour areas, to include associated anchorages used in support of operations.

4.6.1.9 The M3A shall be capable of determining atmospheric and oceanographic conditions required to support the assessment of the environment for Maritime ISR operations.

4.6.2 Passive Image Collection

4.6.2.1 M3A shall be capable of persistent collection of images of operationally significant objects and activities on the earth's surface using passive means.

4.6.2.2 The M3A shall be capable of detecting very narrow bandwidth radiation across the full range of the visible and non-visible electromagnetic spectrum.

4.6.2.3 The M3A shall be capable of integrating the theatre JISR capability to permit effective collection tasking, cross-cueing of other collection capabilities and dissemination of collected information to users.

4.6.2.4 The M3A shall be capable of operating with platforms in the ISA role. (For example: UAS-MA, UAS-HA).

4.6.2.5 The M3A shall be capable of pre-planned imagery collection with in-flight mission update/re-tasking capability.

4.6.2.6 Medium Range. The M3A shall be capable of generating very high quality imagery at ranges up to 50 km (27NM).

4.6.2.7 Long Range. The M3A shall be capable of providing high quality imagery of operationally significant objects and activities on the earth's surface at ranges greater than 50 km and up to 100 km (54NM)

4.6.2.8 The M3A shall be capable of providing very high quality optical and IR imagery - Clear conditions, day/night

4.6.2.9 The M3A shall be capable of providing very high quality imagery - equivalent to IR NIIRS or other similar scale > 6.

4.6.2.10 The M3A shall be capable of providing very high quality imagery - equivalent to Multi-spectral NIIRS or other similar scale > 6.

4.6.2.11 The M3A shall be capable of providing very high quality imagery - equivalent to Optical NIIRS or other similar scale > 7.

4.6.2.12 The M3A shall be capable of providing very high quality optical and IR imagery - Still frame, video.

4.6.3 Active Image Collection

4.6.3.1 The M3A shall be capable of persistent collection of images of operationally significant objects and activities on the earth's surface using active means.

4.6.3.2 The M3A shall be capable of integrating the theatre JISR capability to permit effective collection tasking, cross-cueing of other collection capabilities and dissemination of collected information to users.

4.6.3.3 The M3A shall be capable of generating high resolution radar imagery of surface targets using SAR / ISAR, during day / night and clear / adverse weather.

4.6.3.4 The M3A shall be capable of sensor surveillance for the detection and tracking of slow moving ground objects of interest, including movement of personnel, units, vehicles and other equipment on the surface and at low altitude by day and night, clear or adverse weather

4.6.3.5 The M3A shall be capable of operating with platforms in the ISA role. (For example: UAS-MA, UAS-HA).

4.6.3.6 The M3A shall be capable of pre-planned imagery collection with in-flight mission update/re-tasking capability.

4.6.3.7 The M3A shall be capable of effective sensor ranges greater than 200 km (108NM)

4.6.3.8 The M3A shall be capable of providing good quality imagery and location of fixed or stationary objects of interest - Spot imagery with Radar NIIRS or similar scale > 6..

4.6.3.9 The M3A shall be capable of providing good quality imagery and location of fixed or stationary objects of interest - Strip imagery with Radar NIIRS or similar scale > 3..

4.6.3.10 The M3A shall be capable of providing still-frame and/or video imagery.

4.6.4 Signal Collection

4.6.4.1 The M3A shall be capable of continuous 360° sensor surveillance for collecting, direction finding and locating the source of militarily significant RF signals from both communications and non-communications emitters.

4.6.4.2 The M3A shall be capable of integrating the theatre JISR capability to permit effective collection tasking, cross-cueing of other collection capabilities and dissemination of collected information to users.

4.6.4.3 The M3A shall be capable of operating with platforms in the ISA role. (For example: UAS-MA, UAS-HA

4.6.4.4 The M3A shall be capable of collecting signals of sufficient quality to enable emitter recognition and identification through appropriate emitter parameters databases

4.6.4.5 The M3A shall be capable of persistent coverage of an area of interest (loiter/long dwell) or broad area coverage of several, possibly remote, areas of interest.

4.6.4.6 Range. Capable of effective sensor ranges greater than 200 km (108NM)

4.6.5 Electronic Warfare

4.6.5.1 M3A shall be capable of intercepting, collecting, processing, geo-locating, and exploiting signals from non-communications systems (e.g. radars) to generate ELINT.

4.6.5.2 M3A should be capable of intercepting, collecting, processing, geo-locating, and exploiting signals from Radio Frequency (RF) communications to generate COMINT.

4.6.5.3 M3A shall be capable of intercepting, collecting, and processing communications and non-communications signals (including signals for RF RC-IEDs) in the area of operations.

4.6.5.4 M3A shall be capable of direction finding and locating hostile RF communications (HF, VHF UHF and SATCOM).

4.6.5.5 M3A shall be capable of direction finding and locating hostile non-communications emitters (primarily radar frequencies).

4.6.5.6 M3A shall be capable of emitter recognition and identification of specific emitter parameters through appropriate emitter databases (e.g. NEDB)/libraries for updating the EOB.

4.7 Joint Personnel Recovery

4.7.1.1 The M3A shall support the planning and execution of Joint Personnel Recovery (JPR) operations by detecting, localizing, tracking and classifying search objects by passive and active means employing the capabilities specified for ASW, ASuW and Maritime ISR.

4.7.1.2 The M3A shall be capable authenticating and maintaining surveillance of isolated personnel where hostile interference may be expected.

4.7.1.3 The M3A shall be capable of providing airborne command and control capabilities in support of JPR operations.

4.7.1.4 The M3A shall be capable of deploying survival equipment and/or effectively assisting located survivors until recovered by other capabilities in a hostile environment.

4.8 Support to Special Operations

4.8.1.1 The M3A shall support the planning and execution of the full spectrum of special operations in the maritime environment, across the full spectrum of military operations unilaterally and independently in support of other component commanders.

4.8.1.2 The M3A shall support special operations by detecting, localizing, tracking and classifying search objects by passive and active means employing the capabilities specified for ASW, ASuW and Maritime ISR.

4.8.1.3 M3A shall be capable of employing selective real/near real-time friendly force tracking capabilities (e.g. discrete mode tracking) and battle tracking procedures for own forces.

4.8.1.4 The M3A should be able to transport cargo and personnel as a residual capability.

4.8.1.5 The M3A should be able to airdrop cargo as a residual capability.

4.8.1.6 The M3A should be able to airdrop personnel as a residual capability.

4.8.1.7 The M3A should be fitted with specialized, mission tailored capabilities.

4.9 Airborne Mine Warfare

4.9.1.1 M3A shall be capable of supporting mine hunting operations in an assigned area by passive and active means employing the capabilities specified for ASW, ASuW and Maritime ISR.

4.9.1.2 M3A shall be capable of planning and conducting covert and overt mines laying

ANNEX A – AVIONICS, MISSION SYSTEMS, SENSORS AND TECHNOLOGICAL TRENDS

Navigation Systems

Navigation system technology is arguably mature with ready access to Inertial Navigation Systems and military GNSS that meet current and predicted performance needs. These systems will enable M3A to operate effectively alongside other traffic. Further developments in this area will improve performance and safety margins in congested air space, either civil or military.

M3A have historically avoided civil aircraft when on patrol, by being assigned agreed restricted airspace for military operations below normal civil transit altitudes, and they have tended to operate below civil traffic during transit, either by agreement or using 'Due Regard' procedures. New M3A should now be able to transit to OPAREAs using civil air routes, provided they are suitable equipped, so impending changes in civil air operations will need to be taken into account.

Both the USA (NextGen) and the European Union (Single European Sky) recognise that today's air traffic environment is heavily congested. Of particular concern to European Sponsor states is the expectation that European air traffic will double by 2030s and that European airspace is less efficiently managed than in the US, particularly concerning airspace that is set aside for military operations. Route charging mechanisms are being developed so that Air Navigation Service Providers can incentivise civil operators to adopt a 'Gate to Gate' approach, based on optimum trajectories, and both improve efficiency and reduce CO_2 emissions. It is therefore likely that, while Governments may seek opt-outs, they will face increasing pressure to release military airspace for civil or joint use, and for military aircraft to comply with civil regulations. M3A operations will inevitably be subject to these developments and so, to allow the most cost-efficient use of airspace, M3A should be equipped to take advantage of the cost savings likely to accrue. Without such equipment M3A are likely to be excluded from the airspace and therefore not be able to operate on the most efficient routes or at the optimum altitude. Similar criteria would apply to military aircraft intending to use civil or joint user airfields regarding noise abatement procedures.

For all the above reasons, M3A aircraft (platform) should fulfill civil requirements when required.

Communication Systems

In common with other electronics sensors and systems, communications systems will see increasing capability and performance in the medium and longer terms. Such connectivity will be essential as part of the move towards network-enabled mission systems and will provide increased bandwidth, particularly for data-links, for line of sight and over the horizon communications. The existing link technologies are likely to endure, but will have increasingly diverse routes through which to communicate as network-enabled software defined radios on the M3A and other platforms offer increasing flexibility to accommodate alternate waveforms and spectra. SATCOM is, particularly, seen as the likely source of increased bandwidth, possibly supported by optical communications links. The lack of bandwidth will potentially restrict the platform's flexibility, i.e. its ability to perform multiple roles, especially as an ISTAR asset. The M3A should incorporate a high-bandwidth data link, providing encrypted, real time exchange of the tactical situation, as well as enabling the exchange of sensor information. Improved connectivity will speed up the decision cycle by enabling some of the sensor and mission system advances noted above and by making more mission result data available before aircraft landing. These high-bandwidth data links will complement low-bandwidth links that employ UHF, VHF and HF frequencies, which can provide an alternative data link capability when high-bandwidth means are not available.

Mission Systems

The improvements in electronics technology, noted above, have also driven developments in Mission Systems and are producing important improvement in the capabilities of existing Maritime Patrol or Multi-Mission Aircraft. Most current M3A have received or will shortly receive Mission System upgrades.

Mission System Footprint

New technologies are reinforcing the maritime and overland detection capabilities as well as multi-sensor integration and mission awareness, to enable the decision making process. Similar systems, previously only fitted to heavier platforms such the P-3, can now be fitted to smaller aircraft with improved capability. The reverse is also happening, where manufacturers of larger aircraft are now fitting the same smaller Mission Systems to larger aircraft, either to save the cost of replacing the aircraft or, with much greater capacity to improve the platform's capability.

Information Management

Warfare is becoming increasingly interconnected, fuelled by the revolution in electronics technology, and the future M3A will become isolated if it cannot engage fully with other assets in a number of areas:

- **Unmanned Air Systems (UAS).** The increasing use of UAS, both strategic and tactical, will generate information of value to the M3A crew, and which must be accessed. It is therefore expected that the M3A will interact with UAS to extend their surveillance area, preserve persistence while prosecuting at low altitude, or act as a communications relay, with options to task or even carry and launch them directly. The UAS could, for example, act as a relay for sonobuoys, laid by the M3A, but out of direct RF contact when the M3A is at low altitude. UAS Command and Control is therefore expected to become a routine operation, and the M3A workstation and connectivity suite must therefore be capable of this level of control. The benefits of UAS will be to increase patrol area size or search security at reduced cost, i.e. reduce the number of M3A needed in a force.
- **Networked Sensing.** With the evolution of sensor technology, it will no longer be practical to always operate the M3A as a 'lone wolf' in its own OPAREA. As warfare becomes more localised, the M3A is likely to increasingly find itself operating adjacent to, or even overlapping with, other assets on different missions. As with many other fields, commanders will want to minimize transmissions or maximize the value obtained from transmissions of all kinds, and so M3A operations will be integrated with that of others and sensors will be developed to exploit off-board transmissions; networked sensing will become the norm. The new STANAG for sonobuoys, for example, where each sonobuoy will have its own IP address is a typical example of how sensors will evolve. The same principle will likely be applied to other sensor types, even to those on the M3A itself, such that its sensors could be controlled, given permissions, by off-board assets. An M3A operating with dissimilar assets will increasingly be able to use transmissions from other platforms directly, rather than as processed contact tracks, to improve the quality of its situation awareness picture. The objective of all of these developments is to reduce the number of assets needed for an operation, i.e. the cost of the force, not the platform, recognising that the saving may not be in M3A but in other assets, depending on their capabilities. In this way, cost savings may be realised by being able to retire legacy platforms (with higher operating costs) earlier, rather than reducing the cost of the M3A.

Overland Operations.

As a land-based platform, M3A must be able to transit through that environment as well as operate at sea. If it is to operate overland in a multi-role capability, to contribute ISTAR to the land battle, then it must be interoperable with overland assets, particularly for information exchange. The introduction of AIS was seen as a powerful way to improve their surveillance capability as it reduced the burden of identifying contacts during peacetime surveillance missions at sea. Different systems are used overland, and if the M3A's sensor suite is to be used effectively, then interoperability in this theatre will be essential.

Geo-Focused Operation

The substantial increase in processing power available will also allow a crew to adopt a geographically focused approach to sensor operation, with much automation of data in the background. Searches will be conducted geographically, rather than by sensor, with automated sensor fusion including the fusion of data and information from other, networked, sensors and systems, both on- and off-board. With multi-function sensor systems managing their own scheduling, automated fusion will become more available, e.g. using ESM detections to automatically classify radar contacts, and subsequent fusion of these tracks with AIS. The significant benefits seen from fitting AIS to some M3A illustrates this and sets a norm that will encourage fusion of sensor information to be part of future requirements. Again, as with other sensor and mission system improvements, these will allow the operating crew to be reduced, allowing the systems to be fitted into a smaller aircraft, and hence reducing the whole life cost.

Multi Role Operations

A particular benefit that will emerge from the trend towards much more sophisticated sensor and mission system capability is that these same systems, with only software changes, could be used for entirely different tasks and activities. It is therefore perfectly feasible for an aircraft fitted with such systems to re-role in-flight for a whole range of ISTAR tasks, of which ASW is only one. The only constraint would be the need for suitable weapons, but this may not be an issue. There is certainly an opportunity to exploit the multi-function aspects of such an aircraft along the time-line of a conflict, where the M3A roles could vary considerably from surveillance during tension, to close tracking of ASW assets prior to hostilities, to destroying them as one of the earliest conflict engagements, and then re-focusing on littoral or overland ISTAR / Comms ESM / tactical AEW / Tactical AT as the conflict unfolds. Much of this could be done from a single roll-on/roll-off mission suite. Substantially different roles, i.e. refitting as a gunship or medevac, could still be achieved should the roll-on/roll-off capability be available. The concept of role-fit roll-on/roll-off systems has considerable benefits:

- These system could be fitted to a wide range of civil or military aircraft to common, existing standards. Systems design would need to match standard dimensions to maximise access to the widest fleet of aircraft appropriate for the mission.
- Roll-on/roll-off systems could be kept updated more easily than going through the full aircraft upgrade process and there may be opportunities for systems to be used on different aircraft types, but to a common 'roll-on/roll-off system to Platform' STANAG for mission systems.
- NATO or nations would only need to procure a full complement of mission systems, rather than a full complement of fitted aircraft, to match the NATO Minimum Capability Requirement. If the aircraft are 'earmarked' for taking up from trade, then they could be fitted 'for but not with' the essential aircraft fittings (cabling and hard-points, etc.).

Proposal for a New Standard

Many of today's mission systems (including sensors, radio and avionics equipment) carry considerable amounts of data, control, and business logic buried in different applications, running on different platforms, sensors and equipment. As new technologies and opportunities emerge, companies need new approaches to reduce development life-cycles when building new systems, integrating different capabilities, and updating applications. Consequently, mission system suppliers will often develop solutions for different customers from a common baseline, using a modular approach for their designs. As a result, the same mission systems and sensors could be fitted to different platforms to fulfill different customer requirements.

The development of middleware frameworks in other fields now allows such an approach in airborne systems, where they could provide a versatile infrastructure for distributed and heterogeneous components, cooperating in a network. To take advantage of this approach for M3A, it would be necessary to define a 'Mission System Frame' that could host subsystems that, themselves, were compliant with generic interfaces, including: functional, protocols, electrical, environmental and, when possible, mechanical. Whether this would be in between a Joint Technical Architecture (JTA)-like Technical Architecture or STANAG is not yet clear; but the benefits of such an approach for a Multi-National M3A would be to provide technical interoperability between sub-systems within a mission system, and between mission systems and a platform.

The key points (i.e. enablers) of taking such an approach would be to:

- Enable re-use of subsystems between Mission Systems and MPAs.
- Allow for incremental development.
- Capitalize on development and integration activities between Nations and different industries.
- Allow for unique national needs, including the choice of aircraft and sensors.

Developing a single M3A solution, with perhaps a few options, is arguably the most elegant engineering approach. However, developing harmonized requirements for such a system may produce solutions where not all capabilities are used by all customers, i.e. they would be over-specified for some. It would also take a long time to harmonize the requirements. Instead, taking an incremental building block approach would enable the modularity and re-configurability and solutions would be more resilient to economic uncertainties. The benefits of such an approach for a multinational M3A would be:

- A proper level of standardization which should be "product agnostic".
- Management of the global development process as a NATO M3A product policy.
- Configuration management for sustainable reuse.
- Smart Defense compliance

The concept of taking a roll-on/roll-off systems approach, identified above, is one example of where a standard could be beneficial, particularly if combined with the leased aircraft approach. In this case, the interfaces between the platform and the systems could be standardized so that multiple aircraft types could carry and use a common system, or multiple roll-on/roll-off systems could be used on the same aircraft type. It may even be feasible to fit several modular systems to a large aircraft to give increased capability, i.e. for an ISTAR or SIGINT role. This would considerably increase flexibility provided the other military aspects of capability, such as internal wiring and hard points, etc., could also be included and funded. The standard would need to have wide potential to be adopted.

SG.166 therefore considers that, to improve the modularity of mission systems and their ability to interface to different platforms, NIAG. is tasked to study the implications of a Mission System Frame standard.

Mission Support Systems

The intended purpose of Maritime Air Support is to provide Area commanders with a Command, Control, Communications, Computers and Intelligence (C4I) suite that is able to plan, direct, and control tactical maritime air forces in support of a NATO Maritime Air mission. The Concept of Operations for Maritime Air Support comprises the nations' Maritime Air Support Centres (MASC) at the Main Operating Bases (MOB) and deployable Maritime Multi-Mission Aircraft Support Centres (MMSC). This support of M3A necessitates IT systems for communications, mission preparation and post-mission analysis functions.

The increased processing and communication capabilities of the MASC and MMSC systems will change support capability and systems, even to become a more integral asset to an M3A's mission itself. Mission Support should be available in-flight to reduce the time spent in pre- and post-flight activities and to enable rapid re-tasking of the aircraft. With such on-board/off-board mission planning, it would be feasible to download sensor data in flight for ground support-based analysis, for the crew to re-plan in-flight, potentially with help from the ground, brief/debrief during transit, and (near) real-time download and dissemination of relevant tactical and sensor information. In the longer term, and given suitable bandwidth on data-links, the download of considerably more data, e.g. sensor data, to the ground enables the ground operational team to become an extension of the airborne crew.

NATO has initiated a Smart Defense procurement proposal for a NATO MMSC to provide such a robust, expeditionary C4I capability for M3A engaged in National and coalition maritime air operations. This project currently has a Tier 2 status and the United States is the Lead Nation.

The NATO MMSC is intended to provide the Maritime Air Support needed for participating M3A, in an operation, and to act as a hub for national support centres to plug in, communicate with each other and to share the necessary information. In selecting a remote base to act as the maritime FOB, it is likely that M3A will conduct their part of the campaign away from the main concentration of supporting NATO air assets and traditional close-in command and control. M3A still require access to a robust Command, Control, Communications, Computers, and Intelligence (C4I) capability for coordination and integration into Multi National Maritime Force (MNMF) and Combined Joint Task Force (CJTF) operations. Not only must that C4I capability be accessible, it must be expeditionary in nature, allowing deployment to the remote bases M3A will utilize. Lack of robust C4I prevents mission planning, execution, post flight data distribution, and follow on flight coordination.

The NATO MMSC fills the gap of robust, expeditionary C4I capability for M3A operating as part of MNFM and CJTF supporting the expanded crisis management spectrum at remote and ever changing operating locations. The NATO MMSC meets specific maritime air requirements not provided by other deployable NATO support systems. In its full configuration, the NATO MMSC needs connectivity to the CJTF, whether at sea or land based, and all component commanders. It should be capable of:

- Two-way real-time communication with all assigned maritime air assets.
- Conducting full mission briefing, de-briefing and post-flight reporting.
- Autonomous operations and be self-supporting.

The NATO MMSC capabilities should be modular, enabling it to be tailored to the needs of specific operations.

Sensors

The significant change in electronics technology since the last generation of M3A were designed has opened opportunities to mount sensors in much smaller spaces than previously or, alternatively, to massively increase the capability of the systems within the same footprint. Basic, physical characteristics of sensors, e.g. RF apertures, will not change, but the way that data from those sensors is handled, particularly where the benefits of massive processing power can now be applied, with the ensuing performance that can now be extracted, makes the current generation of technologies look severely limited in their capability. The ability to fit such systems on smaller platforms changes the way in which those platforms should be viewed, while the ability of larger platforms to collect massive amounts of data allows them easily to range from the tactical to strategic in one mission. It is in the field of sensor development that flexibility of operation will emerge, and the immediate re-tasking of a platform to meet a more immediate threat will become commonplace.

Decision Support Tools

The ability to store much larger amounts of data on board with sophisticated search tools will allow the crew to be much more efficient in their operation of the equipment or manoeuvring of the platform. Performance can typically be enhanced through:

- Library or database look-up functions for sensor contact identification.
- Environmental prediction tools to optimize set-up and tactical flight profiles.

- Tactical simulation tools to allow the operator to assess options in-flight for tactical employment i.e. to assess alternate options to employ the sensor before the live search.
- Seed simulated targets into live scenarios for improved crew training.

Signal Processing

Increased processing power allows systems to apply signal processing algorithms that are more complex, but also more effective. A fundamental change is likely in the next 10 years where the concept of ‘sensor dominance’ emerges. Because of the increased processing power, and its associated increased data fidelity, sensors will be able to capture the full data field arriving at the platform. In other words, they will be able to collect all data that presents at the aperture and will be able to process it in multiple modes in real time. Recording systems with real-time access will allow instant recall or re-analysis of selected collected data sets thus providing continuity in search never previously seen and flexibility of tasking not previously imagined. If there is to be any development to improve performance within current airframe footprints, it is in terms of increasing the linearity and dynamic range of sensors: RF (Radar and EW), Acoustic and Optical, and improving the aperture conversion technology (the ability to process data directly at the frequency concerned).

RF Systems

RF Systems, i.e. Radar, Electronic Warfare, and communication systems will evolve through the ongoing research programmes to become multi-mode, software-driven sensors where a single installation would be capable of switching, in real time and to suit the operational environment, to act as a Radar, ESM, ECM, or Communication System (data and/or voice). Antennas would become software-driven Active Electronically Scanned Arrays (AESA) to provide the multi-functionality, and the whole system would be driven by a smart scheduler to make all functions appear as though they were operating in parallel. The new systems would be able to combine multiple functions in a single sweep, eg maritime surface search, AEW Pulse Doppler, or SAR/GMTI search, coupled with inbuilt AIS and IFF interrogator. Multiple target tracking would be taken to a new level. These systems would be able to cope with much higher grazing angles for detection of very small targets. They would have the net effect that performance which, hitherto, could only be achieved with large, heavy, power-hungry sensors would consume less airframe real estate, could be mounted on smaller platforms, with smaller crews, operating higher, and therefore covering much larger areas more quickly and more cheaply, and being able to undertake far more diverse tasks. These benefits could be achieved within 10 years.

Optical Systems

Optical systems, too, would benefit from the advances described for RF sensors, but here the aperture would be much wider, allowing much larger areas to be covered, i.e. wide area, rather than today's narrow field of view (FOV) 'soda-straw' vision. With 'giga-pixel' capability and a wide FOV, optical sensors would operate at multiple and/or selectable optical wavelengths to detect specific characteristics and improve the operator's ability to classify a target, of any sort. These multi-spectral systems would be able to operate equally overland or at sea, but be employed in very different ways. Optical algorithms are already available that can be used at sea to automatically detect very small man-made objects in a very wide FOV, i.e. survivors or periscopes, and these same systems can be used overland in very different ways to aid the overland tactical ISTAR role.

Acoustic Systems

In common with other sensors, airborne Acoustic Systems are also taking advantage of advancing electronics, with much more processing power in a smaller footprint, to improve their ability to detect increasingly difficult targets. M3A-based acoustic systems face the same factors affecting all ASW platforms, including:

- Quieter modern submarines;
- New submarine stealth technologies, i.e. Air Independent Propulsion, Anechoic coating;
- Operations in acoustically-noisy littoral regions; and
- Reduced opportunity for crews to conduct training because of the increase in non-ASW missions and the limited availability of cooperating submarine.

The most promising new area for ASW currently lies in the development of Low Frequency Multi-Static Active (MSA) search. MSA systems comprise a field of M3A-deployed and commanded active sonobuoys, whose sonar transmissions are received on a co-located field of receiver sonobuoys. These new systems take advantage of new techniques to reduce the package size of active sources to achieve significantly longer detection ranges at these lower frequencies, together with the opportunity to make multiple target detections on multiple transmit/receive pairs of sonobuoys. The benefit is that MSA increases an M3A's search area by an order of magnitude over older traditional passive or high frequency active sonobuoys, offering good acoustic search as well as a good tracking and attack capability. However, until these active systems can be used to classify acoustic contacts they will need to complemented by other methods.

A further development will be the ability of an M3A to co-operate with other sonar-equipped platforms in a network-enabled, multi-platform system, using each other's sonar transmissions to improve the overall ensonification of a threat area. For example, high power ship-borne sonar transmission could be detected multi-statically by M3A-deployed sonobuoys at very long range from the ship, allowing the ship to keep clear of submarine threats.

To cope with the increased complexity of these systems, acoustic system providers are developing tools to reduce operator workload, e.g. taking advantage of new automated detections methods to improve search techniques and situation awareness. However, operator skills are still perishable and require continual refresh and so these systems will still include On-Board Acoustic Training modes that allow operational training to be carried out while the aircraft is in transit or tasked on non-ASW missions.

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ANNEX B – SUMMARY OF HIGH LEVEL MANDATORY REQUIREMENTS

Reference	Requirement
3.3.1 Operate	M3A shall be capable of deploying worldwide to conduct persistent maritime airborne operations, day and night, and in all weather and climatic conditions. The M3A shall conduct missions in both permissive and contested CBRN environments.
3.3.2 Communications, Command and Control	M3A shall be capable of receiving and disseminating information and intelligence to military and civilian organisations, platforms, systems and applications in a manner necessary to carry out the M3A function. The M3A shall be capable of line of sight and beyond line of sight communications, through secure (national and NATO) and non-secure means in order to network within a system-of-systems.
3.3.3 Interoperability	M3A shall be capable of interoperating with organizations, platforms, systems and applications necessary to conduct an M3A mission. While related to the ability to communicate, the ability to interoperate goes beyond just communications and information sharing. It includes all aspects of being able to work with Allies and other partners in a robust, secure and sustainable manner.
3.3.4 Plan, Collect, Process and Store Data	M3A air and ground segments shall be capable of planning, collecting and processing mission data in order to exploit it in near real-time for mission execution. It shall also be capable of fusing the data with other externally collected data, conducting detailed post-mission exploitation, and storing and archiving data for future use.

Reference	Requirement
3.4.1 Find, Fix, Finish ASW	M3A shall be capable of executing operations denying the enemy the effective use of their submarines in any maritime environment (key related capability codes: NLRAD, NTRAD, NASW-AIR).
3.4.2 3.4.2 Find, Fix, Finish ASuW	M3A shall be capable of executing operations in any maritime environment to detect, identify and counter an adversary's naval surface capability (key related capability codes: NLRAD, NTRAD, NASuW-AIR).
3.4.3 Maritime ISR	M3A shall be capable of conducting intelligence, surveillance and reconnaissance operations in order to detect, classify, identify, track, and collect on targets in all weather conditions, day and night, in a maritime environment using passive and active sensors (key related capability codes: NLRAD, NTRAD, NAISR-LR, NAISR-TAC).
3.4.4 Joint Personnel Recovery	M3A shall be able to support the recovery of personnel in the maritime and/or overland environment, to include the ability to deploy survival equipment and/or effectively assist located survivors until recovered. (key related capability codes: NLRAD, NTRAD, NAISR-LR, NAISR-TAC, AVN-CSAR-PR)
3.4.5 Support to Special Operations	M3A shall be able to support Special Operations with specific and/or residual capabilities which should include C2 capability, the transport and para-drop of cargo and personnel, support to Special Operations Forces and other specialized, mission tailored capabilities. (key related capability codes: NLRAD, NTRAD, NAISR-LR, NAISR-TAC, SOF-SOMTG, SOF-SOATU-FW)
3.4.6 Airborne Mine Warfare	M3A should be capable of laying mines (key related capability codes: NLRAD, NTRAD, NAISR-LR, NAISR-TAC, NMWL-C, NMWL-O, NHP)

ANNEX C – DETAILED REQUIREMENTS MATRIX AND RELATED STANAGS

Reference	Requirement	CC & CS Codes	Related STANAGS
4.1.1.1	Deploying worldwide executing long range maritime airborne operations, including civilian airfield and military airbases.		
4.1.1.2	Executing ASW, ASuW and Maritime ISR as core mission.	NLRAD 2.05 NTRAD 2.05	
4.1.1.3	Operating day and night, and in all weather and climatic conditions.		
4.1.1.4	Conducting missions in both permissive and contested environments.		
4.1.1.5	Operating in a hostile and/or dense electromagnetic (EM) environment.	NLRAD 3.08 NTRAD 3.08	
4.1.1.6	Capable of safe and expeditious access to segregated and non-segregated airspace based on operational and technical requirements (with appropriate avionics).	NLRAD 3.09 NTRAD 3.10	
4.1.1.7	Capable of surviving and operate in CBRN environments (.	NOAD 3.07	
4.1.1.8	Capable of secure automatic query of and response to external electronic interrogation by military and civilian ground, shipborne and airborne interrogators (such as AIS). (	NLRAD 2.03	
4.1.2.1	An individual M3A capability shall have sufficient range, endurance, and speed to provide the necessary coverage in a joint operations area (JOA) with a suitable weapons and ordinance load (torpedoes, sonobuoys, markers, flares….). Ideally, an M3A shall have long range, long endurance		

Reference	Requirement	CC & CS Codes	Related STANAGS
	and be capable of high speeds to rapidly transit to the JOA, as defined below. However, it shall also be capable of slower on station speeds, as required by operations.		
4.1.2.2	Long Range. Long range M3A shall be capable of a minimum of 6 hours time–on-station when operating 500 NM from any base of operations. They shall also be capable of maintaining a transit true air speed of at least 250 knots and of sustaining a speed of at least 200 knots while on station with full manoeuvrability. Long range M3A should be capable of loiter speeds of lower than 200 knots for the conduct of operations.	NLRAD 2.06 NLRAD 2.07	
4.1.2.3	Tactical Range. Tactical range M3A shall be capable of a minimum of 3 hours time-on-station when operating 120 NM from any base of operations. They shall also be capable of maintaining a transit speed of 120 knots with full manoeuvrability. Tactical range M3A should be capable of loiter speeds of lower than 120 knots for the conduct of operations.	NTRAD 2.06 NTRAD 2.07	
4.1.2.4	Altitude. The M3A is expected to operate from sea level to high altitudes over the range of environmental conditions as required to maximize its capabilities in the execution of the mission.		
4.1.2.5	The flight envelop shall meet the weapon / mission system requirements and allow the weapon / sensors / mission system to be operated at their maximum efficiency parameters.		

Reference	Requirement	CC & CS Codes	Related STANAGS
4.1.2.6	Crew Accommodation. The aircraft must provide the highest possible degree of comfort, to lessen the crew's fatigue, and thus enhance their efficiency on the long patrols which are envisaged. Good lookout facilities and well-planned tactical stations are essential. Adequate rest arrangements for off-watch crew-members, and efficient soundproofing are necessary.		
4.1.3.1	General. The M3A shall be capable of operating day and night in environments ranging from desert to littoral to continental and arctic climates. Within these climates it must be able to cope with high winds, snow, sea states and a wide range of both weather and temperature. As a primarily maritime capability, the M3A will be optimized for the maritime environment which by its nature is harsh and subject to extremes of temperature, wind, humidity, icing, salt spray, and turbulence.		
4.1.3.2	There may be limits to the weather conditions in which an M3A (aircraft) can conduct operations. However, the M3A capability air, ground, network and support segments shall be capable of surviving on the ground in all-weather environments.		
4.1.3.3	While the entirety of the NATO M3A capability shall be able to respond to the entire range of environments, individual nations may choose certain characteristics of aircraft to match specific environmental conditions of national interest.		

Reference	Requirement	CC & CS Codes	Related STANAGS
4.1.4.1	The M3A shall be capable of rapid and easy deployment with minimal logistics or tactical support. M3A will operate from Main Operating Bases (MOBs), but shall also be capable of deploying to established airfields which will serve as Forward Operating Bases (FOBs). M3A shall be able to conduct the initial deployment to the FOB on short notice and shall be able to conduct limited, unsupported operations from the FOB for a short period. However, long-term and full-scale operations from a FOB will normally require airlift to bring forward elements of the ground, support and network segments.	NOAD 1.01	
4.1.4.2	M3A should be also capable of deploying to and operating from more austere airfields. The extent to which operations can be sustained from an austere location will greatly depend on the specific form of the M3A capability.	NOAD 1.01	
4.1.5.1	The M3A shall be capable of employing Aircraft Survivability Equipment for operations in permissive and/or contested environments.		
4.1.5.3	The M3A shall be fitted with Aircraft Survivability Equipment (ASE) to reduce aircraft vulnerability to hostile threats, allowing aircrews to accomplish their immediate mission and survive.	NOAD 2.02	
4.1.5.4	The M3A shall be capable of securely identifying friendly contacts with appropriate system (such as IFF).	NLRAD 3.08	
4.1.5.4	The M3A shall be capable of operating in a hostile and/or dense EM (Electromagnetic) environment		

Reference	Requirement	CC & CS Codes	Related STANAGS
4.1.6.1	The M3A shall be able to detect, localize, track and classify threats. It shall have the capability to minimize its detection against representative threats and when necessary to engage threats with decoys, chaff, flares, directed counter-measures or other means for self-protection.		
4.1.6.2	The M3A shall be capable of employing Electronic Protection Measures to enhance the survivability and effectiveness of Electronic Warfare Systems and forces in general.		
4.1.7.1	The M3A shall be capable of operating in chemical, biological, radiological and nuclear (CBRN) environments.		
4.1.8.1	The M3A shall be capable of enabling the survivability of the aircrew in case of incidents or accidents (emergency).		
4.1.9.1	The M3A shall have sufficient redundancy and reliability in systems to enable continued operation during degraded conditions (e.g. stand-alone modes for sensors, power failures, etc.).		
4.1.9.2	The M3A shall have sufficient redundancy in Position, Navigation and Timing (PNT) systems to enable continued operation in Global Navigation Satellite System (GNSS) denied environment.		
4.2.1.1	The M3A shall be able to receive and disseminate information and intelligence to military and civilian organisations, platforms,		

Reference	Requirement	CC & CS Codes	Related STANAGS
	systems and applications in a manner necessary to carry out the M3A function.		
4.2.1.2	Voice. The M3A shall be capable of voice communications.	NLRAD 3.10 NTRAD 3.11	
4.2.1.3	Data. The M3A shall be capable of data communications with sufficient data rates to support the distribution of data to other M3A capabilities and end users (.	NLRAD 3.10 NTRAD 3.11	
4.2.1.4	Secure and Non-Secure. The M3A shall be capable of communicating with other air, naval, ground and command units by secure and non-secure means of voice and data communications.	NLRAD 3.10 NTRAD 3.11	
4.2.1.5	The M3A shall be capable of cooperating and coordinating with other manned platforms/capabilities to exercise command and control functions.		
4.2.1.6	The M3A shall be capable of controlling and/or directing manned systems specialised in Anti-Submarine Warfare and Anti-Surface Warfare.	NASW 3.02 NASuW 3.01	
4.2.1.7	The M3A should be capable of controlling and/or directing unmanned systems specialised in Anti-Submarine Warfare and Anti-Surface Warfare.	NASW 3.02 NASuW 3.01	
4.2.1.8	The M3A shall be capable of assuming the duties of Search and Attack Unit Commander (SAUC).		

Reference	Requirement	CC & CS Codes	Related STANAGS
4.2.1.9	The M3A shall be capable of underwater communication by some means, i.e. ESUS, slot buoys, telephony.	NASW 3.03	
4.2.1.10	The M3A shall be capable of satisfying the CIS requirements stated in MC 195 for a M3A.	NLRAD 3.13	
4.2.2.1	The M3A shall be capable of Line of Sight (LOS) communications, whether voice or data.	NLRAD 3.10 NTRAD 3.11 NTRAD 3.12	
4.2.2.2	The M3A shall be capable of secure, robust, reliable Line of Sight communications and imagery transmission to appropriate receiving stations (scheduled or on demand), in Near Real Time.	ISA-IMAGECOL-PER-PAS 3.03 ISA-IMAGECOL-PER-ACT 3.03	
4.2.2.3	The M3A shall be capable of transmitting collected signals data (scheduled or on demand) to appropriate receiving stations, in Near Real Time when required employing secure, robust, reliable line of sight communications.	ISA-SIGCOL-PER 3.05 ISA-SIGCOL-PER 3.07	
4.2.3.1	The M3A shall be capable of Beyond Line of Sight (BLOS) communications, whether voice or data.	NLRAD 3.10 MTRAD 3.11	
4.2.3.2	The M3A shall be capable of secure, robust, reliable Beyond Line of Sight communications and imagery transmission to appropriate receiving stations (scheduled or on demand), in Near Real Time when required via appropriate relay e.g. via wide-band SATCOM.	ISA-IMAGECOL-PER-PAS 3.03 ISA-IMAGECOL-PER-ACT 3.03	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.2.3.3	The M3A shall be capable of transmitting collected signals data (scheduled or on demand) to appropriate receiving stations, in Near Real Time when required employing secure, robust, reliable Beyond Line of Sight communications.	ISA-SIGCOL-PER 3.05 ISA-SIGCOL-PER 3.07	
4.2.4.1	The M3A shall be capable of networking its communications with other platforms and end users at the tactical, operational and strategic levels, as required to conduct operations.		
4.2.5.1	The M3A shall be able to integrate with organisations, platforms, systems and applications necessary to conduct an M3A mission. While related to the ability to communicate, the ability to interoperate goes beyond just communications and information sharing. It includes all aspects of being able to work with Allies and other partners in a robust, secure and sustainable manner.		
4.2.5.2	The M3A shall be capable of contributing to the Common Operational Picture, to the Recognised Maritime Picture (RMP) and Alliance Maritime Situational Awareness (MSA) through the dissemination of appropriate sensor data and generated information and intelligence.	NOAD 3.01	
4.2.5.3	The M3A shall be capable of exchanging MSA-related information (including merchant shipping information) in a timely manner and appropriate form with the Maritime Component Commander (MCC).	NOAD 3.02	
4.2.5.4	The M3A shall be capable of receiving and exploiting AIS/SAIS information.	NOAD 3.04	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.2.5.5	The M3A shall be capable of integration within a naval task force using secure, robust (electronic warfare resistant) and timely line-of sight and Beyond Line Of Sight communication with national, multinational and assigned forces, and with commanders (HQs) ashore and afloat (including subordinate, adjacent and superior levels of command), authorised national military and civilian agencies and international organisations (IOs/NGOs) for coordination of activity, disseminating and exchanging of information and intelligence.	NOAD 3.05	
4.2.5.6	The M3A shall be capable of integrating the theatre JISR capability to permit effective collection tasking, cross-cueing of other collection capabilities and dissemination of collected information to users.	NOAD 3.06	
4.2.6.1	The M3A shall enable interoperability by building on NATO Standardisation efforts, incorporating appropriate STANAGs to which all interoperable systems must adhere. The M3A will be interoperable with NATO systems and platforms as required by operations, in particular: 4.2.6.1.1 NATO and National ISTAR systems 4.2.6.1.2 NATO and National Command, Control, Communications, and Information (C3I) systems, such as: 4.2.6.1.3 Bi-Strategic Command (SC) Automated Information System (AIS) (Bi-SC AIS),		

Reference	Requirement	CC & CS Codes	Related STANAGS
	4.2.6.1.4 NATO Air Command And Control System (ACCS) , 4.2.6.1.5 Battlefield Information Collection and Exploitation Systems (BICES), 4.2.6.1.6 Maritime Command and Control Information System (MCCIS), and 4.2.6.1.7 Land Command & Control Information System (LC2IS).		
4.2.6.2	The M3A shall be capable of contributing to the Joint Targeting Process and identifying indications and warnings.		
4.2.6.3	The M3A shall be capable of conducting coordinated ASW, ASuW and Maritime ISR operations with surface, air, and sub-surface forces.		
4.2.6.4	The M3A shall be capable of interoperating with platforms in the Intelligence Support Activity(ISA) role.		
4.2.7.1	The M3A shall be interoperable with national military and non-military systems and platforms as required to meet national objectives.		
4.2.8.1	The M3A shall be interoperable with other coalitions and partners as required by operations and national objectives. These coalitions/partners may reflect established transnational organizations such as the European Union or ad hoc coalitions formed when and as required to conduct operations in an international context.		

Reference	Requirement	CC & CS Codes	Related STANAGS
4.3.1.1	The M3A shall be able to collect and process data in order to exploit it in near real-time for mission execution. It shall also be able to fuse the data with other externally collected data, conduct detailed post-mission exploitation, and store and archive data for future use and evidentiary purposes.		
4.3.2.1	The M3A shall be able to collect and process its own mission data in order to exploit it in real-time for mission execution (Phase 1 analysis).	NOAD 3.03	
4.3.3.1	The M3A shall be able to process externally collected data and fuse it with its own in order to exploit it in real or near-real time for mission execution (Phase 1 analysis). (	NOAD 2.04 NOAD 3.03	
4.3.4.1	The M3A shall be able to store its own mission data for post-mission processing, exploitation and dissemination (PED).		
4.3.4.2	The M3A shall be capable of recording and storing collected imagery.	ISA-IMAGECOL-PER-PAS 3.02 ISA-IMAGECOL-PER-ACT 3.02	
4.3.4.3	The M3A shall be capable of recording and storing collected signals.	ISA-SIGCOL-PER 3.03	
4.3.5.1	The M3A shall be able to process its own mission data in order to exploit it post-mission processing, exploitation and dissemination (Phase 2 analysis).		
4.3.6.1	The M3A shall be able to store validated mission data in order to make it available for		

Reference	Requirement	CC & CS Codes	Related STANAGS
	future processing, exploitation and dissemination (Phase 3 and 4 analysis).		
4.4.1.1	M3A shall be capable of executing airborne operations denying the enemy the effective use of their submarines and other underwater threats (UUV) in any maritime environment and engaging sub-surface targets.	NASW 1.01 NASW-AIR 1.01	
4.4.1.2	The M3A shall be capable of determining oceanographic conditions required to support the assessment of the environment for AntiSubmarine Warfare operations.	NASW 3.01	
4.4.1.3	The M3A shall be capable of conducting coordinated ASW operations with surface, air, and sub-surface forces..	NASW 3.04	
4.4.2.1	The M3A shall be to detect sub-surface contacts in favourable/ adverse ambient conditions, through the use of specialised, passive and/or active acoustic devices, in all water depths at sufficient range to allow engagement.	NASW 2.01	
4.4.2.2	The M3A shall be capable of planning, establishing, maintaining and monitoring sonobuoy patterns and fields	NASW-AIR 2.04	
4.4.2.3	The M3A shall be capable of gathering acoustic Measurement and Signature Intelligence (MASINT) / Acoustic Intelligence (ACINT)	NLRAD 3.12 NTRAD 3.13	
4.4.3.1	The M3A shall be able to localize sub-surface contacts in favourable/adverse ambient conditions, through the use of specialised, passive and/or active acoustic devices, in all	NASW 2.01	

Reference	Requirement	CC & CS Codes	Related STANAGS
	water depths at sufficient range to allow engagement.		
4.4.4.1	The M3A shall be able to track sub-surface contacts in favourable/adverse ambient conditions, through the use of specialised, passive and/or active acoustic devices, in all water depths at sufficient range to allow engagement.	NASW 2.01	
4.4.5.1	The M3A shall be able to classify sub-surface contacts in favourable/adverse ambient conditions, through the use of specialised, passive and/or active acoustic devices, in all water depths at sufficient range to allow engagement.	NASW 2.01	
4.4.6.1	The M3A shall be capable of engaging sub-surface contacts in order to warn, deter and destroy in favourable/adverse ambient conditions, with appropriate means (such as ESUS, anti-submarine torpedoes, depth charges) in all water depths.	NASW 2.02	
4.4.7.1	The M3A shall be able to assess battle damage. This task should not request specific sensors.		
4.5.1.1	M3A shall be capable of executing operations in any maritime environment to detect, identify and counter an adversary's naval surface capability.	NASuW 1.01	
4.5.1.2	M3A shall be capable of conducting coordinated ASUW operations with surface, air, and sub-surface forces.	NASuW) 3.02	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.5.1.3	M3A shall be capable of assuming the duties of Aircraft Control Unit (ACU) and directing FBA aircraft to conduct Direct Support (DS) operations and engage surface targets.	NASuW-Air 2.04	
4.5.1.4	M3A shall be capable of determining atmospheric and oceanographic conditions required to support the assessment of the environment for Anti-Surface Warfare operations.		
4.5.2.1	The M3A shall be able to detect surface contacts by day/night and clear/adverse weather at sufficient range to allow engagement.	NASuW 2.01	
4.5.3.1	The M3A shall be able to localize surface contacts by day/night and clear/adverse weather and at a sufficient range to allow engagement.	NASuW 2.01	
4.5.4.1	The M3A shall be able to track surface contacts by day/night and clear/adverse weather and at a sufficient range to allow engagement.	NASuW 2.01	
4.5.4.2	The M3A shall be capable of conducting Over The Horizon Targeting (OTHT) and/or 3rd party OTHT	NASuW 2.02	
4.5.5.1	The M3A shall be to able classify surface contacts by day/night and clear/adverse weather and at a sufficient range to allow engagement.	NASuW 2.01	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.5.6.1	The M3A shall be capable of simultaneously engaging multiple surface targets by day/night and in clear/adverse weather with appropriate means (such as medium/large calibre gun armament, anti-ship missiles (OTH), anti-ship torpedoes, non-kinetic weapons).	NASuW 2.03	
4.5.7.1	The M3A shall be able to assess battle damage. This task should not request specific sensors.		
4.6.1.1	The M3A shall be capable of conducting intelligence, surveillance and reconnaissance operations in order to detect, classify, identify, and track, and collect on targets in all weather conditions, day and night, in a maritime environment using passive and active sensors.	NAISR 1.01	
4.6.1.2	The M3A shall be capable of providing intelligence, surveillance and reconnaissance, with appropriate onboard sensors during day/night and clear/adverse weather, in order to contribute to JISR in support of air, land and maritime operations.	NAISR 2.01	
4.6.1.3	The M3A shall be capable of pre-planned imagery collection with in-flight mission update/re-tasking capability .	ISA-IMAGECOL-PER-ACT-LR 3.09	
4.6.1.4	The M3A shall be capable of providing persistent surveillance and reconnaissance coverage beyond the horizon of a naval task group.	NAISR-LR 2.03 NAISR-TAC 2.03	
4.6.1.5	The M3A shall be capable of collecting information on landing areas and surrounding environment in support of planning for	ISTAR-REC-AMPH 2.04	

Reference	Requirement	CC & CS Codes	Related STANAGS
	amphibious operations. This includes information on characteristics of defences including beach minefields and obstacles.		
4.6.1.6	The M3A shall be capable of route and area reconnaissance to provide information on opponent deployment and activity along the route or in the specified area, and other relevant factors. This includes the nature and state of the route, location of obstacles and minefields, the nature of the terrain, habitation etc.	ISTAR-REC-AMPH 2.05	
4.6.1.7	The M3A shall be capable of calling and directing fires on targets in the reconnaissance area	ISTAR-REC-AMPH 2.07	
4.6.1.8	The M3A shall be capable of providing ISR in support of the protection for units, facilities and infrastructure located in port/harbour areas, to include associated anchorages used in support of operations.	NHP 1.01	
4.6.1.9	The M3A shall be capable of determining atmospheric and oceanographic conditions required to support the assessment of the environment for Maritime ISR operations.		
4.6.2.1	M3A shall be capable of persistent collection of images of operationally significant objects and activities on the earth's surface using passive means.	ISA-IMAGECOL-PER-PAS 1.01	
4.6.2.2	The M3A shall be capable of detecting very narrow bandwidth radiation across the full range of the visible and non-visible electromagnetic spectrum.	ISA-IMAGECOL-PER-PAS 2.03	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.6.2.3	The M3A shall be capable of integrating the theatre JISR capability to permit effective collection tasking, cross-cueing of other collection capabilities and dissemination of collected information to users.	ISA-IMAGECOL-PER-PAS 2.04	
4.6.2.4	The M3A shall be capable of operating with platforms in the ISA role. (For example: UAS-MA, UAS-HA).	ISA-IMAGECOL-PER-PAS 3.01	
4.6.2.5	The M3A shall be capable of pre-planned imagery collection with in-flight mission update/re-tasking capability.	ISA-IMAGECOL-PER-PAS 3.05	
4.6.2.6	Medium Range. The M3A shall be capable of generating very high quality imagery at ranges up to 50 km (27NM).	ISA-IMAGECOL-PER-PAS 2.05	
4.6.2.7	Long Range. The M3A shall be capable of providing high quality imagery of operationally significant objects and activities on the earth's surface at ranges greater than 50 km and up to 100 km (54NM)	ISA-IMAGECOL-PER-PAS-LR 2.05	
4.6.2.8	The M3A shall be capable of providing very high quality optical and IR imagery - Clear conditions, day/night	ISA-IMAGECOL-PER-PAS 3.06	
4.6.2.9	The M3A shall be capable of providing very high quality imagery - equivalent to IR NIIRS or other similar scale > 6.	ISA-IMAGECOL-PER-PAS 3.07	
4.6.2.10	The M3A shall be capable of providing very high quality imagery - equivalent to Multi-spectral NIIRS or other similar scale > 6.	ISA-IMAGECOL-PER-PAS 3.08	
4.6.2.11	The M3A shall be capable of providing very high quality imagery - equivalent to Optical NIIRS or other similar scale > 7.	ISA-IMAGECOL-PER-PAS 3.09	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.6.2.12	The M3A shall be capable of providing very high quality optical and IR imagery - Still frame, video.	ISA-IMAGECOL-PER-PAS 3.10	
4.6.3.1	The M3A shall be capable of persistent collection of images of operationally significant objects and activities on the earth's surface using active means.	ISA-IMAGECOL-PER-ACT 1.01 ISA-IMAGECOL-PER-ACT 2.05	
4.6.3.2	The M3A shall be capable of integrating the theatre JISR capability to permit effective collection tasking, cross-cueing of other collection capabilities and dissemination of collected information to users.	ISA-IMAGECOL-PER-ACT 2.02	
4.6.3.3	The M3A shall be capable of generating high resolution radar imagery of surface targets using SAR / ISAR, during day / night and clear / adverse weather.	NAISR 2.02	
4.6.3.4	The M3A shall be capable of sensor surveillance for the detection and tracking of slow moving ground objects of interest, including movement of personnel, units, vehicles and other equipment on the surface and at low altitude by day and night, clear or adverse weather	ISA-IMAGECOL-PER-ACT 2.03 ISA-IMAGECOL-PER-ACT 2.04	
4.6.3.5	The M3A shall be capable of operating with platforms in the ISA role. (For example: UAS-MA, UAS-HA).	ISA-IMAGECOL-PER-ACT 3.01	
4.6.3.6	The M3A shall be capable of pre-planned imagery collection with in-flight mission update/re-tasking capability.	ISA-IMAGECOL-PER-ACT 3.09	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.6.3.7	The M3A shall be capable of effective sensor ranges greater than 200 km (108NM)	ISA-IMAGECOL-PER-ACT-VLR 2.06	
4.6.3.8	The M3A shall be capable of providing good quality imagery and location of fixed or stationary objects of interest - Spot imagery with Radar NIIRS or similar scale > 6..	ISA-IMAGECOL-PER-ACT 3.05	
4.6.3.9	The M3A shall be capable of providing good quality imagery and location of fixed or stationary objects of interest - Strip imagery with Radar NIIRS or similar scale > 3..	ISA-IMAGECOL-PER-ACT 3.06	
4.6.3.10	The M3A shall be capable of providing still-frame and/or video imagery.	ISA-IMAGECOL-PER-ACT 3.05	
4.6.4.1	The M3A shall be capable of continuous 360° sensor surveillance for collecting, direction finding and locating the source of militarily significant RF signals from both communications and non-communications emitters.	ISA-SIGCOL-PER 1.01	
4.6.4.2	The M3A shall be capable of integrating the theatre JISR capability to permit effective collection tasking, cross-cueing of other collection capabilities and dissemination of collected information to users.	ISA-SIGCOL-PER 2.01	
4.6.4.3	The M3A shall be capable of operating with platforms in the ISA role. (For example: UAS-MA, UAS-HA	ISA-SIGCOL-PER 3.01	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.6.4.4	The M3A shall be capable of collecting signals of sufficient quality to enable emitter recognition and identification through appropriate emitter parameters databases	ISA-SIGCOL-PER 3.02	
4.6.4.5	The M3A shall be capable of persistent coverage of an area of interest (loiter/long dwell) or broad area coverage of several, possibly remote, areas of interest.	ISA-SIGCOL-PER 3.04	
4.6.4.6	Range. Capable of effective sensor ranges greater than 200 km (108NM)	ISA-SIGCOL-PER-VLR 2.03	
4.6.5.1	M3A shall be capable of intercepting, collecting, processing, geo-locating, and exploiting signals from non-communications systems (e.g. radars) to generate ELINT.		
4.6.5.2	M3A should be capable of intercepting, collecting, processing, geo-locating, and exploiting signals from Radio Frequency (RF) communications to generate COMINT.	ISTAR-EW 1.01	
4.6.5.3	M3A shall be capable of intercepting, collecting, and processing communications and non-communications signals (including signals for RF RC-IEDs) in the area of operations.	ISTAR-EW 2.01	
4.6.5.4	M3A shall be capable of direction finding and locating hostile RF communications (HF, VHF UHF and SATCOM).	ISTAR-EW 2.02	
4.6.5.5	M3A shall be capable of direction finding and locating hostile non-communications emitters (primarily radar frequencies).	ISTAR-EW 2.03	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.6.5.6	M3A shall be capable of emitter recognition and identification of specific emitter parameters through appropriate emitter databases (e.g. NEDB)/libraries for updating the EOB.	ISTAR-EW 2.04	
4.7.1.1	The M3A shall support the planning and execution of Joint Personnel Recovery (JPR) operations by detecting, localizing, tracking and classifying search objects by passive and active means employing the capabilities specified for ASW, ASuW and Maritime ISR.	ISR AVN-CSAR-PR 1.01	
4.7.1.2	The M3A shall be capable authenticating and maintaining surveillance of isolated personnel where hostile interference may be expected.	AVN-CSAR-PR 1.01	
4.7.1.3	The M3A shall be capable of providing airborne command and control capabilities in support of JPR operations.		
4.7.1.4	The M3A shall be capable of deploying survival equipment and/or effectively assisting located survivors until recovered by other capabilities in a hostile environment.		
4.8.1.1	The M3A shall support the planning and execution of the full spectrum of special operations in the maritime environment, across the full spectrum of military operations unilaterally and independently in support of other component commanders.	SOF-SOMTG 1.01	
4.8.1.2	The M3A shall support special operations by detecting, localizing, tracking and classifying search objects by passive and active means employing the capabilities specified for ASW, ASuW and Maritime ISR.	SOF-SOMTG 1.01	

Reference	Requirement	CC & CS Codes	Related STANAGS
4.8.1.3	M3A shall be capable of employing selective real/near real-time friendly force tracking capabilities (e.g. discrete mode tracking) and battle tracking procedures for own forces.	SOF-SOMTG 3.12	
4.8.1.4	The M3A should be able to transport cargo and personnel as a residual capability.		
4.8.1.5	The M3A should be able to airdrop cargo as a residual capability.		
4.8.1.6	The M3A should be able to airdrop personnel as a residual capability.		
4.8.1.7	The M3A should be fitted with specialized, mission tailored capabilities.		
4.9.1.1	M3A shall be capable of supporting mine hunting operations in an assigned area by passive and active means employing the capabilities specified for ASW, ASuW and Maritime ISR.	NMWH	
4.9.1.2	M3A shall be capable of planning and conducting covert and overt mines laying	NWML-C 2.04 NMWL-O 2.04 NWML-C 1.01 NMWL-O 1.01	

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