

EXECUTIVE SUMMARY

BMT Defence Services Ltd (BMT) in association with Autonomous Surface Vehicles Ltd (ASV) is pleased to present this Final Report on Maritime Unmanned Surface Vehicles (MUSV) delivered in accordance with EDA Contract number 09-R&T-007 dated 18 January 2010.

This study is a stock taking of the EU maritime defence industry's capabilities regarding MUSVs. It includes existing and planned systems, identification of key technologies, opportunities, challenges and areas for which research and technology is needed and which could be the basis for future collaborative R&T projects. The study is linked to the EDA R&T priority of "Naval Uninhabited Systems".

BMT has conducted an extensive literature search and Industry engagement to establish a clear and comprehensive view of current and potential future MUSV platforms, technologies/systems and Industry programmes. We have attempted to identify and prioritise national naval requirements and priorities however we have had limited engagement from participating Member States' (pMS) representatives.

Existing regulations have been examined and BMT have determined what additional rules or guidelines should be developed. The impact of regulations on MUSV operations, identifying the operating procedures that would need to be followed and the technologies/systems that would need to be developed to ensure safety and to support the integration of MUSVs into existing maritime activities have also been assessed.

Where the application of current or potential future standards would give cost and performance benefits or penalties has also been identified. BMT has identified and prioritised where additional Research and Technology (R&T) is needed to ensure MUSVs can achieve the mission objectives whilst satisfying maritime regulations and maximising the benefits of standardisation.

BMT have produced 5 roadmaps to show credible development paths and technology insertion points into existing or planned MUSV programmes to illustrate the potential for cooperative programmes between pMS.

Recommendations are made at the end of each WP discussion both in the main report and the relevant annex. Those the team consider most important are listed in Table 1 below.

This Final Report is complemented by a Master Data and Assumptions List (MDAL) giving the results of the survey of current and potential future MUSV platforms, missions, programmes, associated technologies and systems, standards and regulations.

No.	Detailed Recommendation	Report Ref	Annex Ref
R1	EDA & pMS adopt the definition of a MUSV developed under the Regulations WP.	2.1.4	D6.2.1a
R2	EDA & pMS adopt the MUSV classification scheme based on 5 size categories and 5 autonomy levels.	2.3.2	A2

No.	Detailed Recommendation	Report Ref	Annex Ref
R3	Develop operational profile of a number of key missions to identify critical MUSV requirements.	3.2.1	
R4	Detailed study in conjunction with existing EDA MCM studies to develop requirements of a platform operating in the "Patrolling to detect and track floating mines" and "Neutralise floating mines" missions.	3.1.6	B1.5.4
R5	EDA to sponsor OPEVAL of current pMS MUSVs.	4.4	
R6	EDA to invest in automation of Launch and Recovery Systems.	5.8.1a	C3.7.1
R7	EDA to sponsor research into collision avoidance systems for MUSVs to comply with COLREGs.	5.8.1b	C5.1.4
R8	EDA to discuss with US a strategy for ensuring MUSV control system interoperability.	5.8.1c 7.10.3	C8.1.2
R9	EDA to sponsor research into robust and adaptable decentralised data fusion techniques, including low accuracy data sources.	5.8.1d	C8.1.7
R10	EDA to sponsor research into reliable, secure, low bandwidth high data rate communication links.	5.8.1e	C9.3.2
R11	EDA to sponsor industry development of Guidelines for the Safe Operation of MUSVs.	6.7.1a	D6.8.1a
R12	pMS, EMSA and possibly USA to submit information paper to lead to formal recognition at MUSVs as a specific class of marine vehicle especially within COLREGs.	6.7.1b	D6.8.1b
R13	Initiate dialogue between EMSA US coast guard on recommendation R12.	6.7.1b.iii	D6.8.1b.iii
R14	EDA to sponsor development of Sense and Avoid Policy and Specification.	6.7.1c	D6.8.1c
R15	EDA to sponsor development of Naval Task Guidelines for MUSVs.	6.7.1d	D6.8.1d
R16	EDA to sponsor development of standards for MUSV Launch and Recovery including hooks, capture equipment, safety guides.	7.6.2a 7.10.4a	E10.1.4a
R17	EDA to sponsor development of standards for MUSV data transmission (payload downlink)	7.10.4b	E10.1.4b
R18	EDA to sponsor development of standard for MUSV safety	7.10.4e	E10.1.4e

Table 1 - Final Recommendations