Statement of Requirement (SoR)

Reference Number	**RQ0000027254**
Version Number	**1.0**
Date	**20/02/2023**

1.	**Requirement**
1.1	**Title**
	Sonar Safety (SO-SAFE) Maritime
1.2	**Summary**

	Dstl requires support in the development of the Sonar Safety (So-Safe) maritime for un-crewed systems capability for defence.
	The task is proposed to be split into 2 phases:
	• Phase 1: Exploration and feasibility assessment (the subject of this proposal);
	• Phase 2: delivered in two parts;
	  • A - Accelerated development and component laboratory demonstration (initially open to only those organisations who are funded during Phase 1 and who submit their Phase 1 deliverables to the required timescale. Funding for this Phase is dependent upon the project passing the Phase two decision gate);
	  • B Systems Integration and Demonstration.

1.3	**Background**

	Following a number of marine mammal strandings in the late 1990s/early 2000s which coincided with the use of Tactical Active Sonar (TAS), the scientific community and various Non-Governmental Organisations (NGOs) began to pressurise legislators and regulators to implement protective measures for the cetaceans of the marine life. In response to this, countries began to implement legislation and policy for the protection of the marine environment, in particular vulnerable species. Consequently, the Secretary of State (SOS) for defence mandated that the Ministry of Defence (MoD) must ensure that the protection the military affords to the environment must meet legislation in order to uphold its duty of care and the UK MoD has introduced and applied safeguards in response to this mandated requirement. The current safeguards are matched to in-service crewed platforms and systems, however over the last decade, the military has developed options to exploit un-crewed systems to augment crewed assets and enhance military capability delivery. The use of un-crewed systems can obviously lead to new ways of working as well as new challenges including how to mitigate the use of tactical active sonar operated from remote assets. At the same time, UxVs also offer the opportunity enhance the collection of environmental and marine mammal information at reduced cost. While the availability of data has the opportunity to enhance the ability of systems to detect and locate marine mammals and thereby enable more effective mammal protection to be implemented, realising this opportunity requires that the high volumes of data can be quickly and efficiently converted into meaningful ecological information. Therefore a pertinent question is: can machine learning and/or other techniques be used to enable the extraction of essential information so it can be utilised to enable intelligent system decision-making and thereby enhanced marine mammal safety.
1.4	**Requirement**
	The MoD are committed to continually improving their marine mammal risk mitigation practices to ensure that approaches account for the latest science and both current and potential future military capability. The key requirement is to assess the extent to which data collected from deployed and remote sensors (both in-water and overhead), together with modelled data, historical data, and data from other sources, can be used to automatically generate a marine mammal recognised picture, allowing marine mammal risk to be understood and therefore enabling the safe and effective use of un-crewed systems for active sonar operations. It is expected that this safe risk management picture can be extended to crewed platforms. The So-Safe Maritime project is designed to create and assess such a system, developing new technology, building on recent developments in Artificial Intelligence (AI), Machine Learning (ML), and Data Science, for both above and underwater sensors. The outcome of this project will enable intelligent decision making, to optimise the use of sonar in parallel to minimising the risk to marine life and to support safe operations of active sonar from uncrewed systems. In addition, the system will need to consider hearing

damage[1] and behavioural response[2] requirements within the scope of the activity. The outcome, upon receipt by Dstl, will be mature tested assessed and proven.

Under the first phase of this programme, the requirement is to identify and assess a set of concept options that provide intelligent, automated management of the risk to marine mammals when operating sonar from remote (un-crewed) systems. The phase 1 activities should:

- Provide an overall description of the envisaged system;
- Describe how the different types of sensor data, and data from other sources, will be used and the processing schemes which will be applied;
- Identify the performance levels and limitations expected from the different sensor types and associated processing schemes, the range of effect of those sensors and how the elements would be integrated into an operable system;
- Describe the data fusion approaches which are envisaged to bring the different elements of information together to generate the recognised marine mammal picture;
- Identify how information would be handled and the communication requirements to generate the identified system solution;
- Identify the level of performance that is expected to be achieved by the system and key sub-systems – with evidence to support those expectations where possible;
- Explain how the system will be designed to be modular and easy to update / extend – including by third parties under contract to MOD.

Subject to contract, and subject to affordability, the authority intend to place multiple Phase 1 contracts with different suppliers in order to investigate a wide range of potential concepts. Each Phase 1 contract should consist of an exploration and feasibility study to be completed in less than 3 months. The output from each study should include a detailed description of a ~48-month multidisciplinary phased project, to design, develop, test and demonstrate one or more candidate concepts, consisting of new technology solutions and associated software, to be integrated in the So-Safe system. Phase 2 (awarded to the highest scoring proposal for phase 2 delivered during phase 1 and contracted separately) will see the delivery of the proposal set out in Phase 1 and demonstrate the operation and utility of the So-Safe system to support safe operations of active sonar, which minimise the risk to marine life, in the operating environment.

[1] The current method used to assess risk of harm used by MOD
[2] The MOD's future method to assess risk of harm

1.5	Options for follow on work

The aims of the project are to develop and demonstrate an innovative intelligent system to support marine mammal mitigation from remote/un-crewed systems. This will be achieved by developing and testing new concepts using single/networked sensor data collected by uncrewed platforms, together with other data, and recent developments in AI, ML and data science, including data analytics, to detect, monitor and predict marine mammal presence and activity. The project includes an exploitation route for these concepts, as part of the So-Safe system, by demonstrating the system in a realistic environment. The project will be structured around two phases as described below and illustrated in Figure 1. It should be noted that funding for Phases 2 is dependent upon the project passing a decision gate at the end of Phase 1.

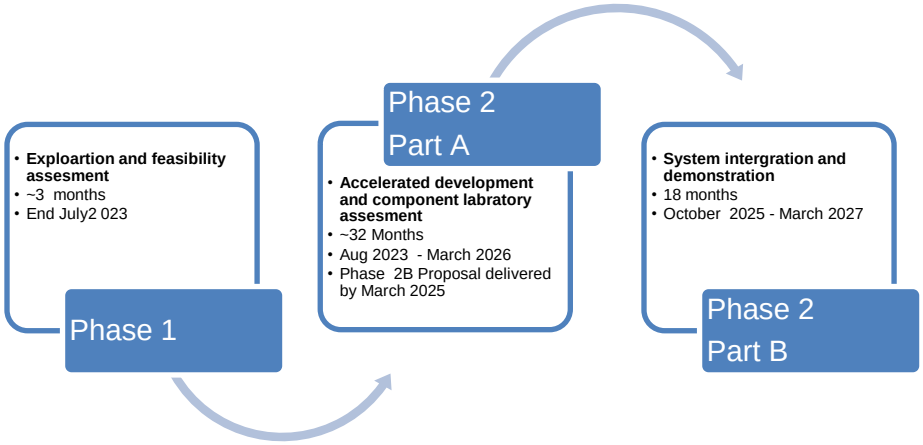

Figure 1. Phased approach for the So-Safe Maritime project

Phase 1: Exploration and Feasibility Assessment. This is the short investigative phase, lasting up to 3 months, that is described within Section 1.4. Its aim is to undertake an initial exploration of the proposed concepts and generate evidence to inform a feasibility assessment for technology maturation including realistic route, timescales, costs and risks/opportunities. Suppliers should use this evidence to support the proposed development stream for their technology in Phase 2 part A.

Phase 2 part A: Accelerated development and component demonstration. This competition Phase, lasting up to 32 months, will only be open to Phase 1 suppliers who submitted a proposal for Phase 2 as a deliverable and who complete their Phase 1 work to the required schedule, scope and quality.

The aim of this phase is to accelerate the development of the concepts from Phase 1 including the development of lower TRL ideas, which will need to be matured rapidly over the 32-month period to include a laboratory demonstration of the technology. Phase 2 part A leads to Phase 2 part B where a demonstration of a prototype system in a representative environment is required.

In the event of the winning proposals not fully covering the scope of the requirement (proposals will only be funded if the Authority assesses them to be of at least adequate

	value for money), the Authority reserves the right to not place any contract or to re-compete the requirement. **Phase 2 part B: Systems integration and demonstration.** This Phase, lasting up to 18 months, (and beginning 6 months before the end of Phase 2), see Figure 1, will integrate component technologies to demonstrate the SO-SAFE system exploiting single /networked sensors and advanced processing techniques in a relevant environment (TRL 5-6[3,4]). The demonstration of the SOSAFE system could take place at an MOD sea range or equivalent location (e.g. protected UK coastal waters). Note that Phase 2 Part B should be described in the Phase 2 proposal and will be contracted at the same time as Phase 2 Part A.

[3] TRL5: Technology basic validation in a relevant environment.
[4] TRL6: Technology model or prototype demonstration in a relevant environment.

1.6	Deliverables & Intellectual Property Rights (IPR)						
Ref.	**Title**	**Due by**	**Format**	**TRL ***	**Expected classification (subject to change)**	**What information is required in the deliverable**	**IPR DEFCON/ Condition**
D - 1	Presentation at Stakeholder Event	TO +3 months	Presentation (.pptx)	3/4	The Authority will work with suppliers during Phase 1 to confirm the classification requirements for their work post Pre-bidders conference.	A Stakeholder Presentation Day will take place during July 2023. Suppliers will present the outputs of the Phase 1 projects to stakeholders and outline their plans for Phase 2 research.	705 Full Rights
D - 2	Proposal for Phase 2	TO +2 months	Proposal document (.pdf)	3/4	The Authority will work with suppliers during Phase 1 to confirm the classification requirements for their work post Pre-bidders conference.	Suppliers will be expected to produce a fully costed proposal for a Phase 2 project. Only bidders funded at Phase 1 qualify for entry into Phase 2 of this competition	705 Full Rights
D – 3	Final report	TO +3 months	Report (.pdf)	3/4	The Authority will work with suppliers during Phase 1 to confirm the classification requirements for their work post Pre-bidders conference.	A final report documenting the research undertaken within Phase 1.	705 Full Rights

***Technology Readiness Level required**

1.7	**Standard Deliverable Acceptance Criteria**
1.8	**Specific Deliverable Acceptance Criteria**
	The Phase 2 proposal shall clearly demonstrate how the solution will be matured over a further period of development up to 45 months. This should be supported by evidence generated through Phase 1 including: • The technology advancement for SO-SAFE offered by the proposed approach, when compared with existing or planned solutions. • The realistic route, costs and timescales to technology maturation, including risks to achieving this. • The system integration challenges/opportunities including how the proposed approach can provide an effective (intelligent) assessment of risk from mammal tracks and behavioural information The Phase 2 proposal shall include a project plan, a clear description of the technical challenge that will be addressed, detailed descriptions of the technical approach/method and detailed descriptions of outputs. Detailed descriptions of deliverables shall also be included and should be designed to provide evidence of progress against the project plan and record the technical findings of the work. Proposals should include a resourcing plan with CVs for those members of the project team that will either deliver a significant proportion of the activity or who will have a major impact on the direction of the work.

2.	**Quality Control and Assurance**
2.1	**Quality Control and Quality Assurance processes and standards that must be met by the contractor**
	☒ **ISO9001** (Quality Management Systems) ☐ **ISO14001** (Environment Management Systems) ☐ **ISO12207** (Systems and software engineering — software life cycle) ☐ **TickITPlus** (Integrated approach to software and IT development) ☐ **Other:** (Please specify below)
2.2	**Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement**

	N/A

3.	Security	
3.1	**Highest security classification**	
	Of the work	It is anticipated that Phase 1 proposals will be [redacted]. However, if suppliers believe any elements of their Phase 1 proposal should be protected at a higher classification they should submit these using a separate classified Annex. The Authority will work with suppliers during Phase 1 to confirm the classification requirements for their work and deliverables including the Phase 2 proposal.
	Of the Deliverables/ Output	As above
3.2	**Security Aspects Letter (SAL)**	
	Yes If yes, please see SAL reference- 20230220_SAL_for_ITT_SOSAFE[redacted] The Authority will work with suppliers during Phase 1 to confirm the classification requirements for their work post Pre-bidders conference.	
3.3	**Cyber Risk Level**	
	[redacted]	
3.4	**Cyber Risk Assessment (RA) Reference**	
	[redacted] If stated, this must be completed by the contractor before a contract can be awarded. In accordance with the Supplier Cyber Protection Risk Assessment (RA) Workflow please complete the Cyber Risk Assessment available at https://suppliercyberprotection.service.xgov.uk/	

4.	Government Furnished Assets (GFA)
GFA to be Issued -	No