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Statement of Requirement for the R-Cloud Electromagnetic Activities (EMA) Strategic Capability

Introduction

The Defence Science and Technology Laboratory (Dstl), which is part of the UK Ministry of Defence (MOD), is refreshing its commercial agreement for Science and Technology (S&T) research contracts, known as R-Cloud (Research Cloud).

MOD places extensive fundamental, experimental and applied research with industry and academic suppliers and wants to broaden access for this supply base, reducing the cost of trading with MOD and enabling agile contracting. R-Cloud complements MOD's other contracting mechanisms and academic and industry suppliers of S&T research are now invited to apply to join MOD's research supplier community within the Electromagnetic Activities (EMA) Strategic Capability.

This statement of requirement relates to suppliers joining R-Cloud within the Electromagnetic Activities (EMA) capability area. R-Cloud provides a low barrier to entry for potential suppliers and offers direct access to MOD's current and future research requirements. Academic and industrial suppliers of Electromagnetic Activities (EMA) research are invited to apply to R-Cloud if you are a supplier of Science and Technology Research in this area.

Support is required across MOD's products and services:

Research

Original research and concepts to create new and enhanced capabilities for Defence & Security.

Requirements & Evaluation

S&T support to the assessment, evaluation and delivery of current and next generation capabilities.

Specialist Advice & Services

Specialist knowledge and facilities at readiness to meet priority needs.

Operational Support

Rapid and deployed S&T to meet the urgency of operations.



Description

The S&T ambition for EMA is that through real-time and pervasive EM situational awareness and offensive capabilities to contest the electromagnetic spectrum; UK Defence and security will be able to protect its forces, maintain freedom of action and disrupt, degrade, deceive and deny adversary's capabilities via the Electromagnetic Environment (EME).

Context

Electromagnetic Activities are defined as "All offensive, inform and defensive activities that shape or exploit the electromagnetic environment and the enabling activities that support them." (*UK Defence Electromagnetic Activity Strategy*, 2020).

To understand, manage and control the EME is a vital role in warfare at all levels of intensity with the outcome of future operations decided by the protagonist who does this to decisive advantage.

Digitisation has led to the need for convergence of cyber and information activities to such an extent that coordination of Cyber and Electromagnetic Activities (CEMA) across the joint force will be imperative. CEMA includes both Offensive, Defensive and Inform activities, a more coherent/dynamic approach to the management of spectrum use and integration with wider capabilities including Cyber.

As such, the synchronisation and coordination of EMA, delivering operational advantage thereby enabling freedom of movement, and effects, whilst simultaneously, denying and degrading adversaries' use of the EME and cyberspace is vital.

UK Defence is therefore moving towards an integrated operating concept model to face these challenges, including persistent sub-threshold competition in which the Cyber and EM domain is strategically important.

Elements

This capability area covers a wide range of relevant research topics relating to all EMA capabilities at all levels from fundamental/underpinning science through to system of systems levels issues. Below is a summary of overarching research requirements for EMA by capability element:

Threats and Targets

S&T to develop and deliver technology to enable rapid characterisation and assessment of the operation of software and hardware within EM threat and target systems and technologies, both military and civilian. Including, Communications, Radar, Position Navigation and Timing and Electromagnetic Warfare systems.

Effects Development

S&T to enable rapid development of EMA effects and techniques, from exploitation of specific communications and Radio Frequency (RF) standards to system of systems level effects assessment. Includes EM deception, counter-ISR, counter-comms, exploitation of



Automation/AI for cognitive Electromagnetic warfare and analogue and digital RF system design and development.

Sense and Understand

Techniques to detect, recognise, identify and locate Electromagnetic targets (with a focus on communications, Radar, adversary EM effects and unintended RF emissions), including digital signal processing (DSP) and Electromagnetic Surveillance (ES) techniques.

Environmental Effects

S&T to understand and mitigate the effects of EM fields on systems within a congested and contested environment. Includes Electromagnetic Compatibility (EMC) to support the integration of EM systems into wider platform systems, Electromagnetic protection and security, plus propagation modelling and spectrum management.

EM Futures

Developing and emerging S&T applicable to Electromagnetic Activities which may provide novel approaches to protect UK forces or to disrupt, degrade, deceive and deny adversary's capabilities. Includes EM applications of Meta-Materials and Quantum technologies plus fundamental Electromagnetic theory.

Test and Assurance

S&T to develop and deliver technology which enables Defence to rapidly test, assure and innovate its current and future capabilities as well the underpinning R&D. This includes over-the-air, hardware in the loop as well as modelling and simulation of contested and congested Electromagnetic environments and systems.

Interoperability Standards

Technologies to enable Defence to rapidly integrate new and future capabilities while maximising its ability to exploit EM data and information at the pace of relevance to the strategic and tactical warfighter. Includes S&T to enable systems to be rapidly updated to keep pace with the evolving threat, through modularity across enterprise, data, command and control, software, hardware and platform integration via the stewardship and development of open standards.

Platform Integration

RF, electronic, electrical and mechanical engineering S&T enabling platform integration of EM systems. Includes the implementation and management of EM techniques on Defence systems across electromagnetic warfare and electromagnetic countermeasures.

Enterprise Integration

S&T enabling the support to and development of Electromagnetic Activities capabilities as part of a strategic EM Enterprise and its integration with other domains. Includes technologies and standards for data and information exchange, Electromagnetic battlespace Management (EMBM) and broader business, policy, concepts and doctrine support and analysis.

Note: This SC does not include directed energy weapons S&T.