



Electromagnetic  
Activities

OFFICIAL



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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.

Below is a summary of overarching research requirements for EMA:

### **EMA - Statement of Requirement**

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). For the purposes of R&D, we also include uses of the Electromagnetic Environment for all types of Communications and other uses such as for Position, Navigation and timing.

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 Offense, Defensive and Inform activities, a more coherent/dynamic approach to the management of spectrum use and integration with wider capabilities including Cyber.



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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. As we enter the Information Age through digitisation, the distinction between operating at home and away has also blurred, sitting across the EM Spectrum (EMS) in a new operating context.

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.

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. Particular research topics of interest include synchronisation and coordination of EMA; Electronic Attack; and our ability to understand and access the EMS. (towards real-time spectrum operations) These are considered below although other topics are also relevant.

Across all topics, pan-Defence Lines of Development (DLOD) approaches to capability improvement are relevant including changes to concepts, doctrine, and training. This should be considered along with EMA Planning and management capabilities including tactical, operational and campaign level across multiple disciplines and planning with other agencies with potential for automation across the enterprise.

1. The scope of coverage of topics related to Synchronisation and Coordination of EMA includes, but is not limited to, the following:
  - a) Enabling a common/integrated approach to Electromagnetic Activities Planning and management capabilities including tactical, operational and campaign level across multiple disciplines and planning with other agencies including, but not limited to, potential for AI driven automation across the enterprise.
  - b) Technology concepts for advancing integrated Electromagnetic Activities capabilities including multi-function multi-spectrum EM systems, mission data, open architectures and distributed and cognitive design. Toward enterprise-level capabilities operating across domains.
  - c) Means for physical test and evaluation, for virtual modelling and simulation and some hybrid combination of the two at the enterprise-level.
2. The scope of coverage of topics related to Electronic Attack includes, but is not limited to, the following:
  - a) Technology concepts for advancing Electronic Attack as a service within CEMA. Including, but not limited to, EM deception, counter-ISR and counter-comms.
3. The scope of coverage of topics related to understand and accessing the EMS includes, but is not limited to, the following:
  - a) Technology concepts for advancing risk management in spectrum access through dynamic, even liberal, policies for access.
  - b) Development of Electronic Surveillance techniques to detect, classify, identify and locate a wider range of EM emitters, including functional identification of those that have not been previously seen and do not have prior records.



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These areas may include, but are not limited to:

- Basic research into processes, techniques and technologies that may be of use to CEMA Systems, Electronic Attack or understanding and access to the EMS (towards real-time spectrum operations).
- Applied research into component, sub-system and system level aspects of:

GENERALLY IMPORTANT	SUBJECT AREAS THAT MAY OFFER SPECIFIC OPPORTUNITIES	
Artificial Intelligence, Machine Learning and Data Science Architecture and Operating Systems Effector Technologies (Electronic Attack) Integrated systems engineering and technology Sensors (Sensor Fusion) Digital Signal Processing Simulation technology Effector Technologies (Cyber) Sensors (ES) Autonomous Systems and Robotics Information management systems research Optimisation planning and decision support systems ICT Networks & Distributed Systems Defensive aids suites research Electronic protection measures research Battlespace information acquisition and processing Information superiority research Antennas and Loops (Tx and Rx) RF & Microwave Devices Advanced Electronics and Computing	Computing hardware and software research Microelectronics Device Technology Microelectronics Design Sensors (Radar) RF & MW Communications Human factors engineering Signature control and signature reduction Electromagnetic propagation in air and water Complexity Science Sensors (EOIR) Mathematical Analysis Control Engineering Radio frequency wave propagation Sensors and Instrumentation Surveillance and navigation satellites research Communications systems research Statistics and Applied Probability Command and control systems research Operations research and systems analysis Effector Technologies (RF DEW)	Sensors (Graphene - Thz, UV) Sensors (Quantum) Pervasive and Ubiquitous Computing Microsystems Electromagnetic pulses Graphics and Visualisation Nanoengineering and nanotechnology Numerical Analysis Advanced Materials (Advanced Manufacturing) Power, Energy Storage, Conversion, and Transmission Effector Technologies (Laser DEW) Human performance research Training and education research