Specification of Requirements for National Space Operations Centre (NSpOC) Space Domain Awareness 2030 Capabilities

Background

In 2023, UK Space Command, the Met Office and UKSA established the National Space Operations Centre (NSpOC). Space Domain Awareness (SDA) – the ability to understand and respond to what is happening in space – underpins all space activities and is a critical requirement for delivering a wide range of UK civil and military space objectives.NSpOC combines and coordinates civil and military space domain awareness capabilities to enable UK space operations and protect our interests in space and on Earth from space related threats, risks, and hazards. With a combined annual budget of over £20 million and approximately 70 civilian and military personnel, NSpOC plays a vital role in ensuring space remains safe, sustainable and accessible for all.

Our mission sets include:

- protecting and defending the UK's space interests
- missile warning
- uncontrolled re-entry early warning
- in-space collision avoidance
- fragmentation alerting and monitoring
- support to licence monitoring
- space weather notifications and advice

Since May 2024, NSpOC has generated SDA through a centralised System of Systems (SofS) approach. The Cross-Government Space Domain Awareness Requirements were published in July 2023 to inform the development of the SofS, which includes the entire SDA chain from sensors and data processing through to readouts for policymakers. The SofS leverages opportunities to collaborate with partners and acquire commercial off-the-shelf solutions that complement national capabilities while safeguarding sensitive data and ensuring capability assurance. The SofS continues to evolve in response to changes in the space domain environment to ensure it provides security-focused, decision-quality information that can be used to successfully mitigate adversary space effects and support the integration of allied space effects into multi-domain operations. This approach entails combining data from various sensors and fusing it with operational and intelligence sources that enhance SDA. It encompasses space, ground and link segments. SDA is inherently dual-use (civil and military), with sensor data potentially serving a multitude of functions. The focus is on developing a cohesive and integrated system that can effectively analyse activities in space and provide comprehensive domain awareness.

Aims and Objectives

Provide an overview of the aims and objectives of the specific procurement, identifying the reasons behind the procurement and what the overall aim of the procurement is. Information should be provided to set context to tenderers and to identify the overall objectives for the procurement.

This specification builds upon priority user requirements UKSDA-UR-800 and UKSDA-UR-900 ("Independent UK SDA data and assurance capabilities: The SoS shall facilitate development of SDA data and UK sovereign assurance capabilities, e.g. through sensor capability and direct data acquisition rights from non-UK assets" and "Independent UK SDA national capabilities and skills: The SoS shall develop sovereign UK SDA capabilities, e.g. through development of hardware and software capabilities, and national skills and expertise growth in SDA"). To achieve this, active consideration is being given to increasing both the number of sensors and associated infrastructure within government ownership, as well as increasing the capabilities of both new and existing sensors. UKSA's intention is to ultimately procure one or more sovereign sensors that will form part of NSpOC's SofS.

By 2030, NSpOC is aiming to secure an electro-optical capability that can operate in surveillance and tracking modes in order to tessellate across as wide a Field of View as possible, alongside a more exquisite capability that could provide a characterisation element. We are open to innovative approaches and suggestions from suppliers, but our anticipation is this will include:

a) A sovereign LEO sensor capable of tracking at least 10,000 objects per day down to 5cm at 1,000 km range, with accuracy and precision in-line with or exceeding international capabilities to ensure data is of international value and detection and tracking capabilities for both catalogued and uncatalogued objects
b) Sovereign sensors covering 100% of the GEO belt (noting that 100% uptime/coverage is not expected due to visibility constraints such as weather)
c) An overarching system capable of both GEO and LEO observations, which will be highly available (>95%) and have some element of expandability to increase coverage and/or improve object detection size
d) The capability to detect low observable targets in GEO
e) A modular approach which enables NSpOC to incrementally build up the system over time and incorporate future emerging requirements
f) A testbed area alongside sensors to be able to test new capabilities
g) Sufficient space to be able to accommodate at least 3-4 other independent sensors in future

NSpOC would expect this system to:

1) Directly support core mission sets:
    a. Conjunction
    b. Re-entry
    c. Fragmentation
    d. Compliance
    e. Support our understanding of space weather impacts
    f. Support military requirements

2) Support future operations, capabilities and licensing:
    a. Launch/LEOP, OSAM, EO, PNT, Science, etc
    b. Monitoring of novel and high-risk activities to develop better practices and understanding of risks
    c. Space Traffic Management/Coordination
3) Be a sovereign assurance system:
    a. Assurance of international catalogues including gaps
    b. Assurance of data from satellite operators (e.g. ephemeris accuracy and covariance realism)
    c. Assurance of data and services from satellite operators is to be consistent and compliant with UK Government principles of Secure by Design, covering integrity, vulnerability and availability, for data at rest and data in transit – we would expect this to be embedded throughout your full supply chain
    d. Solution architecture must be resilient to meet Service Level Agreement availability of >95%, with hardware and/or software fault tolerance to withstand cyber-attack (including but not limited to service denial, hacking, data leakage, ransomware either direct or within the supply chain)
    e. Assurance of commercially accessed SDA data
4) Be designed to have low ongoing operational expenditure in terms of maintenance, site personnel required, power and data.
5) The system may comprise a network of geographically disparate sub-systems but should account for PESTLE factors as well as the ongoing operational burden to support such a network.
6) Meet and exceed published SDA requirements with a particular focus on
    a. Object detection size: at least down to 5cm at 1000 km
    b. Volume of catalogue that could be detected: 10,000 objects per day based on current population with capacity to increase as orbital population grows
    c. Revisit rate of objects:
    d. Weak characterisation (e.g. approximate object size, stability)
    e. Detection of fragmentation events
    f. Generating accurate characterisation data e.g. RCS/Mag Data

UKSA wants to encourage suppliers to innovate in proposing solutions that could meet the above objectives and has designed a procurement process to accommodate this by utilising a competitive flexible procedure available under Procurement Act 2023. This will include three distinct phases with a Downselection competition at the end of each phase:

1. Phase 1: Feasibility Study (this requirement, 18 months in duration). Suppliers are asked to conduct desk-based research to set out a pathway to phase 2, identifying how their proposed solution would meet the requirements list above and producing a design specification. We anticipate selecting approximately five suppliers at this stage. We anticipate offering a firm fixed price of £1,000,000 inclusive of VAT for this work.
2. Phase 2: Prototype and Testing (30 months in duration). Suppliers are asked to refine their design specification, set out operating costs and requirements and manufacture a prototype to demonstrate operational capability. We anticipate selecting two suppliers at this stage.

3. Phase 3: Build and Deployment (72 months in duration). The successful supplier will build and deploy the proposed system, including a handover period to transition operations across to UKSA. We anticipate selecting one supplier at this stage.

Suppliers' Phase 1 feasibility study is expected to set out how a proposed system or solution will address all of the technical requirements identified above. Requirements, KPIs and Risks are set out below for phase 1.

UKSA reserves the right to:

- Amend the Tender Notice throughout the full duration of the requirement to ensure all feedback can be addressed and any emerging issues identified at the earliest possible stage – this may include adding additional requirements to be addressed in subsequent phases or providing further clarification on existing requirements.
- Amend the proposed procurement process, including but not limited to, withdrawing stages or terminating the process, at any point throughout the life of this requirement – either because a foreseen or unforeseen risk has materialised, or for any other reason.
- Amend the assessment criteria, including adding additional criteria or sub-criteria, at any point during the process
- Amend the specification, including the technical requirements listed above
- Undertake dialogue with individual suppliers to steer their emerging solutions towards our requirements more effectively

Requirements					
Item #	**Work Category**	**Requirement Guidance**	**Contract Deliverables**	***Delivery Date***	***Acceptance Criteria***
	Input title for work category	*Provide overview of the requirement including any background needed (WHY)* *Include any requirements that need to be met when delivering this requirement (HOW)*	*Identify specifically what the deliverables are to be provided- including format (WHAT)*	*When should the items/ service be delivered. At tendering this should be marked as CA+X months. Upon Contract award this should be updated to include firm dates*	*This should identify the process along with timescales you will undergo to accept the deliverables/ service. This should identify any technical review steps you plan to take deliverables through. This section should be aligned with the contractual terms.*
1	Project Management	The Contractor shall present at kick-off a proposed project schedule covering the 18-month project delivery timetable and re-present this as a standing item at each quarterly meeting to confirm any updates	Project schedule provided as a Gantt Chart in PDF, and presented as a standing item at each	*Quarterly*	Confirmation within quarterly meeting minutes that project schedule review has taken place and been agreed.

		to the schedule. The Contractor shall ensure the project schedule is updated at least once per fortnight	quarterly update meeting. Project schedule provided 5 Working Days before scheduled meeting alongside agenda.		Updated project schedule provided alongside meeting agenda.
2	Delivery of Quarterly Meetings	The Contractor shall deliver quarterly meetings throughout the life of the Contract. These will form part of the Governance process of the Contract and be used to track progress, identify risks and issues, and escalate any issues that arise throughout the life of the Contract. Quarterly meetings shall be held in person, alternating between the Contractor location and the Authority offices. Meetings shall include the ability for virtual attendance. The Contractor shall supply an agenda and management pack which includes as a minimum: Project schedule, progress towards technical feasibility report completion, KPI data, forecast data, risks, issues & Dependencies. The Contractor shall maintain accurate minutes from each meeting.	Meeting agenda issued 5 Working days before scheduled meeting. Quarterly Review meeting held. Meeting minutes provided 5 Working Days post Quarterly Review meeting.	*Quarterly*	Minutes provided to Agency Contract lead via email that align to request within the requirement guidance. Reviewed and formally agreed by the Authority within 5 working days. Should any deficiencies be identified these will be identified by the Authority and the deliverables re submitted for review for acceptance within 5 working days by the Authority.
3	Risk Management	The Contractor shall present at kick-off a proposed risk register covering key risks (including key technical risks) and re-present this as a standing item at each quarterly meeting to confirm any updates to the schedule. The Contractor shall ensure the risk register is updated at least once per month.	Risk register provided in an agreed format and presented as a standing item at each quarterly update meeting. Risk register provided 5 Working days before scheduled meeting	*Quarterly*	Confirmation within quarterly meeting minutes that risk register review has taken place and been agreed. Updated project schedule provided alongside meeting agenda.

			alongside agenda.		
4	Technical Feasibility Study	At the conclusion of the 18-month period, the Contractor shall present a final technical feasibility study which details how the technical requirements listed in the specification above will be addressed. The feasibility study should include: • a high-level design for any sensors proposed • details of any software or systems you plan to use • details of any off-the-shelf products or solutions you intend to incorporate • how the solution addresses the technical requirements set out above • Rough order of magnitude costings for prototype, build, deployment and ongoing maintenance • Expected ongoing maintenance and operational requirements An interim technical feasibility study will be presented at least six months prior to the conclusion of the 18-month period to enable UKSA to comment.	Interim technical feasibility study provided at least six months prior to project conclusion, with 20 working days for UKSA to review and provide comment. Final technical feasibility study provided at 18-month conclusion, with 10 working days for UKSA to review and provide comment.	*Interim report provided at least six months prior to project conclusion* *Final report provided after 18 months at project conclusion*	Confirmation of acceptance following technical review of deliverables by UKSA and DSTL.
5	Phase 2 Proposal and Costings	At the conclusion of the 18-month period, the Contractor shall present a proposal for their Phase 2 activity, including relevant costings.	Phase 2 proposal provided at 18-month conclusion	*Phase 2 proposal provided after 18 months at project conclusion*	Confirmation of acceptance of bid for Phase 2 downselection competition following eligibility review by UKSA.

Price
UKSA offers up to £1,000,000 inclusive of VAT for the full 18-month feasibility study, based on capped time and material costs/full cost recovery (*to be determined prior to issue*). We encourage suppliers to breakdown proposed costings on a quarterly basis to be invoiced following each quarterly review and confirmation of satisfactory completion by UKSA. Proposed bids should include clear costings (we anticipate this will principally be day rates for

staff involved, overhead costs and quotes from any subcontractors for their role). For any proposed subcontractors, we would expect to see validated quotations that clearly detail the proposed work and pricing.

Key Performance Indicators (KPIs)

No.	Key Performance Indicator Title	Definition	Frequency of Measurement	Severity Levels
KPI1	Project schedule progress	Adherence to the project schedule agreed at contract award	Quarterly	**Target Performance Level** (Good): On schedule **Minor KPI Failure** (approaching Target): 2-4 weeks behind schedule **Serious KPI Failure** (Requires Improvement): 4-6 weeks behind schedule **Severe KPI Failure**: (Inadequate) Over 6 weeks behind schedule
KPI2	Effective risk management	Effective risk mitigation of risks identified in the risk register	Quarterly	**Target Performance Level** (Good): No major risks materialised, up to two minor risks materialised **Minor KPI Failure** (approaching Target): two to four minor risks materialised, no major risks materialised **Serious KPI Failure** (Requires Improvement): One major risk materialised **Severe KPI Failure**: (Inadequate) Two or more major risks materialised

Risks

No.	Risk	Risk Owner	Mitigation	Issue Management
RISK1	Delays in kick-off or contract	UKSA	UKSA will provide contracts	Contract may require minor

	signature prevent suppliers from commencing work on time		for signature on the same day to all successful suppliers and ask they are returned countersigned within five working days to ensure an equitable kick-off	extension in the event risk materialises
RISK2	Key staff absences result in delays to technical feasibility study progression	Supplier	Supplier will ensure appropriate resource is built in, with contingency in the event of key staff unavailability	Contract may require extension in the event risk materialises
RISK3	Technical solution proposed that is unfeasible from a UKSA perspective	UKSA	UKSA will require suppliers to provide updates on their feasibility study and proposed solution at each quarterly meeting so UKSA technical experts can provide insight at an early stage on any unfeasible proposals.	Contract may require amendment in the event risk materialises.
RISK4	Supplier unable to bid into subsequent phases owing to resource challenges or unforeseen circumstances	Supplier	Supplier will ensure robust risk management plan is in place and provide regular updates to UKSA	Phase 2 competition may need to be delayed in the event this risk is realised for multiple suppliers.

Evaluation Criteria

The evaluation criteria below are proposed for phase 1. The same four categories and weightings will be used for phase 2 and phase 3, but suppliers should note these may be refined with further questions or sub-categories added.

Question Category	Question	Weighting
Project Plan	Please outline a plan for delivery of the sovereign sensor feasibility study as set out in the statement of work. As a minimum, your response should include: - A clear and achievable project schedule including milestones and a Gantt chart or similar to depict this	30%

	- Pricing against each milestone - A resourcing plan to deliver the contract - A CV for the project lead - A risk register including reference to technical risks and how these will be managed	
Technical Feasibility	Please describe how your proposed feasibility study will address the technical requirements set out in the specification. As a minimum, your response should include: - How you plan to address the list of technical requirements above, including any methodologies you will deploy - How you intend to test assumptions within your feasibility study to validate them - The list of requirements and how you plan to meet these, including details of any systems, software, sensors and/or components you intend to deploy - Any work that has been done to date to develop such a system, or parts of the system, and test its efficacy	30%
Value for Money	Please demonstrate how your proposal will demonstrate value for money for the taxpayer with reference to your sourcing strategy and spend controls. As a minimum, your response should include: - A budget breakdown including detailed costings with day rates for proposed staff, key subcontract costs and costs associated with hardware - Details of your sourcing strategy and supply chain, including any proposed subcontractors and whether you have validated quotations - Details of any spend controls your organisation has in place to provide assurance that costings are competitive and offer value for money - Details of how subcontracts have been/will be placed to provide assurance that conflicts of interest have been managed appropriately	20%

Social Value	Please set out how you will take steps to increase supply chain resilience and capacity by outlining how you will create a diverse supply chain that directly benefits the UK. As a minimum, your response should include: a) Any direct UK involvement in the sensor(s) and associated supply chains b) Any knowledge or skill transfer to the UK, UK-based employment and contract opportunities that will increase the resilience and/or capacity of the supply chain c) New business or academic relationships that will increase resilience and/or capacity within the supply chain	20%