RCloud Tasking Form – Part B: Statement of Requirement (SoR)

Title of Requirement	PhD in scalable electromagnetic solvers on high-performance compute platforms
Requisition No.	Redacted under FOI Exemption
SoR Version	0.1

1.	Statement of Requirements
1.1	Summary and Background Information

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1.2	Requirement

The overall requirement is to deliver computationally efficient Computational Electromagnetics (CEM) software to simulate multi-static radar data for scenes with objects inside buildings. Frequencies of interest are between 100 MHz and 2 GHz, with buildings at least 10x20m and one storey tall, making the scene hundreds of wavelengths across. The building will contain both metallic and dielectric objects of interest, with dimensions down to the order of a tenth of a wavelength, and up to the order of a wavelength.

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applied to these problems, Redacted under FOI Exemption , and verify the methods both for numerical stability and against suitable data.

Redacted under FOI Exemption , carrying out research and development in radar imaging, processing and simulation, as part of the Redacted under FOI Exemption The student will be expected to apply their expertise in mathematics and computational science to research being undertaken on relevant Redacted under FOI Exemption ; these tasks may not contribute to the PhD. This will improve their knowledge of Redacted und research and application areas. They will take direction from the Work Package Leader, Project Technical Authority, Project Manager and/or Team Leader, as appropriate. The PhD student must be a UK national, or (with specific agreement) a dual national with a UK nationality, and undergo a Security Check clearance process.The PhD student will meet the Redacted under FOI Exemption standards to be offered the place, and for progression at each year of the award. They will have at least a 2.1 degree in a related subject, and relevant experience in mathematics, electromagnetics, programming, and/or numerical methods.

Redacted under FOI Exemption is able to integrate this into its own software developments throughout the project. These will be at flexible points during the programme to allow for sufficient progress and flexible development, but will not be more than 6 months apart without agreement.

Quarterly progress update reports will be provided, and the PhD student will remain in regular communications via phone, email or face-to-face to ensure Redacted is aware of the progress and direction of research. This will allow Redacted under FOI Exemption activities during the course of the programme, and vice-versa.

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The student shall:

- Further the implementation of Higher-order basis functions for electromagnetic ██ with Maxwell's equations.
- Investigate strategies for efficiently coupling the ██ and ██ problems, in particular when the ██ representation is low-order and the ██ representation is high-order.
- Implement efficiently-scaling electromagnetic coupled ██ solvers for ██ platforms for both Maxwell's equations and the Helmholtz equation.
- Verify code against suitable data, where this data is either to be agreed by or supplied by ██
- Redacted under FOI Exemption ██

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Additionally, in support of achieving the PhD, we encourage research in the following areas:

- High-frequency fast-multipole representations for ██
- Preconditioning strategies for the Redacted under FOI Exemption as well as for the global coupled problem.
- Model order reduction techniques to reduce solver computational costs.

Pre-processing techniques (perhaps using compressed sensing ideas) to reduce data load and computational cost when using experimental data.

Proposed Payment Plan

Progress payment 1: end of PhD Year 1 – (proposed end September 2023) = ██

Progress payment 2: end of PhD Year 2 - (proposed end September 2024) = ██

Progress Payment 3: end of PhD Year 3 – (proposed end September 2025) = ██

Progress Payment 4: end of PhD Year 4 – (proposed end September 2026) = ██

Student Placement: end of PhD Year 3 – (proposed end March 2025 – date subject to change if required) = ██

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1.3	**Options or follow on work** *(if none, write 'Not applicable')*
	Potential for provision of software support and/or updates
1.4	**Contract Management Activities**
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1.5	**Health & Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement**
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1.6	Deliverables & Intellectual Property Rights (IPR)				
Ref.	Title	Due by	Format	Expected classification (subject to change)	What information is r... deliverab...
D- 1	Start-Up Presentation	T0+2 weeks	*Presentation (.pptx)*	Redacted	Presentation pack to inclu... - Project plan (to include ... schedule - Deliverables list (with ag... and "Forecast Delivery ... - Payment milestones (wi... Date" and "Forecast Del... - Risks and issues - Dependencies and assu... - Redacted under FOI Exemption - Project team Future project meetings
D - 2	Quarterly Progress Presentations	T0+3 months and every 3 months thereafter	Presentation (.pptx)	Redacted	Presentation pack covering ... project progress, to include ... minimum: - Actual progress versus ...

					- Risks and issues - Dependencies - Future project meetings - Record of actions and d Any changes to the followin reported to the Authority's P - Schedule - Deliverables Forecast D - <mark>Redacted under FOI Exempti</mark> Project team
D - 3	Annual Continuation Reports (Interim PhD Thesis) and Presentations	T0+12 months, T0+24 months, T0+36 months	Report (.pdf) and presentation	Redac	Reports and presentation pa technical findings from the p plan for the next year.

D – 4	Final PhD Thesis and Presentation	T0+48 months	Report (.pdf) and presentation (.pptx)	Redacted	Report and presentation pac technical approach, results, recommendation from the w
D - 5	Software Project Management Plan	T0+12 months	Report (.pdf)	Redacted	A document to describe how be developed, maintained a updated as necessary durin project).
D- 6	Redacted under FOI Exemption	T0+18 months and every 6	Source Code	Redacted	Redacted under FOI Exemption

		months thereafter			
D - 7	Redacted under FOI Exemption	T0+18 months and every 6 months thereafter	Report (.pdf) and presentation (.pptx)	Red	Redacted under FOI Exemption
D- 8	Redacted under FOI Exemption	T0+48 months	Redacted under FOI Exemption	Red	Redacted under FOI Exemption

					• Software system lev test data (to enable validate performance • Software system lev providing evidence and Software User Guide errors, warnings and excep the Authority).
D- 9	Final Software Training Session and Materials	T0+48 months	Report (.pdf) and presentation (.pptx)	Test	

1.7	**Deliverable Acceptance Criteria**

- Meeting minutes shall provide a clear and accurate account of the decisions made and actions agreed at the meeting, and be agreed with the Authority prior to formal issue.

- Presentation packs shall include sufficient detail on the slides or in the notes for the content to be understood by someone not attending the meeting.

- All reports included as Deliverables under the contract shall be free from spelling and grammatical errors, and comply with the Redacted under FOI Exemption which defines the requirements for the presentation, format and production of scientific and technical reports prepared for Redacted un.

- Interim/progress reports shall include the results of work done during the period covered, a description of current substantive performance, any problems encountered and any problems that may be encountered, along with proposed corrective action. They shall also include an explanation of any differences between planned progress and actual progress, why the differences have occurred, and if behind planned progress, what corrective steps are planned.

- Final reports shall provide a comprehensive description of the entire work performed under the contract, the results achieved, the conclusions drawn and any recommendations for further work. The technical detail shall be sufficient to permit independent reproduction of any such process or system.

- Should it be agreed with the Authority that background IP will be included in the study, both Full and Limited Rights Versions shall be provided for any DEFCON 705 deliverables.

- For all Deliverables, the release conditions shall be clearly marked on the front page.

- Deliverables shall be delivered by the requested date as FINAL (not DRAFT) versions that have already been reviewed by the Authority. The Authority would strongly recommend periodic informal submission of draft reports to The Authority for its feedback in order to minimise the chances of rejection.

- Failure to comply with the above may result in the Authority rejecting the deliverables and requesting re-work before final acceptance.

- Acceptance of Deliverables will by confirmed by the Authority's Project Manager and Technical Partner within 30 working days of receipt.

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2	Evaluation Criteria
2.1	Method Explanation
	Evaluating this based on technical compliance and affordability.
2.2	Technical Evaluation Criteria
	Confirmation that the proposal fully meets the Authority's Statement of Requirement. Pass/Fail
2.3	Commercial Evaluation Criteria
	Tenderer has submitted a commercially compliant bid Firm priced version submitted within budget of ■■■■■ Pass/Fail Labour rates and price as per single source rates uploaded to R Cloud Pass/Fail Completion of Research Workers Form's Pass/Fail Completion of Statement Relating to Good Standing Pass/Fail Completion of SAQ Pass/Fail Confirm acceptance of R Cloud Version 4 Terms and Conditions Pass/Fail Completion of DEFFORM 711 Pass/Fail