[Redacted] Under FOI Exemption

[Redacted] Under FOI E

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

Title of Requirement	**Mathematical Transforms Study**
Requisition No.	**RQ0000008266**
SoR Version	**0.1**

1.	Statement of Requirements
1.1	**Summary and Background Information**
	This Statement of Requirement is to initiate a focussed study into mathematical transforms for converting signals between the time and frequency domain. MOD and [Redacted] need to be pushing at the forefront of innovation and technology trends; and given the changing nature of wireless digital signal design, need to examine a broader range of mathematical approaches to process and understand signal behaviour. The study will necessitate the evaluation of a broad range of underpinning mathematical transforms against a broad range of different signal types.
1.2	**Requirement**
	Over the past 40 years, wireless technology has transformed the (technology) landscape and the range and breadth of signal types and wireless systems has grown immensely. Whereas once signals where non stationary in time and frequency, consisted of relatively basic modulation types and exhibited large distinct magnitudes; many of the modern day digital signals are the polar opposite – particularly those that are assigned into contested and generally unlicensed bands. The requirement for this work therefore and the long-term vision is to re-examine the fundamental mathematical form of how wireless systems process and understand modern day, complex, non-stationary signals. Mathematically, the FFT is still applicable but initial internal investigations have shown that the FFT yields an often-constrained view of modern complex signal types. The long term goal is to understand what benefits exist from the application of different mathematical transforms which would be formed in comparison to the standard FFT that is commonly known and applied. The following transforms are to be considered but we would welcome engagement with academia to understand potential additions to the following list: FFT (as a baseline from which to compare) Continuous Wavelet Transform (CWT) & wider wavelet approaches Walsh-Hadamard Transform (WHT) Hilbert-Huang Transform (HHT) Wigner-Ville Transform (WVT) Gabor-Wigner Transform (GWT) Radon-Wigner Transform (RWT) Least squares spectral analysis

	Of particular interest in the above transforms is the CWT and broader wavelet approaches. A list of synthetically generated signals will be supplied as part of this work but the study may not be limited to such forms – we would welcome the proposal of wider wireless signal options.
1.3	**Options or follow on work** *(if none, write 'Not applicable')*
	Depending on progress, scope and exploitation potential, follow-on funding could be provided in FY23/24. [Redacted] wishes to include in this RCloud Task the provisions for a Tasking Arrangement whereby, subject to the technical review of the outputs delivered in respect of the "Requirements" detailed in paragraph 1.2 above, additional related Tasks that may arise may be ordered from the Supplier. If [Redacted] Under wishes to raise Tasks under the Tasking Order Arrangement it will do so by issuing a series of additional tasks to the Supplier under this RCloud requirement on a Tasking Order Form (to be agreed prior to award of this RCloud Task) against which the Supplier will be requested by DSTL Commercial Services to provide Firm Prices for consideration prior to amendment of the R Cloud Tasking Order Form. No work is to be undertaken without formal amendment to the Tasking Order Form without which any such work undertaken will be at the Supplier's risk. Firm Prices for any requirements raised under the Tasking Order Arrangement shall be submitted by the Supplier to [Redacted] Under FOI Exemption if/when requested and shall utilise rates within the allowable rates detailed on the RCloud rate card. The Limit of Liability under this Tasking Order arrangement shall be [Redacted] Under FOI Ex Excluding VAT although no guarantee is provided that such a level of funding will be available.
1.4	**Contract Management Activities**
	None Specific
1.5	**Health & Safety, Environmental, Social, Ethical, Regulatory or Legislative aspects of the requirement**
	None Identified

[redacted]

1.6	Deliverables & Intellectual Property Rights (IPR)				
Ref.	**Title**	**Due by**	**Format**	**Expected classification** (subject to change)	**What information is r deliverab**
D - 1	Final Report at the end of the Study	End of FY 22/23	Report	[redacted]	Update on technical progres Technical results Technical designs Application inform

1.7	Deliverable Acceptance Criteria
	Final Summary Report: shall describe the entire work performed under the Contract in sufficient detail to explain comprehensively the work undertaken and results achieved including all relevant technical details of any hardware, software, process or system developed there under. The technical detail shall be sufficient to permit independent replication of the study. The raw data should also be made available to [Redacted] in an appropriate format (e.g. Microsoft Excel). If upon review of the final report, the Authority [Redacted] does not accept the deliverables, the Contractor shall provide acceptable replacements at no additional cost to the Authority.

2	Evaluation Criteria
2.1	Method Explanation

The Supplier's Proposal shall be reviewed for compliance with the Statement of Requirements and may be subject to clarification and re-submission if not found to fully address the requirements.

The response from Suppliers will be evaluated by a Technical Tender Evaluation Panel.

The evaluation shall be conducted under the Most Economically Advantageous Tender (MEAT) principles, with the application of an Absolute Method, defined as the Value for Money (VfM) Index.

This approach sets out to divide the total score of the non-cost (Technical Quality) criteria by the tender cost (£k); the tenders are ranked on the technical quality (represented by the non-cost score) for each £ (or £k) of cost.

Value for Money Index example

Using a VfM ratio (Non-cost score / Price (£NPV)) gives the following results:

Tender	Non-cost score	Cost £K (NPV)	VFM Index	Rank
A	62	20	3.10	3
B	85	24	3.54	1
C	100	29	3.44	2

The highest VFM Index provides more 'quality'/non-cost score per £ and is therefore the winning tender.

2.2	Technical Evaluation Criteria

ID	Technical Evaluation Criteria	Score	Weighting	Maximum Weighted Score
1	Proposal gives confidence that the requirement is understood.	1 - 10	3	30
2	Proposal gives evidence that the bidder and staff working on the project have the required knowledge, experience, expertise and facilities.	1 - 10	2	20
3	Proposal contains a clear project plan which gives confidence work will be done in a timely fashion.	1 - 10	3	30
4	Quality and credibility of the proposed solution.	1 - 10	3	30
5	Clear evidence of previous work in the area of mathematical approaches to signal processing	1 - 10	2	20

Only proposals which pass the commercial evaluation below shall be evaluated by the Technical Evaluation Team against the questions above.

A total technical score will be calculated using a weighted sum of the marks awarded for each of the four serials. Each serial can be scored on a scale of 0-10 prior to the weighting being applied, resulting in a maximum achievable weighted score of 130

Technical scores will be awarded as follows:

Excellent	The response addresses all elements of the Requirement and provides a comprehensive, unambiguous and thorough explanation of how the Requirement will be fulfilled.	10
Good	The response addresses all elements of the Requirement and provides sufficient detail and explanation of how the Requirement will be fulfilled.	7
Adequate	The response addresses the majority of elements of the Requirement but is weak in some areas and does not fully detail or explain how the Requirement will be fulfilled.	3
Inadequate	The response does not address or explain how the Requirement will be fulfilled and fails to demonstrate the ability to meet the Requirement.	0

2.3 Commercial Evaluation Criteria

The commercial evaluation shall assess the proposal on the following questions:

Serial	Question	Marking
1	Has the proposal been submitted against a Firm Price for the Core requirement detailed in Section 1.2.	Pass / Fail
2	Has the bidder provided 1 (One) full technical proposal excluding all price detail	Pass / Fail
3	Has the bidder provided 1 (One) full technical proposal including all price detail	Pass / Fail
4	Has a completed RCloud Part C Task Response Form been submitted	Pass / Fail
5	Has a completed Supplier Assurance Questionnaire form been completed and submitted	Pass/Fail
6	Has a DEFFORM 711 been completed and submitted	Pass/Fail

Noting that only proposals which pass the commercial evaluation (compliant) shall be considered for Technical Evaluation.

Once a preferred bidder has been identified following the evaluation, [Redacted] will request the completed Research Worker Forms (PPRW) to be submitted. No contract will be awarded until the completed Research Workers Forms are submitted and processed.

4.	Government Furnished Assets (GFA)

GFA to be Issued - Yes

GFA No.	Unique Identifier/ Serial No	Description:	Available Date	Issued by	Return Date (T0+)
GFA-1	[Redacted] Synthetic Signals	[Redacted] will supply some synthetic signals which are to be applied as inputs to the transforms	When required	[Redacted] Under FOI [redacted]	Return at end of contract – 30/04/2023