

# Serapis Tasking Form

## Tasking Form Part 1: *(to be completed by the Authority's Project Manager)*

<b>To:</b>	Lot 6 Frazer-Nash Consultancy Ltd	<b>From:</b>	The Authority
Any Task placed as a result of your quotation will be subject to the Terms and Conditions of Framework Agreement Number: LOT 6 DSTL/AGR/SERAPIS/UND/01			
<b>VERSION CONTROL</b>			
Version control please ensure this is kept up to date Version 1.0			
<b>REQUIREMENT</b>			
<b>Proposal Required by:</b>	01/09/2022	<b>Task ID Number:</b>	U111
<b>The Authority Project Manager:</b>	[REDACTED]	<b>The Authority Technical Point of Contact:</b>	[REDACTED]
<b>Task Title:</b>	QEI Pathfinder – Phase 2		
<b>Required Start Date:</b>	22/09/2022	<b>Required End Date:</b>	01/12/22 16/03/2023 (with option)
<b>Requisition No:</b>	RQ0000014886	<b>Budget Range</b>	Core £90K (Inc. Fees) Options £80k (inc. fees)
<b>TASK DESCRIPTION AND SPECIFICATION</b>			
<b>Serapis Framework Lot</b>	<input type="checkbox"/> Lot 1: Collect <input type="checkbox"/> Lot 2: Space systems <input type="checkbox"/> Lot 3: Decide <input type="checkbox"/> Lot 4: Assured information infrastructure <input type="checkbox"/> Lot 5: Synthetic environment and simulation <input checked="" type="checkbox"/> Lot 6: Understand		
<b>Statement of Requirements (SOR)</b>  <b>Task 1</b> will answer the research question 'What impact is the use of Quantum Processing Units likely to have on the speed and scalability of the image classification stage of the image processing cycle?': It will complete the research commenced in Phase 1 (which was delivered by Quantum Chancellor, U27, University of York, U28, and BAE Systems, U29). The task will require integration of front-end image compression <REDACTED> with back-end D-Wave implemented image classification using both Boltzmann Machine and Restricted Boltzmann Machine implementations of neural networks. It will: <ol style="list-style-type: none"> <li>Evaluate the run-time performance (anneal and throughput times) and ease of implementation (the number of qubits needed for processing and other relevant</li> </ol>			

factors) as a function of image size (2x2, 4x4, 8x8, ..., 28x28 pixel images from the MNIST database);

- ii. Run a small technical workshop to present the project approach, gain further inputs, to generate short term and longer term next-steps ideas relating to Task 2. Attendees will be limited to experts in the fields of image processing and quantum computing <REDACTED>
- iii. **Stretch target:** Mirror the larger classification experiments on the Intel Neural Compute Stick 2;

**‘Task 2’ (Option)** will answer the research questions ‘Can Quantum Processing Units be used to execute another stage of the image processing cycle?’ and ‘What impact is the use of Quantum Processing Units likely to have on these other stages of the image processing cycle’: Hybrid algorithms which could provide quantum acceleration of non-image analysis steps in the image processing pipeline will be investigated. <REDACTED>. The task will analyse the complete image processing pipeline, drawing on the results from studies in FY21/22, and identify other opportunities for quantum advantage. A promising candidate step will be chosen (in consultation with Dstl) and a feasibility study and initial benchmarking using D-Wave will be performed for the chosen step.

#### Procurement Strategy

☐ Lot Lead to recommend ☒ Single Source / Direct Award

#### Pricing:

☒ Firm Pricing ☐ Ascertained Costs\* ☐ Other\*

Firm Pricing shall be in accordance with DEFCON 127 and DEFCON 643

Ascertained Costs shall be in accordance with DEFCON 653 or DEFCON 802.

\*only at Authority’s discretion

#### Task IP Conditions

Task IP Conditions (Follow the NIPPY guide to identify your information and IP requirements for each deliverable)	Summary of the Authority’s rights in foreground IP (IP generated by the supplier in performance of the contract)
DEFCON 703 <input type="checkbox"/>	Vests ownership with the Authority
DEFCON 705 Full Rights <input checked="" type="checkbox"/>	Enables MOD to share in confidence as GFI or IRC under certain types of agreements. Can be shared in confidence within UK Government.
OTHER IP DEFCONS: 14* <input type="checkbox"/> , 15* <input type="checkbox"/> , 16* <input type="checkbox"/> , 90* <input type="checkbox"/> , 91* <input type="checkbox"/> , 126* <input type="checkbox"/>	Generally only suitable for deliverables at TRL 6 and above.
BESPOKE IP Clause <input type="checkbox"/> *	Details to be added and agreed by IP Group

\* Do not use without IPG advice and approval

Please state in this text box if MOD or the customer has a requirement a) that one or more Other Government Departments is able to share confidentially with their own suppliers, b) to publish but you do

*not think there is a requirement to own or control the deliverable, or c) to share under a procurement\* Memorandum of Understanding (MOU).*

*If any of these three issues applies, please contact IPG for advice before completing this form. \*Listing research MOUs is not required but can be a helpful courtesy to the supplier.*

## DELIVERABLES

<u>Ref</u>	<u>Title</u>	<u>Due by</u>	<u>Format</u>	<u>TRL</u>	<u>Expected classification (subject to change)</u>	<u>Information required in deliverable</u>	<u>IPR DEFCON</u>
D-1	Task 1: Kick off meeting	22/09/2022	PowerPoint or PDF		[REDACTED]	Outline plan of work and assignment of staff  Risk register  Commercial aspects	<u>705</u>
D-2	Task 1: Fortnightly progress meetings over Teams	Fortnightly throughout project	PowerPoint or PDF		[REDACTED]	Deviation from plan  Technical achievements  Review of deliverables  Updated risk register  Known risks or opportunities  Plan for next fortnight	<u>705</u>
D-3	Task 1: 'Image processing chain: opportunities for quantum benefit using D-Wave' workshop report	28/10/2022	Word/ PowerPoint or PDF		[REDACTED]	Workshop attendees  Presentation material used  Narrative description of meeting  Recommendations for next steps	<u>705</u>
<u>D-5</u>	Task 1: Final Report	01/12/2022	Word or PDF		[REDACTED]	Narrative description of Task 1  Quantitative comparison of MNIST image classification using Boltzmann Machines and	<u>705</u>

						Restricted Boltzmann Machines implemented on D-Wave, INCS2 and CPU. Scaling behaviour of performance broken down by image size, resource requirements Recommendations	
D-6	Option 1: 'Task 2' Final report	NLT 16/03/2023	Word or PDF		[REDACTED]	Quantitative results and analysis for chosen non-image processing task Recommendations	<u>705</u>

#### DELIVERABLE: ACCEPTANCE / REJECTION CRITERIA

Unless otherwise stated below, Standard Deliverable Acceptance / Rejection applies. This is 30 business days, in accordance with DEFCON 524 Rejection, and DEFCON 525 Acceptance.

#### Standard Deliverable Acceptance / Rejection:-

Yes ☒ (DEFCON 524 Rejection, and DEFCON 525 Acceptance)

No ☐ (if no, please state details of applicable criteria below)

#### Deliverable Acceptance / Rejection Criteria:-

*If there are any other specific acceptance/rejection criteria you would like to apply to any of the deliverables, please state them here.*

#### Government Furnished Assets (GFA)

**ISSUE OF EQUIPMENT/RESOURCES/INFORMATION/FACILITIES** (if not applicable, delete table and insert "None" in this text box)

<u>Unique Identifier/ Serial No</u>	<u>Description</u>	<u>Classification</u>	<u>Type</u>	<u>Available Date</u>	<u>Issued by</u>	<u>Return or Disposal Date</u>	<u>Any restrictions?</u>
<i>Serial no</i>	<i>Description</i>	<i>Official-Sensitive</i>	<i>Equipment</i>	<i>00/00/0000</i>	<i>Issuer</i>	<i>00/00/0000</i>	<i>Include details here</i>
	BAE Systems final report: QEI Pathfinder U28, U29 Serapis Lot 6	[REDACTED]	Report	28/02/2022	Dstl	End of contract	For use only by named individuals agreed with Dstl
	QEI Pathfinder : Serapis U28 final technical report	[REDACTED]	Report	17/03/2022	University of York		
N/A	Access to D-Wave processing time (being procured separately by Dstl)	[REDACTED]	Equipment	Oct 2022	D-Wave via Dstl	End of contract	For use only by named individuals agreed with Dstl

	5 x Neural compute sticks	[REDACTED]	Equipment	March 2022	Not known	End of contract	
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**QUALITY STANDARDS**

☐ **ISO9001** (Quality Management Systems)

☐ **ISO14001** (Environment Management Systems)

☐ **ISO12207** (Systems and software engineering — software life cycle)

☐ **TickITplus** (Integrated approach to software and IT development)

☐ **Other:** (Please specify in free text below)

**SECURITY CLASSIFICATION OF THE WORK**

**The highest classification of this SOR**  
OFFICIAL ☐ OFFICIAL-SENSITIVE ☐ SECRET ☐ TOP SECRET ☐ STRAP ☐ SAP ☐

**The highest expected classification of the work carried out by the contractor**  
OFFICIAL ☐ OFFICIAL-SENSITIVE ☐ SECRET ☐ TOP SECRET ☐ STRAP ☐ SAP ☐

**The highest expected classification of Deliverables/Output**  
OFFICIAL ☐ OFFICIAL-SENSITIVE ☐ SECRET ☐ TOP SECRET ☐ STRAP ☐ SAP ☐

**Is a Security Aspects Letter (SAL) required?** *(A Security Aspects Letter (SAL) will be required for each Task above Official-Sensitive and above)*  
Yes ☐ No ☐

**TASK CYBER RISK ASSESSMENT.** *(In accordance with DEF STAN 05-138 and the Risk Assessment Workflow)*

Cyber Risk Level	[REDACTED]
Risk Assessment Reference	[REDACTED]

**ADDITIONAL TERMS AND CONDITIONS APPLICABLE TO THIS CONTRACT**

N/A

Please ensure all completed forms are copied to DSTLSERAPIS@dstl.gov.uk when sending to the Lot Lead.

## Tasking Form Part 2: *(To be completed by the Lot Lead)*

To: The Authority		From: The Lot Lead	
Proposal Reference	017933-97955L U111 QEI Pathfinder – Phase 2 - Frazer-Nash Proposal (attached)		
<b>Delivery of the requirement:</b> <b>The proposal <u>shall</u> include, but not be limited to:</b> <ul style="list-style-type: none"> <li>• A full technical proposal that meets the individual activities that are detailed in Statement of Requirements (Part 1 to Tasking Form).</li> <li>• Breakdown of individual Deliverables, with corresponding Intellectual Property rights applied.</li> <li>• Breakdown of Interim Milestone Payments, with corresponding due dates.</li> <li>• A work breakdown structure/project plan with key dates and deliverables identified.</li> <li>• A list of required Government Furnished Assets from the Authority, including required delivery dates.</li> <li>• A clear identification of Dependencies, Assumptions, Risks and Exclusions which underpin your Technical Proposal.</li> <li>• Sub-Contractors Personnel Particulars Research Worker Form and security clearances (if applicable)</li> </ul>			
<b>PRICE BREAKDOWN</b> <i>You are to use the costs detailed in Item 2 Table 1 in the Schedule of Requirement and at Annex E Table 2 of the Serapis Framework Agreement. Please also provide a price breakdown which should include, but is not limited to: Lot Lead Rates, Sub-contractors' costs and rates, travel and subsistence. In support of your Proposal you are requested to provide clear details of all Dependencies, Assumptions, Risks and Exclusions that underpin your price.</i>			
<b>Offer of Contract:</b> <i>(to be completed and signed by the Contractor's Commercial or Contract Manager)</i>			
Total Proposal Price in £	£78,655.90		(ex VAT)
Start Date:	01/12/2022	End Date:	28/02/2023 (possible extended to 31/032023)
Lot Leads Representative	Name	[REDACTED]	
	Tel	[REDACTED]	
	Email	[REDACTED]	
	Date	07 October 2022	
Position in Company	Serapis Project Manager		
Signature	[REDACTED]		

## Core Work – Breakdown

[REDACTED]  
[REDACTED]  
[REDACTED]

## Core Work – Milestone breakdown costs

### Proposed Milestones Payments

*Your TMS bid costs shall be included in milestone 1.*

*The final Milestone must reflect the actual cost of the deliverable, and be greater than 20% of the Task value, unless otherwise agreed with your Commercial POC*

*Please duplicate the template per milestone table format below as necessary and rename milestone number accordingly.*

[REDACTED]

## Tasking Form Part 3:

*To be completed by the Authority's Commercial Officer and copied to the Authority's Project Manager.*

1. Acceptance of Contract:		
Authority's Commercial Officer	Name	[REDACTED]
	Tel	[REDACTED]
	Email	[REDACTED]
	Date	10/11/2022
Requisition Number		RQ0000014886
Contractor's Proposal Number		017933-97955L
Purchase Order Number		DSTL0000009853
Signature		[REDACTED]
<i>Please Note: Task authorisation to be issued by the Authority's Commercial Officer or Contract Manager. Any work carried out prior to authorisation is at the Contractor's own risk.</i>		