

Serapis Tasking Form

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

To:	Lot 6 Frazer-Nash Consultancy Ltd	From:	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			
VERSION CONTROL			
Version 0.4			
REQUIREMENT			
Proposal Required by:	21/01/2022	Task ID Number:	U79
The Authority Project Manager:	[REDACTED]	The Authority Technical Point of Contact:	[REDACTED]
Task Title:	AI Toolbox Enablers Development		
Required Start Date:	31/01/2022	Required End Date:	31/03/2022
Requisition No:	[1000170930]	Budget Range	~£100k
TASK DESCRIPTION AND SPECIFICATION			
Serapis Framework Lot	<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		
Statement of Requirements (SOR)			
Background <p>The Future of AI for Defence (FAID) project is working in collaboration with the [REDACTED] to develop a pipeline for the development, training and deployment of AI models in an operational environment. This pipeline will be used to create an AI 'Toolbox' of models for testing and deployment in an operational environment through a series of [REDACTED]. The ambition is to adapt this pipeline in future years to drive novel AI approaches, such as data efficient and interactive learning, into the operational environment through experimental deployment in trials. These approaches can be rapidly re-trained during a mission ensuring incorporation of new and more relevant data.</p> <p>The collaboration is centred around a [REDACTED]'. The AI development is working on a vignette of [REDACTED]'. As part of the [REDACTED]'. The AI Toolbox is expected to demonstrate progress in these annual trials by deploying AI models onto [REDACTED]', with the demonstrations being progressively more ambitious over the years. This year we demonstrated (in a virtual setting, https://www.gov.uk/government/news/us-and-uk-research-labs-collaborate-on-autonomy-and-ai) the feasibility of a non-expert user selecting and deploying the most suitable algorithm 'in-mission' against a data stream; and the transfer learning of a model to meet changing mission requirements. In 2022 we are expected to deploy</p>			

Machine Learning (ML) models onto the [REDACTED] and deploy the pipeline for retraining so ML models can be adapted to meet changing mission requirements overnight. As the collaboration progresses this may expand to vignettes within the [REDACTED].

This requirement is for an Agile development team to support the development of the ML Pipeline for the development, training and deployment of AI models ready for a trial later in 2022. This team will work alongside Dstl team members and focus on an overarching backlog of activity, which will be regularly prioritised (must, should, could, won't) and revised by the integrated team. The aim is to achieve a minimum viable product (MVP) through completing the main high priority tasks. Any tasks not finished by the end of the contract will remain on the backlog for the potential phase 2 and future sprints.

Approach

As this is low TRL research work in a novel area we require an iterative approach to the work, with appropriate review and replanning with the Dstl TP, which places an emphasis on small releases of working software on a regular basis measured in weeks. We suggest this task adopts an Agile approach covering the main requirements listed above.

In line with an Agile approach, we expect the work to be undertaken as coordinated, development sprints. It is assumed there will be 4 sprints in the two months of the contract (including the first sprint, which will provide a pipe cleaning function and be required to start within 1 week of contract start). The size and content of sprints will be selected in collaboration between the supplier's team and Dstl staff.

Dstl has provided an initial product backlog below figure 1. The backlog contains a set of user stories that describe the functionality for two of the services for the pipeline. We will evaluate the bidder's proposed development team and skillsets to make a determination as to whether we judge it likely that good progress can be made towards a minimum viable product (MVP) for these user stories. The product backlog may be updated for future increments by the Dstl product owner. It is expected a more detailed product backlog will be developed for each sprint, in partnership with the Dstl team. An MVP shall be offered as part of the proposal in the Tasking Form response.

Dstl will fulfil the role of product owner – responsible for defining and elaborating user stories, prioritizing the product backlog and establishing acceptance criteria. The product owner will also be the de-facto technical partner to this SERAPIS Lot 6 task.

We request the supplier supports the development approach with a part time (precise hours to be proposed) scrum master/Agile coach – focused on ensuring the team (supplier and Dstl) works effectively and positively towards the state goals.

Using this Agile approach, technical freedom is retained to adjust direction every iteration and increment based on development team recommendations and feedback provided by the Dstl Technical Partner (TP) in a dynamic exchange.

We anticipate that the bulk of the development work will be completed remotely by the suppliers. We anticipate collaborative development activity will take place on a MOD Cloud development environment (which is based on AWS) at up to [REDACTED]. The backlog will be hosted on a private GitHub repository using the GitHub project tracker.

Tasks

The sprints will work towards developing some of the services required for our AI pipeline. The draft outline of the pipeline architecture is shown in **Error! Reference source not found.** The UK and [REDACTED] will be developing this pipeline collaboratively. The services will together form a service oriented architecture with integration via APIs, the exact architecture is to be determined in discussion with [REDACTED]. As part of the UK contribution two of these services have been selected for this task (TEV&V and Miniaturisation) and the corresponding user stories will form the backlog for the sprints. These services will not be developed to production-quality code, but are expected to be sufficient to prove the concept of the pipeline and retraining models in mission by a military non-expert user and for use in a series of experimental trials. The current elements of the pipeline are deployed in Kubernetes so we expect the services will be dockerised and code provided to deploy in Kubernetes.

[PARAGRAPH REDACTED IN ENTIRITY]

Backlog: The initial backlog breaks down into two epics:

1. TEV&V: Developing a set of services that will conduct Testing, Evaluation, Verification and Validation (TEV&V) of the ML models trained by the toolbox. The set of tests to be conducted will include evaluation on a range of datasets and formal validation (e.g. <https://github.com/TrustAI/DeepConcolic>) to understand limitations of models.
 - a. As an AI Officer I can evaluate my ML model (implemented in MISTK) on a range of datasets (including out of domain)
 - b. As an AI Officer I can understand the data requirements to perform TEV&V on models suitable to my deployment environment
 - c. As an AI Officer I can perform formal validation methods on my models (implemented in MISTK)
 - d. As a developer I have a standard framework to define further TEV&V approaches for my model (implemented in MISTK) which captures the information about the testing performed and results in a suitable ontology.
2. Miniaturisation: In the 2022 demo, we will need to deploy these models onto UAVs with Jetson TX2s for edge processing. Therefore miniaturisation (or optimisation) of the models will be required to reduce the processing power and memory requirements of these models. This miniaturisation service should take models from the toolbox and create miniaturised versions for deployment. This should use existing libraries for model miniaturisation (e.g. TensorRT).
 - a. As an AI Officer I can create a miniaturised model (in MISTK) which is suitable to be deployed onto specified hardware.
 - b. As a developer I can understand the miniaturisation performed and capture process and parameters in a suitable ontology.

It is expected that there may be tasks remaining on the backlog once all sprints are completed.

Development Team Members

In their proposal the supplier should propose, based on the initial backlog provided above, a development team with a suitable skill set. The team proposed shall be enduring. It is preferred that named individuals from vendors are evaluated and approved by the Dstl technical lead and FNC to join the AI Toolbox development team. This approach designs in quality from the start and reduces risk.

Dstl will also provide internal staff to support sprint activity and any required preparation and follow-up. This will include staff with understanding of the collaboration and current software that makes up the pipeline. This will be a joint effort with the internal team and may include collaboration with [REDACTED].

Foreign nationals will be considered for positions.

The supplier is requested to provide evidence that their proposed candidates have at a minimum:

- BPSS clearance is needed for using MODCloud
- Expertise in Python development and the definition of APIs
- Experience in development and training of ML models (pytorch, tensorflow)
- Experience with Docker and Kubernetes
- Expertise in service based architectures and the orchestration of APIs/and micro services using technologies such as nodeRed, NiFi

Optional Phase 2

Optional Phase 2 – A flexible contract extension for the same team to continue for a further 6 months should be included in the bid. A go/no go decision point will be taken by 31st March 2022. If taken forward phase 2 will be managed by another project as the FAID project is finishing in March 2022. This would continue the work on an expanded backlog of tasks, alongside the Dstl team.

It is envisaged that there will be a 2-4 week delay between the first and second phases.

Future Backlog: The future backlog may also include the following epics, to be determine through collaborative planning with [REDACTED]:

3. Synthetic data generation: The creation of a tunable synthetic data generation service for automated target recognition, allowing the generation of images and labels based on a simple user input (e.g. location, object class, number of images, environmental variables). This should use a suitable simulation environment (e.g. VBS3) and existing code is available to be built on for simple synthetic data generation in VBS3.
4. Real data curation: The creation of a service which enables the curation and labelling of real data captured in an operation (from drone sensor or handheld camera) so this data can be used in the training of future models. The amount of manual labelling is expected to be minimal so this can be can conducted in a field HQ.
5. Analytics: Each element of the pipeline will be creating metadata and this can be combined to capture the provenance of models and the data used to train them. Existing services in the pipeline [REDACTED]' already use ontologies to store metadata. This would create a knowledge graph to capture all the metadata about models generated by the pipeline and use analytics to support the user (e.g. recommendations).

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 checked="" type="checkbox"/>	Vests ownership with the Authority
DEFCON 705 Full Rights <input 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	
The outputs will be shared with the [REDACTED]. For ease of sharing we would prefer no background IP from the supplier is provided. Open source software should only be used where licensing allows.	

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	All Software developed	31/03/2022	Software	3	[REDACTED]	Source code, Dockerised containers and deployment scripts for delivered services, to be agreed with the Dstl TP using an agile backlog. The software should only use open source software where licensing allows.	703
D-2	Software Documentation	31/03/2022	PDF/Word	3	[REDACTED]	Documentation for all software delivered including information on installation, usage, testing conducted and the implementation so these can be further developed	703
D-3	Project kickoff meeting	31/01/2022	Meeting attendance and minutes		[REDACTED]	Attendance at a kick off meeting. Minutes for the meeting including a short overview plan for each team member regarding what they will focus on for sprint 1. To be delivered two days after the meeting.	703
D-4	Sprint review meetings	Every two weeks	Meeting attendance and minutes		[REDACTED]	Attendance at a sprint review meeting. Minutes for the meeting including a short overview plan for each team member regarding what they will focus on for that sprint. To be delivered two days after the meeting.	703
D-5	Phase 2 updated proposal	31/03/2022	Phase 2 proposal		[REDACTED]	Costed proposal	703

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>
G-1	Access to MODCloud development environment	[REDACTED]	Information	T0	Dstl	Contract End	Users must abide by SyOps.
G-2	Code for existing services in the pipeline	[REDACTED]	Information	T0	Dstl	Contract End	Delete at end of contract.
G-3	Access to Dstl GitHub Repo for task tracking	[REDACTED]	Information	T0	Dstl	Contract End	Access will be removed at contract end.

The Authority (Dstl) does not give any warranty or undertaking as to the completeness, accuracy, or fitness for any purpose of any of the Authority provided information. Neither the Authority (Dstl) nor its agents or employees shall be liable to the Contractor in contract, (save as expressly provided elsewhere in the contract), tort and statute nor otherwise, as a result of any inaccuracy, omission, unfitness for purpose or inadequacy of any kind, in the Authority provided information

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****[REDACTED]****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

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

To:	The Authority	From:	The Lot Lead
Proposal Reference	015138-96748L U79 AI Toolbox Enablers Development Support - Frazer-Nash Proposal (attached)		
Delivery of the requirement:			
The proposal <u>shall</u> include, but not be limited to:			
<ul style="list-style-type: none"> • A full technical proposal that meets the individual activities that are detailed in Statement of Requirements (Part 1 to Tasking Form). • Breakdown of individual Deliverables, with corresponding Intellectual Property rights applied. • Breakdown of Interim Milestone Payments, with corresponding due dates. • A work breakdown structure/project plan with key dates and deliverables identified. • A list of required Government Furnished Assets from the Authority, including required delivery dates. • A clear identification of Dependencies, Assumptions, Risks and Exclusions which underpin your Technical Proposal. • Sub-Contractors Personnel Particulars Research Worker Form and security clearances (if applicable) 			
PRICE BREAKDOWN			
<p><i>You are to use the costs detailed in Item 2 Table I 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></p>			
Offer of Contract: <i>(to be completed and signed by the Contractor's Commercial or Contract Manager)</i>			
Total Proposal Price in £	£94,392.61		(ex VAT)
Start Date:	ASAP	End Date:	31/03/2022
Lot Leads Representative	Name	[REDACTED]	
	Tel	[REDACTED]	
	Email	[REDACTED]	
	Date	20/01/2022	
Position in Company	Project Manager – Serapis		
Signature	[REDACTED]		

Core Work – Breakdown

[TABLE REDACTED IN ITS ENTIRETY]

Core Work – Milestone breakdown costs

[TABLE REDACTED IN ITS ENTIRETY]

Options – Summary

[TABLE REDACTED IN ITS ENTIRETY]

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	[REDACTED]
Requisition Number		1000170930
Contractor's Proposal Number		015138-121828V
Purchase Order Number		TBC
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>		